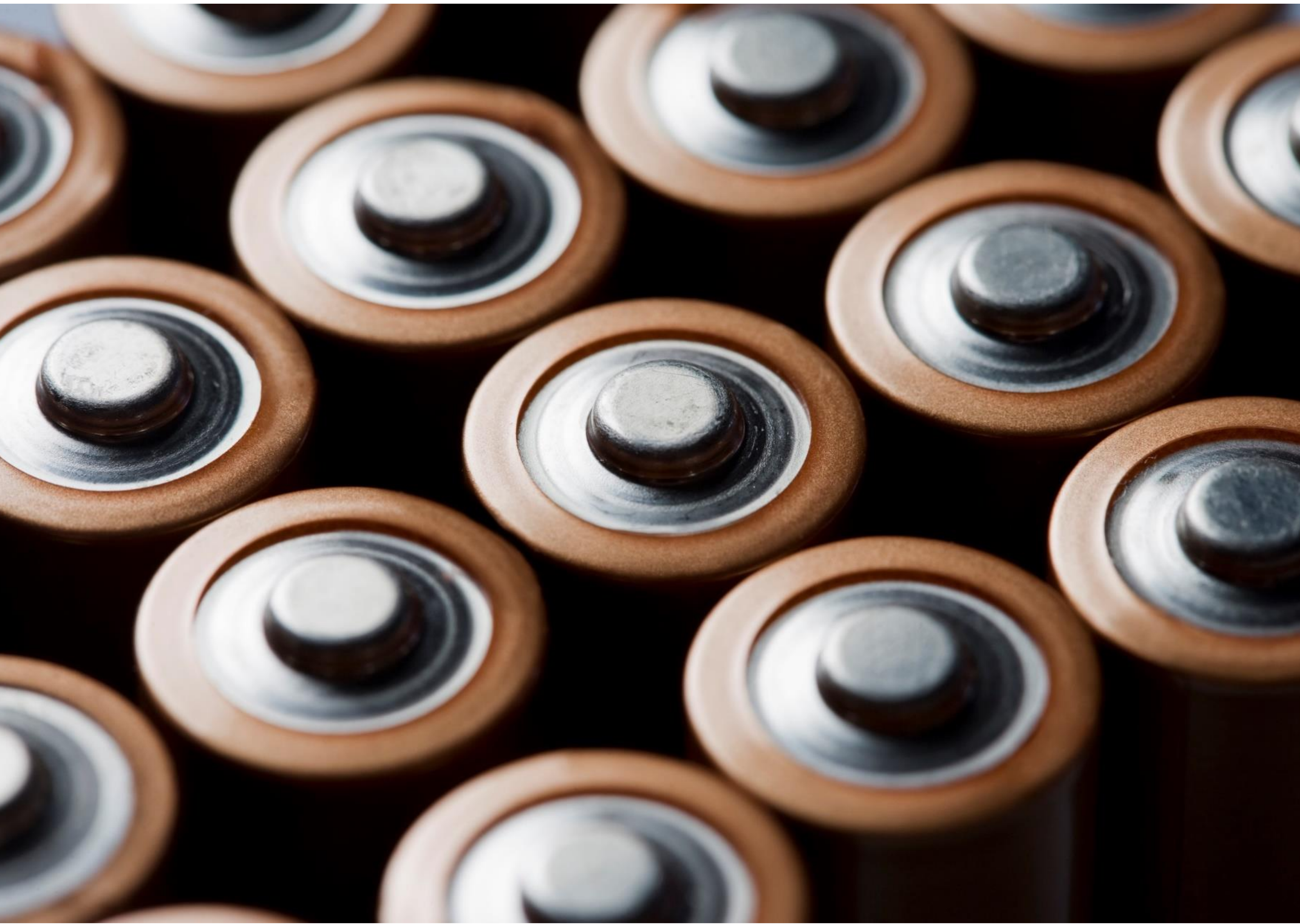
Preliminary Hazard Analysis

Battery import project

Port of Newcastle Operations Pty Ltd

02 May 2025

→ **The Power of Commitment**



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1. Introduction

1.1 Background

Port of Newcastle (PON) are proposing to modify its Development Application (DA) (DA 8137) to allow storage of imported lithium-ion battery (LiB) containers prior to being transported to various locations for installation into battery energy storage systems (BESS). As part of the DA modification application, a preliminary risk screening, as dictated by the *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP (Resilience and Hazards)) and a modification report is required.

1.2 Purpose of this report

PON have engaged GHD Pty Ltd (GHD) to undertake a preliminary risk screening and, if required, the corresponding Preliminary Hazard Analysis (PHA) as per SEPP (Resilience and Hazards), to determine if the proposed storage of LiB containers at the Mayfield Cargo Storage Facility is 'potentially hazardous of offensive'.

This report is to provide sufficient information and assessment of risks to show that the modification satisfies the risk management requirements of the Council and the NSW Department of Planning, Housing and Infrastructure (DPHI) to prevent or mitigate any identified impacts, including human health, the environment and property. By demonstrating that the residual risk levels are acceptable in relation to the surrounding land use, and that risk will be appropriately managed, the requirements under the SEPP (Resilience and Hazards) and the planning development will be met.

1.3 Scope and limitations

SEPP (Resilience and Hazards) presents a systematic approach to planning and assessing proposals for potentially hazardous or offensive development for the purpose of industry or storage.

For development proposals classified as a 'potentially hazardous or offensive industry' the policy establishes a comprehensive test by way of a PHA to determine the risk to people, property and the environment at the proposed location and in the presence of controls.

The scope of this report includes the interactions between the introduction of the storage of LiB containers within the Mayfield Cargo Storage Facility. Excluded is any identification or assessment of hazards and risks associated with current operational activities at Mayfield Berth 4 beyond the LiB container storage and associated interactions. Whilst Mayfield Berth 4 also handles combustible liquids and two types of dangerous goods (ammonium nitrate and explosives) only one ship at a time berths at Mayfield Berth 4 meaning there would be no berth side interaction of LiB with other dangerous good at Mayfield Berth 4.

Additionally, this report: has been prepared by GHD for Port of Newcastle Operations Pty Ltd and may only be used and relied on by Port of Newcastle Operations Pty Ltd for the purpose agreed between GHD and Port of Newcastle Operations Pty Ltd as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Port of Newcastle Operations Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1.2 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Port of Newcastle Operations Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.4 Assumptions

The following assumptions have been made in the preparation of this report:

- Dangerous good quantities provided are true and correct at the time of the screening.
- The chemical data (UN number, dangerous goods classification) was based on available Safety Data Sheets (SDS) and are referenced in Section 6.1.
- All plant and equipment items are installed and operated in accordance with appropriate Australian Standards, codes, and guidelines.
- Dangerous goods are stored in accordance with the Australian Dangerous Goods Code (ADG Code), relevant standards and guidelines, even if not a licensable quantity.
- All equipment and systems are designed to be inherently safe.
- All equipment is maintained and operated as designed.

Any changes to the assumptions used in this report should result in a review of the screening process and update as required.

2. Legislation and policy context

2.1 State Environmental Planning Policy (Resilience and Hazards)

The NSW Department of Planning and Environment consolidated the state environmental planning policies (SEPPs) in December 2021, for introduction in March 2022. As a result, the previously named *SEPP 33 – hazardous and offensive development provisions* have been transferred to SEPP (Resilience and Hazards). No policy changes have been made. The SEPP consolidation does not change the legal effect of the SEPPs being repealed and section 30A of the *Interpretation Act 1987* applies to the transferred provisions, meaning the transfer does not affect the operation or meaning of the SEPP provisions.

The NSW Department of Planning and Environment, *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines,2011* (Applying SEPP33), continues to provide the process for assessing if developments are potentially hazardous or offensive, including threshold levels that trigger the potentially hazardous or offensive status. Applying SEPP 33 is the main guidance document that has been followed for this report.

2.2 Hazardous Industry Planning Advisory Paper No 4

The Department of Planning and Environment, NSW, 2011, *Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning* (HIPAP No 4) sets out risk criteria for industries that are considered hazardous to comply to. This document is used when Applying SEPP 33 indicates a development is potentially hazardous.

2.3 Hazardous Industry Planning Advisory Paper No 6

The Department of Planning and Environment, NSW, 2011, *Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis* (HIPAP No 6) lists the process required for undertaking a PHA. This document is used when Applying SEPP 33 indicates a development is potentially hazardous.

3. Methodology

The method to determine whether a project is deemed potentially hazardous or potentially offensive and the required follow up assessments is provided in Table 3.1.

Table 3.1 SEPP (Resilience and Hazards) method for potentially hazardous or offensive industries

Issue	Methodology to determine if potentially hazardous/ offensive	Follow up assessment if confirmed as potentially hazardous/ offensive industry
Potentially hazardous industry	Applying SEPP 33 risk screening process	PHA is required
Potentially offensive industry	Review of potential impacts to the amenity of the site or discharges, such as emissions (e.g. noise, air)	Meeting any licencing requirements issued by relevant authorities e.g. NSW Environmental Protection Agency (EPA) is required

The Applying SEPP 33 process is discussed in Sections 3.1 to 3.3.

3.1 Risk screening

Applying SEPP 33 relates to any project which falls under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'.

A 'hazardous industry' is one in which when all locational, technical, operational, and organisational safeguards are employed, continues to pose a significant risk, as per the requirements of SEPP (Resilience and Hazards). A 'potentially offensive industry' is one which would, in the absence of safeguards, emit a polluting discharge which would cause a significant level of offence.

SEPP (Resilience and Hazards) requires a screening process be undertaken. The overall risk screening process, as outlined in Applying SEPP 33 is summarised in Figure 3.1.

The risk screening process concentrates on the storage of specific dangerous good classes that have the potential for significant off-site effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored, or produced on site with an indication of storage locations. The quantities of dangerous goods are then assessed against the Applying SEPP 33 threshold quantities. If any of the Applying SEPP 33 threshold quantities are exceeded, then that the project is potentially hazardous, then a PHA is required.

If the project is potentially offensive, after considering the quantity and nature of any discharges and the significance of the offence likely to be caused, having regard to surrounding land use and the proposed controls, then additional controls are required.

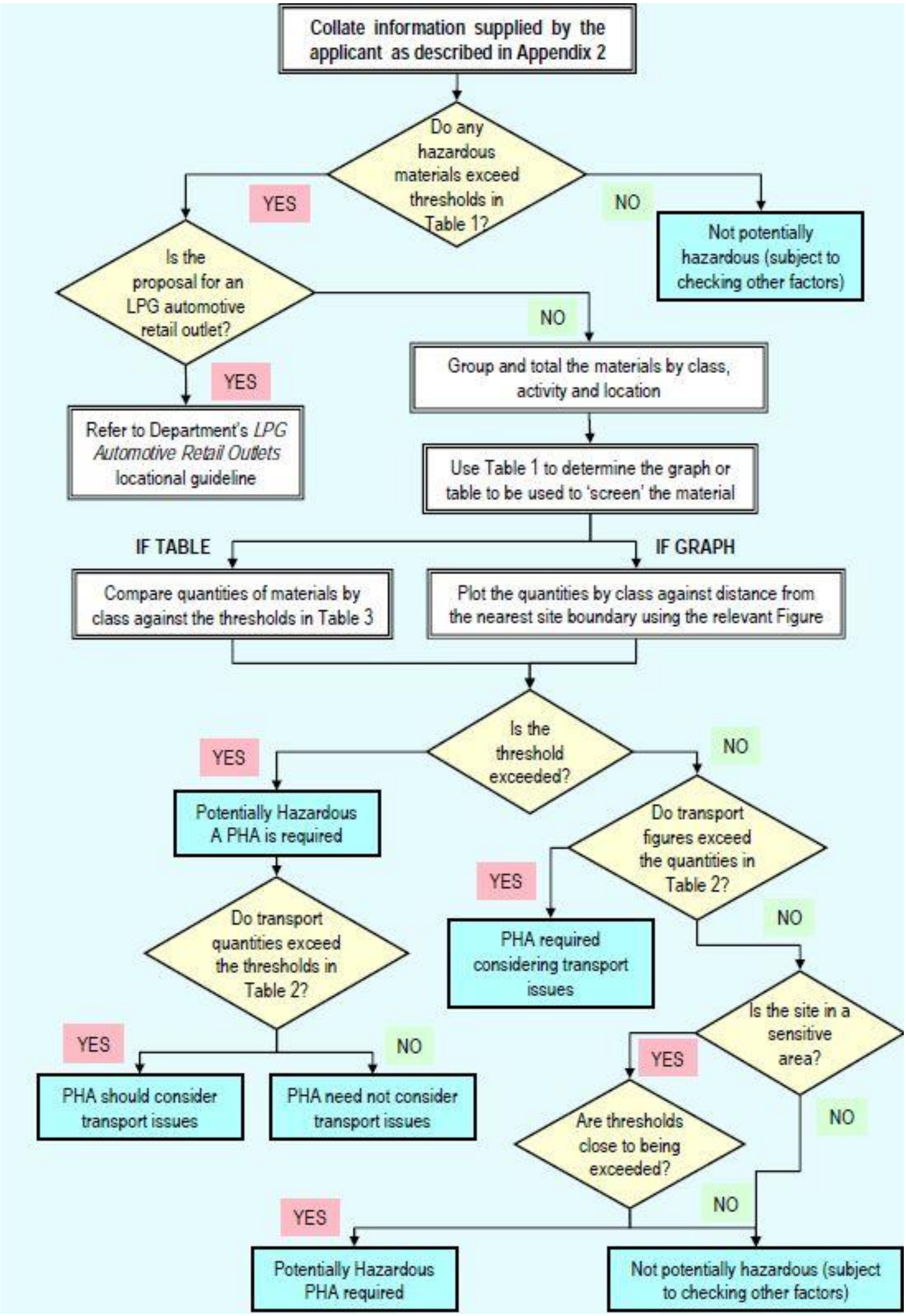

Figure 3.1 SEPP (Resilience and Hazards) risk screening process

3.2 Hazard identification

Following screening, Applying SEPP 33 requires a determination of whether the proposal poses significant risk or offence. This requires identification of potential hazards to highlight any risks associated with the interaction of the proposal (as a whole) with the surrounding environment (i.e. a systematic process to identify any potential off-site impacts).

The hazard identification (HAZID) process is a desktop assessment and involves documenting possible events that could lead to a possible off-site incident. The assessment then lists the potential causes of the incident, as well as identification of operational and organisational safeguards to prevent the incidents from occurring or mitigate their impact. The HAZID process identifies the scenarios relevant to the PHA, should it be required.

3.3 Preliminary hazard analysis

For a development proposal classified as ‘potentially hazardous’, a PHA is required to determine the risk to people, property, and the environment at the proposed location and in the presence of controls. Criteria of acceptability are used to determine if the development proposal is classified as a ‘hazardous industry’. If this is the case, the development proposal may not be permissible within most industrial zonings in NSW.

The PHA identifies the potential hazards, analyses these hazards in terms of their impact to people and the environment and their likelihood of occurrence, quantifies the resulting risk to surrounding land uses and assess the risk to demonstrate that the proposal will not impose an unacceptable level of risk.

Applying SEPP 33 identifies three levels of PHA. If a PHA is required, a judgement of the level of risk associated with the proposal is determined using the results of the screening and HAZID stages.

The three levels of PHA are:

– Level 1 – if low potential for harm is identified, a qualitative PHA is completed.
– Level 2 – if medium potential for harm is identified, a semi-quantitative PHA is completed.
– Level 3 – if high potential for harm is identified, a quantitative PHA is completed.

3.4 DPHI consultation

During the early phases of the project a draft report was provided to DPHI for review. A response was received from DPHI which is attached at Appendix D. Details of how DPHI comments have been addressed are provided in Table 3.2.

Table 3.2 DPHI consultation comments

DPHI comment	Response
The report refers to Mayfield Berth 4 as the location for the storage of lithium-ion batteries. This is incorrect and the report should be amended to refer to the Mayfield Cargo Storage Facility for the temporary storage of the batteries.	Report has been updated throughout to clarify reference to Mayfield Berth 4 versus the Mayfield Cargo Storage Facility.
Section 1.3 of the report refers to scope and limitations of the hazard assessment. The department is unclear about scope exclusion as it is stated “The scope of this report includes the interactions between the introduction of the storage of LiB containers within Mayfield Berth 4. Excluded is any identification or assessment of hazards and risks associated with current operational activities at Mayfield Berth 4 beyond the LiB container storage”. This appears to exclude an assessment of the potential conflict of loading and unloading at Mayfield Berth 4 with the proposed storage at the Mayfield Cargo Storage Facility. The department requires the hazard assessment to assess the risk of potential incidents at Mayfield Berth 4 (which currently handles combustible liquids and 2 types of Dangerous Goods (ammonium nitrate and explosives) impacting the proposal site or an incident occurring at the proposal location affecting combustible liquids and dangerous goods at Mayfield Berth 4.	Potential interaction with other cargos on Mayfield Berth 4 is addressed in Section 4.0.

DPHI comment	Response
Table 5 of the report presents the results of the hazard identification and proposed safeguards. Row three of the Table identifies mechanical damage of lithium-ion batteries as a potential hazard. The department considers that the loading and unloading of project cargo in the Mayfield Cargo Storage Facility may result in impact collision with stored batteries. These operations should be identified as a potential hazard battery storage.	Table 5 has been updated and this confirmed that the potential hazards associated with loading and unloading have been addressed in this report.

4. Existing environment

The Mayfield Cargo Storage Facility is in the Port of Newcastle (refer Figure 4.1). The site provides for the storage of a range of freight and cargo including, but not limited to; wind turbine components, large industrial and mining components, luxury boats, electrical transformers and related machinery, general cargo such as farm machinery, excavators and construction machinery, breakbulk (e.g. steel or timber products) and containerised cargo.

The original development consent (DA 8137) approved the use of the existing hardstand area for port-facilities for the unloading, storage and transportation of freight on the site. The Mayfield Cargo Storage Facility forms part of the Mayfield Concept Plan Area. Subsequent modifications were undertaken due to growth in the capacity requirements for the PON's freight storage needs. The modification expanded the area approved for the storage and handling of cargos.

Neither the original development proposal or subsequent modifications sought approval for the import, storage on-site or export of any cargos classified as dangerous or hazardous under the Australian Dangerous Goods Code. As a result, no dangerous goods are currently moved through the area of concern. Whilst Mayfield Berth 4 handles combustible liquids and two types of dangerous goods (ammonium nitrate and explosives) only one ship at a time berths at Mayfield Berth 4 meaning there would be no berth side interaction of any dangerous good at Mayfield Berth 4. No storage of combustible liquids or dangerous goods occur at the Mayfield Cargo Storage Facility. Transportation routes of combustible liquids or dangerous goods from Berth 4 off site do not intersect the Mayfield Cargo Storage Facility.

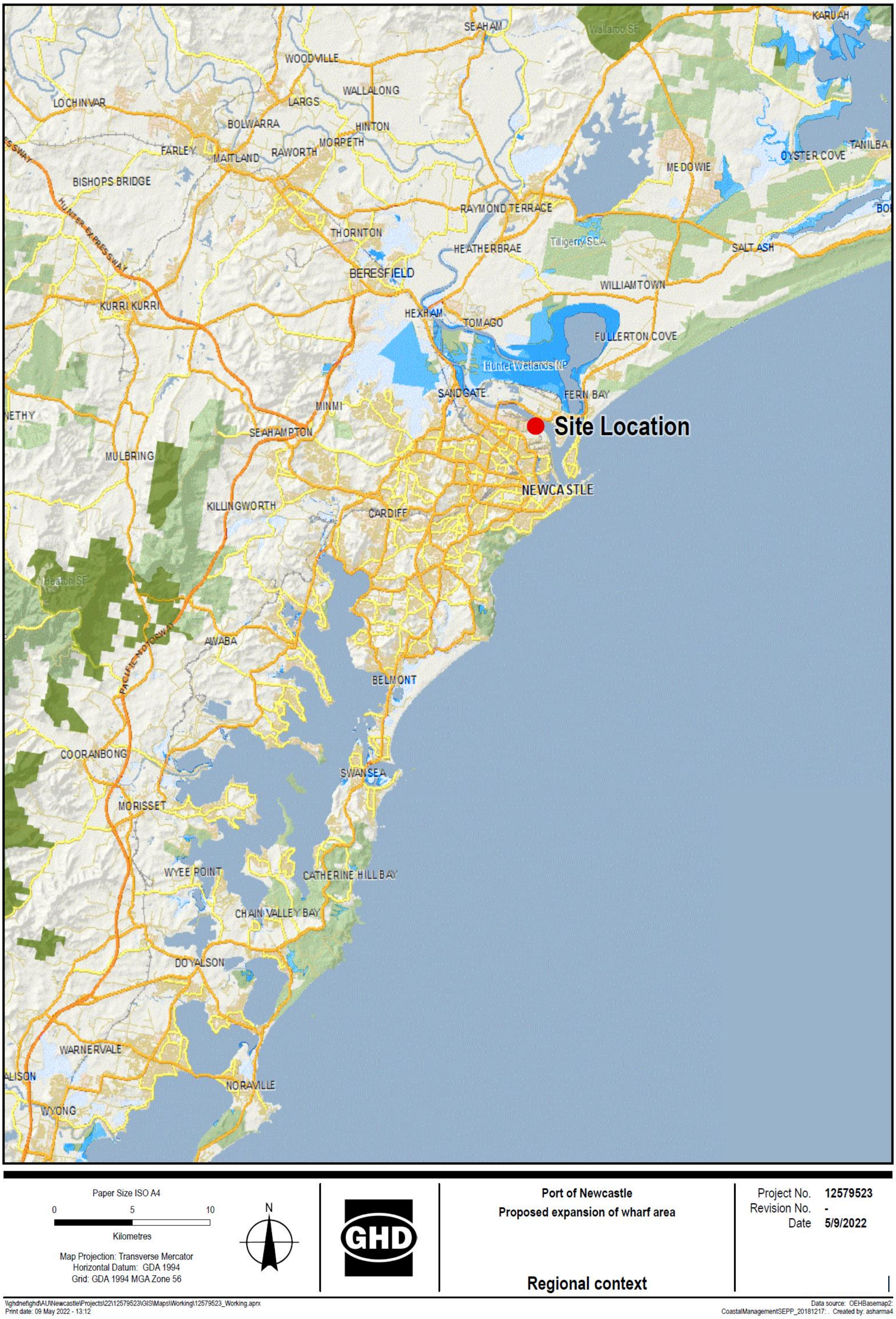

Figure 4.1 Regional site context

Figure 4.2 Mayfield Cargo Storage Facility modification showing lithium-ion battery unit storage

5. Modification description

PON are proposing to import or export LiB units via ship and store the units in an approximate 10,000 m^2 area at Mayfield Cargo Storage Facility, as shown in Figure 4.2, within the Port of Newcastle. The 10,000 m^2 area can store up to 600 units. The LiB units will then be transported to their ultimate installation location. LiB will be brought to the storage area prior to moving them to Mayfield Berth 4 for loading onto a ship. The result is that there will be a continual turnover of LiB units as they will be shipped in and trucked out. The cargo will be received and managed as follows:

– Discharged from ship to truck.
– Truck to storage area.
– Forked off truck for storage.
– Forked onto truck for transport offsite.

An example of a LiB unit is shown in Figure 5.1.

Figure 5.1 An example of a lithium-ion battery unit

6. Risk screening and emissions

6.1 Dangerous goods screening

A dangerous good is a substance or article that poses a risk to people, property, or the environment. Each class represents a different type of dangerous good. Some classes are divided into packing groups (PG), where PG I substances present a high level of danger, PG II substances present a medium level of danger, and PG III substances present a low level of danger. A summary of the different DG classes is shown in Table 6.1.

Table 6.1 Dangerous good classes as per ADG Code

DG Class	Packing Group	Description
1.1	N/A	Substances and articles which have a mass explosion hazard
1.2	N/A	Substances and articles which have a projection hazard but not a mass explosion hazard
1.3	N/A	Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both but not a mass explosion hazard
1.4	N/A	Substances and articles which present no significant hazard
1.5	N/A	Very insensitive substances which have a mass explosion hazard
1.6	N/A	Extremely insensitive articles which do not have a mass explosion hazard
2.1	N/A	Flammable gases
2.2	N/A	Non-flammable, non-toxic gases
2.3	N/A	Toxic gases
3	I, II, or III	Flammable liquids
4.1	I, II, or III	Flammable solids, self-reactive substances and solid desensitised explosives
4.2	I, II, or III	Substances liable to spontaneous combustion
4.3	I, II, or III	Substances which in contact with water emit flammable gases
5.1	I, II, or III	Oxidising substances
5.2	I, II, or III	Organic peroxides
6.1	I, II, or III	Toxic substances
6.2	I, II, or III	Infectious substances
7	N/A	Radioactive material
8	I, II, or III	Corrosive substances
9	I, II, or III	Miscellaneous dangerous goods and articles

A summary of the dangerous goods proposed to be stored onsite during operation of the proposed modification is shown in Table 6.2, including whether the dangerous goods exceed the SEPP (Resilience and Hazards) threshold.

Table 6.2 Dangerous goods proposed to be stored on site

Chemical/ product	UN #	DG class	Packing group	Expected storage quantity	SEPP (Resilience and Hazards) combined storage threshold	Exceedance of SEPP (Resilience and Hazards) threshold
Lithium-Ion Batteries	3480	9	N/A (contained units)	600 units	N/A[1]	Pass (excluded)

[1] Class 9 Miscellaneous DGs are considered to pose little threat to people or property and have no threshold limit within the Applying SEPP 33 risk screening process.

The dangerous good screening indicate that the proposed LiB storage does not exceed the thresholds within the SEPP (Resilience and Hazards). The proposed modification is therefore not considered a ‘potentially hazardous industry’ and a PHA is not required.

Any change to the proposed LiB unit inventory will require a review of this assessment.

6.2 Transportation screening

This Applying SEPP 33 transport screening relates to the carriage of dangerous goods to and from the port. Table 6.3 shows the transport screening for the operation of the proposal. This includes the expected vehicle movements of each dangerous good class and the vehicle movement thresholds according to Applying SEPP 33.

The LiB units will be transported to Mayfield Berth 4 at least fortnightly by sea freight. Transport from the port to their final location will occur via trucks (two LiB units per truck), with 300 units requiring movement off site per month.

Table 6.3 Transport screening

DG Class	Chemical/ product	Combined quantity	Combined transport movements	Transport movements threshold	Exceedance of Applying SEPP 33 threshold
9	Lithium-Ion Batteries (incoming – via ship)	200 units / ship	24 per annum (2 shipments per month)	>1,000 per annum	Does not exceed threshold
9	Lithium-Ion Batteries (outgoing – via truck)	2 units / truck	38 per week (150 trucks per month)	>60 per week	Does not exceed threshold

The transport screening indicate that the proposed LiB storage does not exceed the thresholds within the SEPP (Resilience and Hazards). The proposed modification is therefore not considered a ‘potentially hazardous industry’ and a PHA is not required.

Any change to the frequency of LiB container deliveries to Berth 4 will require a review of this assessment.

6.3 Screening results

According to Applying SEPP 33, if any of the screening thresholds are exceeded then the proposed development should be considered a ‘potentially hazardous industry’ and a PHA is required.

The results of the dangerous goods and transport screening indicate that the project does not exceed any of the thresholds, so the modification is not considered ‘potentially hazardous’. However, based on industry knowledge of battery storage technology and the associated fire risk, a PHA has been prepared.

6.4 Summary of emissions

The nature of LiB storage is not pre-disposed to emissions. Given they are connected during storage, there is no noise or vibration emitted. Based on this, the modification would not release a quantity of pollutant emissions to be considered ‘potentially offensive’.

7. Preliminary hazard analysis

Whilst the results of the SEPP (Resilience and Hazards) risk screening indicate that a PHA is not required, due to the known fire risk associated with LiB, a PHA has been prepared. It is considered that there is a medium potential for harm, and a Level 2 PHA is appropriate. A Level 2 PHA uses a semi-qualitative approach based on comprehensive hazard identification to demonstrate that the activity does not pose a significant risk.

7.1 Hazard identification

The results of the hazard identification are provided in Table 7.1, including safeguards. The safeguards are required to ensure the risk scenarios that were identified are contained or at least controlled to an acceptable level.

Table 7.1 Hazard identification

“	Causes	Consequence	Potential for Off Site Impact	Identified / Recommended Safeguards
Vehicle interactions within the project area	Vehicle movements in vicinity of personnel	Personal injury	No	Prepare traffic management plan including standard traffic rules and signage Implement site speed limits Provide designated pedestrian areas for construction and operation Driver competency
Natural hazards	Flooding, earthquake, lightning, bushfire	Personal injury Asset Damage	No	Prepare emergency management plan
Mechanical damage of lithium-ion Battery units	Rapid heating of individual cells (e.g. lack of venting, thermal runaway reactions) Vehicle impact into batteries during unloading/loading of general cargo Unloading/loading of batteries resulting in impacts between battery units or with other stored cargos[1]	Personal injury / fatality Asset Damage	Yes	Ensure batteries are Quality Assured to ISO 9001, AS/ NZS 5139 and prevailing battery manufacturing standards Install bollards/protective barriers around batteries at truck loading area Batteries to be stored as per supplier's specifications Implement a regular inspection regime for the battery units (checking for visible impact damage) Prepare emergency management procedure

1 – As no other DGs are currently permitted to be stored at the Mayfield Cargo Storage Facility no further consideration of battery interactions with other DGs have been considered.

7.2 Hazardous materials

7.2.1 Lithium-ion batteries

LiB are regulated as Class 9 Miscellaneous dangerous goods and are the only material with the potential to cause off-site impacts from a hazardous event.

LiBs contain electrolyte and lithium in various forms, along with other metals. LiBs use an intercalated lithium compound as one electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery. The electrolyte, which allows for ionic movement, and the two electrodes are the constituent components of a LiB cell.

There are different electrolyte chemistries that can be used in LiBs. The main types of LiBs currently seen are:

- Lithium Nickel Manganese Cobalt Oxide (NMC)
- Lithium Nickel Cobalt Aluminium Oxide (NCA)
- Lithium Iron Phosphate (LFP)
- Lithium Cobalt Oxide (LCO)
- Lithium Manganese Oxide (LMO)
- Lithium Titanate (LTO)

All LiB types have potential for rapid heating, or thermal runaway, within a cell and subsequent fire and explosion.

7.2.2 Hazard scenarios

The key hazard for LiBs is thermal runaway. There are several causes of thermal runaway, however for this modification, as the LiBs are not connected, only stored, the ability for rapid heating is due to a latent battery fault or damage. These scenarios will be further analysed.

7.3 Consequence determination

Table 7.2 summarised the conditions used in the consequence determination.

Table 7.2 Consequence Assumptions

Parameter	Value	Comment
Surrounding air temperature	22 °C	Average outside air temperature for Newcastle [2]
Assumed average container surface temperature during thermal runaway reaction	660 °C	Trigger temperature for thermal runaway is lower (about 70-80 °C) The individual cells may exceed 600 °C [3] 660 °C is melting point of aluminium[4] and conservatively assumed to be equal to the external surface temperature
Height of battery	3.26 m	Assumed height of LiB [5]
Length of battery	2.44 m	Assumed length of LiB [5]

7.3.1 Results

A summary of the determined heat radiation consequences is provided in Table 7.3. The radiated heat distances are relevant for all three thermal runaway hazard scenarios. These distances do not extend beyond the Mayfield Cargo Storage Area boundary. Details of the calculations are in Appendix A.

Table 7.3 Summary of heat radiation consequences

Release Scenario	Maximum Distance Downwind of Release to Heat Radiation		
	4.7 kW/m^2 (heat radiation level that can cause injury)	12.6 kW/m^2 (heat radiation level that can cause fatality)	23 kW/m^2 (heat radiation level that can cause property damage)
Single container battery thermal runaway	4.2 m	2.0 m	0.95 m

[2] Bureau of Meteorology website, summary statistics for Newcastle Nobbys Signal Station AWS, accessed November 2023 **Climate statistics for Australian locations (bom.gov.au)**
[3] Tesla, 2017, Lithium-ion battery emergency response guide – Tesla Powerpack system, Powerwall and sub-assembly, all sizes, pgs 7 and 9
[4] DNV-GL, 2020, McMicken Battery Energy Storage System Event Technical Analysis and Recommendations Issue A
[5] ATS Projects, Typical Transport Configuration drawing, 20221103-001, s-310 Rev A and PON shipping manifest

Offsite health effects from smoke in the event of a battery fire, which could include small quantities of fluorinated hydrocarbons or hydrofluoric acid are considered low given the lack of combustible material available for a prolonged fire event and the low residential and industrial (e.g. Stolthaven) density in the area. As detailed in Figure 4.2, the nearest offsite facility, Stolthaven, is approximately 160 metres away from the proposed battery storage area. At this distance radiation from any fire would be negligible.

7.3.2 Separation distances

Adequate clearance between battery units is a critical consideration for an electrically connected BESS design when considering escalation/propagation of a fire from a single unit to neighbouring units. There are international guidelines and standards that provide recommended separation distances for BESS design, some of which are also relevant to LiB unit storage. While each of these documents should be read individually for context, below is a list of relevant standards.

1. NFPA855 - Standard for the Installation of Stationary Energy Storage Systems (2023)
2. FM Global Property Loss Datasheets – Lithium-ion Battery Storage Systems (5-33) (2023)
3. UL9540 – Standard for Energy Storage Systems and Equipment (2023)

Table 7.4 is shown to demonstrate high level requirements from these standards.

Table 7.4 BESS separation distance guidelines

Standard/ Code	Separation distance reference
NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems 2023	0.9 m to adjacent indoor racks 3 m from buildings, boundary, hazardous or combustible materials 3 m clearance of combustible vegetation
UL 9540 – Standard for Safety of Energy Storage Systems and Equipment 2023 UL 9540A (Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems)	UL 9540 – refers to NFPA 855 (reduced distances require a large-scale fire test via valid thermal testing process) UL 9540A – Testing regime dependent
FM Global DS 5-33 – Data sheet (Electrical Energy Storage Systems) 2023	1.5m (LFP)[6] or 4.0m/2.4m (NMC)[7] between BESS units 2.7 m from combustible elements

7.4 Likelihood estimation

The likelihood of the thermal runaway scenario resulting in a fatality or injury was determined using the calculations shown in Table 7.5. The assignment of the frequency and probability values has been made based on industry failure frequencies, specialist risk management judgement and the quantified consequences.

It is important to note that the determination of 'absolute values' for assigned probabilities is less important than consistently using 'comparative' or 'relative' values. The overall aim is to provide a ranking to compare with risk criteria.

A summary of the frequency of thermal runaway due to storage is shown in Table 7.5.

Table 7.5 Thermal runaway frequency

Scenario	Frequency per year	Interval years
Latent manufacturing fault leading to thermal runaway and fire (per annum)	9.0×10^{-5}	11,111
Impact during transportation movement leading to thermal runaway and fire (per annum)	1.80×10^{-2}	56
Combined site frequency for thermal runaway events	1.81×10^{-2}	55

[6] "on sides that contain access panels, doors or deflagration vents"
[7] Depending on fire rating of wall construction (1-hour)

7.5 Risk assessment

The risk criteria for land use and safety planning within HIPAP 4 (Department of Planning, 2011) include onsite and offsite fatality values, as well as offsite injury and property damage values. The HIPAP 4 fire and explosion risk criteria are summarised in Table 7.6.

Table 7.6 HIPAP 4 Risk Criteria

Impact	Onsite Criteria	Offsite Criteria
Fatality (12.6 kW/m^2 & 21 kPa)	5.00 x 10^{-05}	1.00 x 10^{-06}
Serious injury (4.7 kw/m^2 & 7 kPa)	–	5.00 x 10^{-05}
Property damage (23 kw/m^2 & 14 kPa)	–	5.00 x 10^{-05}

Calculations for the frequency of fatality, injury and property damage for a thermal runaway event are detailed in Appendix B and summarised in Table 7.7.

Table 7.7 Risk criteria compliance for thermal runaway events

Event	Frequency per year	Interval years	Compliance
OFFSITE property damage	0	0	Complies
OFFSITE serious injury	0	0	Complies
OFFSITE fatality	0	0	Complies
ONSITE fatality	7.5 x 10^{-06}	132,670	Complies

There are no expected offsite impacts given the proposed location of the LiB unit storage and buffer distances between the site and sensitive receptors. As detailed in Figure 4, the nearest offsite facility, Stolthaven, is approximately 160 metres away from the proposed battery storage area. At this distance radiation from any fire would be negligible. Coupled with the highly unlikely chance of an incident occurring the risk of injury, fatality or property damage is negligible and complies with HIPAP 4. The onsite fatality risk also complies with HIPAP 4.

8. Recommendations

8.1 Management of hazards

Following the hazard identification shown in Section 7, there are controls that should be enacted to manage hazards in line with the relevant legislative requirements. A detailed discussion of the management of key hazards is provided in the following sections.

It is recommended that a battery storage management plan be developed and implemented to capture the following key battery safety requirements (Occupational Safety and Health Administration, 2019, Battery University, 2017 and Tesla, 2017):

- LiB units will be stored as per manufacturer specifications.
- Installation of bollards/protective barriers around vehicle movement routes.
- The location of the LiB storage area should be at least 3 m from other general cargo and dangerous good transportation routes, based on NFPA 855.
- Separation distances between LiB units should be at least 1 m, based on preliminary radiant heat contours for property damage.
- Regularly inspect LiB units for signs of damage, such as visible impacts, hissing, leaking, and smoking.
- Develop a protocol for managing damaged batteries that should include the following actions:
  - Immediately place it in an area away from flammable materials if any sign of damage is present.
  - Before moving a damaged battery, wait a period of time to observe if there is any smoke, as this may be an indication that a thermal reaction is in progress. A damaged battery should also be monitored after isolation for evidence of smoke, flame, or signs of heat.
- Develop a battery fire emergency response procedure that should include the following actions:
  - Follow manufacturer's guidance on how to extinguish small battery fires, which could include using dry chemical extinguishers, foam fire extinguishers, powdered graphite, dirt, or sand. If the fire of a burning lithium-ion battery cannot be extinguished, allow the container to burn out on its own in a controlled and safe manner, using water to cool the outside unit.
  - Exclusion of potential ignition sources in a 3 m zone around the LiB storage area.
  - A regular review and test of the battery fire emergency response procedure to ensure relevance.

9. Conclusions

This report addressed the hazards and risks associated with the storage LiB units at Mayfield Cargo Storage Facility.

The PHA involved a preliminary risk screening of the proposed modification in accordance with the requirements of SEPP (Resilience and Hazards). While the results of the dangerous goods and transport screening indicated that the project does not exceed any of the thresholds within the SEPP requirements, due to the potential for fire associated with the LiB units, the project was considered "potentially hazardous”.

The initial hazard identification process considered hazards during storage. Fire started because of thermal runaway is considered a plausible event and may pose off-site impacts. Given the port location of the site, it is considered that there is a medium potential for harm from BESS fires, and a Level 2 PHA is an appropriate level of examination and has been included in this report. A Level 2 PHA uses a semi-qualitative approach based on comprehensive hazard identification to demonstrate that the activity does not pose a significant risk.

Based on the information provided by PON and the assessment as outlined in the PHA, it was determined that the risk arising from LiB unit thermal runaway fire scenarios does not exceed the individual fatality or injury risk criteria specified in the NSW Department of Planning 2011 publication HIPAP No. 4 – Risk Criteria for Land Use Safety Planning. Therefore, the project does not pose any significant risk or offence.

It is recommended that management procedures and safeguards as listed in Section 8 be implemented to incorporate practices that will prevent risk scenarios occurring.

Any changes to the assumptions used in this report should result in a review of the PHA and update as required.

10. References

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11. Abbreviations

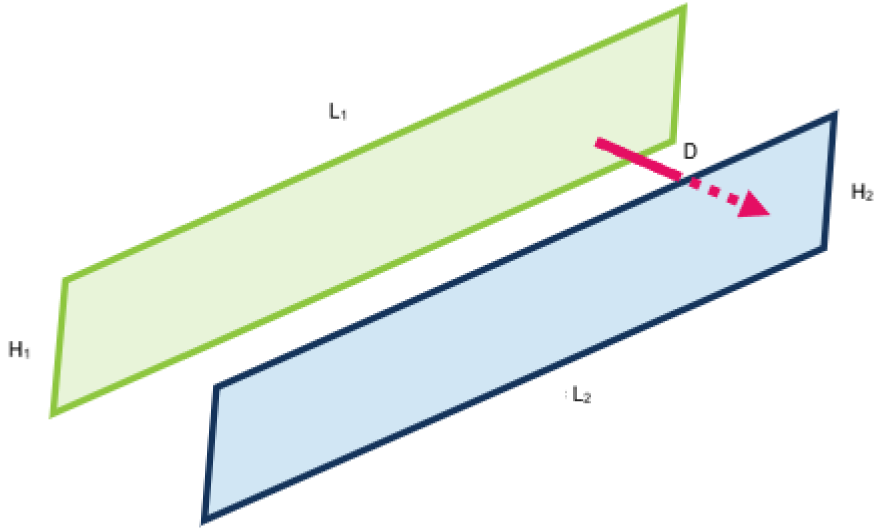
Abbreviation	Description
AHD	Australian Height Datum
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
BESS	Battery Energy Storage System
°C	Degrees Celsius
DG	Dangerous Good
EP&A Act 1979	Environmental Planning and Assessment Act 1979
g	Gram
GHD	GHD Pty Ltd
HAZID	Hazard Identification
HIPAP	Hazardous Industry Planning Advisory Paper
ISO	International Organisation for Standardisation
kg	Kilogram
kL	Kilolitre
km	Kilo metre
kWh	Kilowatt hour
kW/m^2	Kilowatt per square meter
L	Litre
LFP	Lithium Iron Phosphate
LiB	Lithium-Ion Battery
m	Meter
m^3	Cubic meter
NMC	Lithium Nickel Manganese Cobalt Oxide
NSW	New South Wales
PHA	Preliminary Hazard Analysis
PON	Port of Newcastle
SDS	Safety Data Sheets
SEE	statement of environmental effects
SEPP	State Environment Planning Policy

Appendix A

Consequence calculation summary

Radiation between parallel surfaces

It was estimated that the heat experienced between a battery container outer surface and another battery container or a person in range during a thermal runaway fire, can be estimated by two plates. Given the battery containers are stationary and pose an escalation point, the radiated heat is calculated between two battery containers. This calculation estimated the net radiant heat exchanged between two plates using the diagram below.



Description	Symbol	Value	Units	Reference
Height of LiB unit	$H_1 = H_2$	3.25	metre	ATS Projects, Typical Transport Configuration drawing, 20221103-001, s-310 Rev A
Length of LiB	$L_1 = L_2$	2.8	metre	ATS Projects, Typical Transport Configuration drawing, 20221103-001, s-310 Rev A
Temperature of runaway reaction	T_1	933	Kelvin	Melting point of aluminium as referenced by DNV-GL McMicken Battery Energy Storage System Event Technical Analysis and Recommendations and conservatively assumed to be equal to the external surface temperature as requested by DPHI
Atmospheric temperature	T_2	295	Kelvin	Assumption
Distance between points of interest	D	Values provided over page	metre	Iteratively adjusted to get HIPAP 4 heat flux impact

The heat radiation *q* from one plate to the other is calculated as:

$$q = \sigma \times VF_{(1-2)} \times A \times (T_1^4 - T_2^4)$$

Where

$\sigma = 56.69 \times 10^{-9}$ = average Stefan-Bolzmann constant

A = area of plate 1 = $L_1 \times H_1$

T_1 is the plate 1 temperature

T_2 is the plate 2 temperature

$VF_{(1-2)}$ = view factor from plate 1 to plate 2 (also known as radiation shape factor, angle factor, and configuration factor)

$VF_{(1-2)} = (a + b + c – d) \times e$

Where:
$a = \ln[(1+y^2)(1+z^2)/(1+y^2+z^2)^{0.5}]$

$b = z[(1+y^2)^{0.5}]\text{atan}[z/(1+y^2)^{0.5}]$

$c = y[(1+z^2)^{0.5}]\text{atan}[y/(1+z^2)^{0.5}]$

$d = z[\text{atan}(z)] + y[\text{atan}(y)]$

$e = 2/(\pi yz)$

Where *y* and *z* are defined as:
$y = L_1 / D$
$z = H_1 / D$

Heat flux = q/A

Heat flux	Units	Distance (D)	Units	Reference
4.7	kW/m^2	4.5	m	HIPAP 4 heat radiation level that can cause injury
12.6	kW/m^2	2.15	m	HIPAP 4 heat radiation level that can cause fatality
23.0	kW/m^2	1.0	m	HIPAP 4 heat radiation level that can cause property damage

References

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Appendix B

Likelihood calculation summary

The frequencies of all hazard scenarios are calculated in the following section. The expected frequency is needed to enable a calculation of the risk. The scenarios are:

1. Latent battery failure caused by a manufacturing fault
2. Thermal runaway caused by transportation impact

Frequency and risk results

The results of the frequency analysis for the three scenarios are summarised below.

Latent battery failure

Value	Parameter	Value	Reference
A	Total number of battery units	600	Modification storage specification
B	Manufacturing fault rate (failure per battery per year)	1/10,000	Assumed – includes battery faults
C	Latent battery failure frequency (per year)	0.006	Calculated = A*B
D	Percentage of faults leading to thermal runaway	30 %	Conservative professional estimation
E	Effectiveness of fusible separators in preventing thermal runaway	95 %	Conservative professional estimation
F	Thermal runaway from latent battery failure frequency (per year)	9.0×10^{-05}	Calculated = C*D*(1-E)
G	Thermal runaway from latent battery failure (years)	11,111	Calculated = 1/F

Transportation damage

Value	Parameter	Value	Reference
H	Transportation movements	2	From ship to shore, onto truck
I	Total number of unit movements	1,200	Calculated = A*H
J	Impact rate (human error per movement per year)	0.003	Assumed from Human Error Assessment & Reduction Technique (HEART) Generic Task Type Classification for shift or restore system, with procedures
K	Impact damage frequency (per year)	3.6	Calculated = I*J
L	Percentage of damage leading to thermal runaway	10 %	Conservative professional estimation
M	Effectiveness of fusible separators in preventing thermal runaway	95 %	Conservative professional estimation
N	Thermal runaway from impact frequency (per year)	0.018	Calculated = K*L*(1-M)
O	Thermal runaway from impact (years)	56	Calculated = 1/N

Total frequency for a thermal runaway event

Value	Parameter	Value	Reference
P	Combined thermal runaway frequency (per year)	0.0181	Calculated = N+F
Q	Combined thermal runaway events (years)	55	Calculated = 1/P

Risk assessment results – onsite

		Value	Reference
R	Frequency of thermal runaway event (per annum)	0.0181	Calculated = P
S	Probability of person impacted	1/24	Assumed – using consequence combined with someone present for an hour every day
T	Probability impact results in fatality	1/100	Professional estimation
U	Probability impact results in injury	5/10	Professional estimation
V	Probability impact results in property damage	5/10	Professional estimation
W	Frequency of fatality (per annum)	7.5×10^{-06}	Calculated = R*S*T
X	Frequency of injury (per annum)	3.8×10^{-04}	Calculated = R*S*U
Y	Frequency of property damage (per annum)	9.0×10^{-03}	Calculated = R*V

Risk assessment results – offsite

		Value	Reference
Z	Frequency of thermal runaway event (per annum)	0.0181	Calculated = P
AA	Probability of person and or property impacted	0	Assumed – using consequence and proposed location of BESS
AB	Frequency of fatality (per annum)	0	Calculated = Z*AA
AC	Frequency of injury (per annum)	0	Calculated = Z*AA
AD	Frequency of property damage (per annum)	0	Calculated = Z*AA

Appendix C

Example lithium-ion battery safety data sheet

ENERGIZING A NEW WORLD

EXIDE TECHNOLOGIES

SAFETY DATA SHEET

LITHIUM ION BATTERIES UN3480

1. Identification of Product and Company

Product Name:	**LITHIUM - ION BATTERY**
Other names:	LFP, $LiFePO_4$, NMC, NiMnCo, Lithium Ion Battery.
Trade names:	Sonnenschein Module Pro Sonnenschein Lithium, Sonnenschein Lithium Material Handling Batteries, Sonnenschein@home Lithium, Light Traction Block, Light Traction Block v2, , Equipment Li-Ion
Use:	Lithium Ion batteries for the Motive and Network Power markets including electric forklifts, mobility, rail, telecommunications, utilities, renewables, mining, remote area power and standby power applications.
Supplier:	GNB Industrial Power
ABN:	84 093 272 005
Street Address:	135 Nancy Ellis Leebold Drive Bankstown NSW 2200
Telephone Number:	(02) 9722 5700
Emergency Telephone Numbers:	Australia: 1800 033 111 (ALL HOURS) New Zealand: 0800 734 607 (ALL HOURS) Ixom Emergency Response Service

2. Hazards Identification

Lithium Ion batteries are classified as an article and are not hazardous when operated in accordance with the manufacturers recommendations. When used in accordance with recommendations, the electrode materials and liquid electrolyte are non-reactive provided that the cell enclosure and the seals remain intact. Battery cells are designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition, explosion or hazardous material leakage. The potential for exposure should not exist unless the battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused or damaged.

2.1 Classification of the substance or mixture

Not classified as hazardous according to Safe Work Australia criteria.

2.2 Label elements

No signal word, pictograms, hazard or precautionary statements have been allocated.

2.3 Other Hazards

- When recharging batteries, never use chargers which are unsuitable for the battery type.
- Do not short-circuit batteries.
- Do not inflict mechanical damage (puncturing, deforming, disassembling etc.).
- Do expose to heat or incinerate them.
- Keep batteries away from small children.
- Always store batteries in a dry and cool place.
- Contact with leaking battery substances may pose a danger to personal health and the environment. For this reason, when coming into contact with batteries with a conspicuous appearance (leaking substances, deformed, discoloured, dented or the like), adequate PPE and breathing protection is required. Lithium

batteries can, for example, react very strongly in combination with fire. This can result in battery components being ejected with considerable force.

2.4 Handling and operational safety

Lithium batteries are always to be handled in accordance with the manufacturer's specifications. This is true particularly for complying with the limits for maximum current load, charging and end-point voltages, and mechanical and thermal loads.

Usually product packages are marketed that have already been matched. Such products are not to be modified or tampered with, since that could result in substantial safety hazards. Use only the charging process tailored to the respective cell type of a rechargeable battery.

2.5 Danger

As with other batteries, so also for lithium batteries it is true that even when thought to be discharged, they can still represent a source of danger. They can deliver a very high short-circuit current, however, even in the state of the minimum permitted end-point voltage lithium batteries with a high voltage (over 75 Volts) can pose a danger of a lethal electric shock.

For most products, deep discharge beyond the documented limits leads to permanent damage. Deep-discharged lithium batteries are no longer permitted to be re-charged or operated.

In all cases, avoid excessive charging voltages and overcharging. This can lead directly to critical situations, but also have a negative impact on battery life.

3. Composition and Information on the main Ingredients

3.1 Battery Cells

The following components are found inside the sealed Li-ion cell. Cells have been further combined as larger battery modules and systems using mechanical parts.

Component	Chemical name	CAS number
Cathode Lithium-Metal oxide	LFP: Lithium Iron Phosphate	15365-14-7
	NMC: Lithium Nickel Manganese Cobalt oxide	182442-95-1
Anode	Graphite	7782-42-5
Binder	Polyvinylidene difluoride	24937-79-9
Electrolyte	Ethyl acetate	141-78-6
	Ethylene carbonate	96-49-1
	Dimethyl carbonate	616-38-6
Cu	Copper	231-159-6
Al	Aluminum	231-072-3

3.2 Li-ion cell chemistry

The following Li-Ion cell chemistries are available from Exide:

LFP: $LiFePO_4$, Lithium Iron Phosphate
NMC: NiMnCo, Lithium Nickel Manganese Cobalt

Trade name	Cathode	
	LFP	NMC
Sonnenschein Lithium	X	
Sonnenschein Lithium Material Handling Batteries		X
Sonnenschein@home Lithium		X
Light Traction Block		X
Light Traction Block v2	X	
Equipment Li-Ion	X	
Sonnenschein Lithium Module Pro	X	

3.2 Battery Management System (BMS)

Electronic Components
Contactor

3.3 Battery Tray (where applicable)

Steel

4. First Aid measures

When handled and stored in accordance with the manufacturer’s recommendations, lithium batteries are not hazardous The chemicals listed in item 3 are enclosed in a sealed housing so that they cannot escape during normal use. The following measures are only applicable if exposure has occurred to the components when a battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused or damaged.

INGESTION: If the contents have been ingested, rinse mouth out with water. If swallowed, Do NOT induce vomiting. Seek medical advice immediately as urgent hospital treatment is likely to be required. For advice, contact a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or a doctor at once. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE: If the contents come into contact with the eyes, hold eyelids apart and flush the eye immediately with large amounts of running water. Continue flushing for at least 15 minutes or until advised to stop by a Doctor. Check for contact lenses. If there are contact lenses, these should be removed after several minutes of rinsing by the exposed person or medical personnel if it can be done easily. As the content is rated as Causes severe eye damage, after flushing, immediately call a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or doctor/physician.

SKIN CONTACT: If skin or hair contact has occurred with the contents, remove any contaminated clothing and footwear, wash skin or hair thoroughly with soap and water. As the product is rated as a Corrosive that Causes severe skin burns, after flushing, immediately call a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or doctor/physician.

INHALATION: If affected by content vapours, remove the patient from further exposure into fresh air, if safe to do so. If providing assistance, avoid exposure to yourself - only enter contaminated environments with adequate respiratory equipment. Once removed, lay patient down in a well-ventilated area and reassure them whilst waiting for medical assistance. If not breathing, provide artificial respiration and seek immediate medical assistance. If unconscious, place in a recovery position and seek immediate medical assistance. As the electrolyte is corrosive and decomposition may cause corrosive and toxic vapours, if the person has inhaled vapours and is having difficulty breathing, immediately call a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or doctor/physician.

5. Firefighting measures

5.1 EXTINGUISHING MEDIA:

SUITABLE MEDIA: Use extinguishing media appropriate for surrounding fire. Use carbon dioxide, dry chemical or water fog. If batteries are involved in a fire and the hazard situation is unclear, only extinguish with dry chemical extinguishers.

UNSUITABLE MEDIA: Do not use water or foam extinguishers on ruptured batteries. Confining or smothering the fire is recommended as reaction of the materials with water may produce flammable and explosive hydrogen gas as well as corrosive hydrogen fluoride gas. Hydrofluoric acid can cause severe chemical burns, is extremely reactive and is toxic by all routes of exposure.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE:

COMBUSTION HAZARDS: Combustion and thermal degradation of the battery may produce hazardous fumes of lithium, cobalt and manganese, hydrofluoric acid, hydrogen and oxides of carbon as well as smoke and irritating vapours.

5.3 ADVICE FOR FIREFIGHTERS:

FIRE: Electrolyte leakage or battery container rupture is possible under the conditions experienced in a fire. Keep fire exposed surfaces, etc. cool with water spray.

HAZCHEM CODE: 4W.

EXPLOSION: Closed containers may explode, burst, rupture or vent when exposed to high temperatures

PROTECTIVE EQUIPMENT: In the event of a fire, wear full protective clothing and self-contained breathing equipment with full-face piece operated in the pressure demand or other positive pressure mode.

6. Measures to be taken in case of accidental release

If the battery housing is damaged, electrolyte can leak. For small spills seal batteries in an airtight plastic bag, having added dry sand, chalk powder ($CaCO3$) or vermiculite. Traces of electrolyte can be soaked up with dry paper towels. When doing so, prevent direct contact with skin by wearing PVC safety gloves. Thoroughly rinse with water.

If mists or vapours are generated, an approved inorganic vapours and gases/acid gases/particulate respirator is required. For large battery spill scenarios, or in confined spaces, a full chemically resistant body-suit with self-contained breathing apparatus is required. For an incident involving more than one or two modules, only trained personnel should deal with leaking battery incidents.

Ventilate area to dissipate vapours and extinguish and/or remove all sources of ignition. Never enter a spill area unless you know the vapours have dissipated to make the area safe. Stop the leak if safe to do so. Avoid contact with the spilled material.

In the event of a spill or accidental release, notify the relevant authorities in accordance with all applicable regulations. Do not allow batteries or electrolyte to enter drains, surface water, sewers or watercourses - inform local authorities if this occurs

7. Handling and Storage

7.1 Handling

Under normal operating conditions where the battery remains intact, it is not hazardous.

- Do not open the battery.
- Do not crush, disassemble, drop or solder.
- Incorrect handling can lead to explosion or fire.

- Protect the battery from rain
- Do not immerse in liquids or pressure wash
- Effectively prevent a short circuit of the battery poles by using suitable insulation. (e.g.: taping the terminals with insulation tape).
- Do NOT use, charge or discharge damaged, defective or deformed batteries.

7.2 Storage

Lithium batteries are preferably stored at room temperature and in a dry location (for details, refer to the manufacturer's specifications concerning the storage temperature range); large temperature fluctuations are to be avoided. (For example, do not store in the vicinity of heating elements, do not expose to sunshine for long periods). If substances leak out due to damage or improper handling, be sure to comply with the manufacturer's instructions. This particularly includes the use of personal safety equipment.

8. Exposure limits and personal protective equipment

Lithium batteries are articles from which no substance is released when operated, handled and stored in accordance with the manufacturers recommendations

Skin protection: Not necessary under normal conditions.
Hand Protection: Wear nitrile, neoprene, PVC or natural rubber gloves when handling an open or leaking battery.
Eye protection: Not necessary under normal conditions.
Respiratory protection: Not necessary under normal conditions. In the event battery case ruptured inside an enclosed space, use a self-contained breathing apparatus.
Ventilation: Not necessary under normal conditions

9. Physical and Chemical properties

Appearance: Manufactured sealed battery unit

Colour: Various.

Odour: n.a. If leaking smells of medical ether

pH: n.a.

Flash point: n.a.

Flammability: n.a.

Density: n.a.

Solubility in Water: n.a

Stability: stable

10. Stability and Reactivity

Chemical Stability: The product is stable when operated, handled and stored in accordance with the manufacturers recommendations.

Conditions to avoid:
- Do not open the battery.
- Do not crush, disassemble, drop or solder.
- Incorrect handling can lead to explosion or fire.
- Protect the battery from rain

- Do not immerse in liquids or pressure wash
- Effectively prevent a short circuit of the battery poles by using suitable insulation. (e.g.: taping the terminals with insulation tape).
- Do NOT use, charge or discharge damaged, defective or deformed batteries.
- Comply with the voltage limits defined for the battery during discharge and charge. If the limits are exceeded, the battery may burst or even explode

Hazardous decomposition Products: Exposure to fire may cause emission of flammable and highly toxic gases.

Reactivity: n.a

11. Toxicological Information

11.1 Acute toxicity

The product is stable when operated, handled and stored in accordance with the manufacturers recommendations. Unbroken cells or batteries do not represent toxicity hazard.

11.2 Irritation and corrosion

Risk of thermally or electrically abuse causing cells to rupture. Electrolyte is corrosive. It causes chemical burns on contact with skin. Inhalation of fine mist or vapors is irritating to the respiratory system. Prolonged contact with the skin or mucous membranes may cause irritation.

- Sensitization: No information is available at this time.
- Carcinogenicity: No information is available at this time.
- Reproductive toxicity: No information is available at this time.
- Teratogenicity: No information is available at this time.
- Mutagenicity: No information is available at this time

12. Ecological Information

12.1 Eco-toxicity

Not applicable for undamaged product.

12.2 Persistence and degradability

Not applicable

12.3 Bio-accumulative potential

Not applicable

12.4 Mobility in soil

Not applicable

12.5 Results from PBT –and vPvB assessment

Not applicable

12.6 Other adverse effects

In case of an accident emissions may be harmful to environment

13. Disposal Considerations

In accordance with EU Battery Directive and the respective national legislation, Lithium-Ion batteries are labelled with a crossed-oust dust bin together with the ISO return/recycling symbol.

The symbol reminds the end user that batteries are not permitted to be disposed of with household waste, but must be collected separately.

Do not incinerate.
Dispose of in accordance with appropriate local regulations
Recycle or reuse where possible. Contact your state EPA or the manufacturer for additional information.

14. Transport Information

Road and Rail Transport

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.

UN No: 3480
Proper Shipping Name: LITHIUM ION BATTERIES (including lithium ion polymer
Class-primary 9
Packing Group:
Special Provisions: 188, 230 310 348 376 377 384 387 390
Hazchem Code: 4W

Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN No: 3480
Proper Shipping Name: LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Class-primary 9
Packing Group:
Special Provisions: 188 230 310 348 376 377 384 387 390
Hazchem Code: 4W

Air Transport

Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; DANGEROUS GOODS.

UN No: 3480
Proper Shipping Name: LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Class-primary 9
Packing Group:
Special Provisions: A88, A99, A154, A164, A181, A182, A183, A185, A201, P965, P966, P967, P968, P969, P970
Hazchem Code: 4W

To assist shippers in understanding the complete requirements related to the transport of lithium batteries, including packing instructions, IATA has prepared the updated Lithium Battery Guidance Document
https://www.iata.org/contentassets/05e6d8742b0047259bf3a700bc9d42b9/lithium-battery-guidance-document.pdf

15. Regulatory Information

Poison schedule: A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Classifications: Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.
The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

Hazard codes: None allocated
Risk phrases: None allocated
Safety phrases: None allocated
Inventory Listings: AUSTRALIA: AICS (Australian Inventory of Chemical Substances)
All components are listed on AICS, or are exempt.

16. Other Information

16.1 Safety Data Sheet

The European Directive 91/155/EEC which described the requirements for Material Safety Data Sheets had been repealed by the Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals on June 1st, 2007 (REACH-Regulation 1907/2006/EC, Art. 31). The requirement to publish a Safety Data Sheet applies to all suppliers of substances and preparations.

As already defined under the former Directive there is no requirement to develop and maintain a Safety Data Sheet for products such as Batteries.

16.3 General

The information given above is provided in good faith based on existing knowledge and does not constitute an assurance of safety under all conditions. It is the user's responsibility to observe all laws and regulations applicable for storage, use, maintenance or disposal of the product. If there are any queries, the supplier should be consulted.

However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Date of preparation: March 2022 **Date of last Review:** March 2022

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END OF SDS

Appendix D

DPHI Correspondence

Department of Planning and Environment

Our ref: DA8137 Mod 3

Mr Phillip Carroll
Planning Advisor
Port of Newcastle
Level 4, 251 Wharf Road
Newcastle NSW 2300

14 December 2023

Mayfield Cargo Storage Facility DA 8137 Mod 3 – Proposed Lithium-ion Battery Storage

Dear Mr Carroll

I refer to your email of 30 November 2023 and accompanying letter about a proposal to store lithium-ion batteries at the Mayfield Cargo Storage Facility. The email included a hazard assessment of the proposal.

The department has reviewed the battery storage proposal and requires the Statement of Environmental Effects (SoEE) for the proposal to assess the following additional issues:

1. Details of the proposal, including duration of battery storage, stacking height of lithium-ion battery units, bunding of battery storage areas to capture runoff from fire-fighting liquids and chemicals, type and material of barriers/structures to isolate the battery storage areas from other project cargo storage and whether the proposal will be operated by the Port of Newcastle or another party.
2. Traffic and Transport – an assessment of traffic generated by the existing Facility as modified, and the proposal and compliance with freight traffic movements specified in Condition 2.3 of the Mayfield Concept Plan.

In relation to the report titled Hazard Assessment Battery Import Project prepared by GHD dated 16 November 2023, the following comments are made:

1. The report refers to Mayfield Berth 4 as the location for the storage of lithium-ion batteries. This is incorrect and the report should be amended to refer to the Mayfield Cargo Storage Facility for the temporary storage of the batteries.
2. Section 1.3 of the report refers to scope and limitations of the hazard assessment. The department is unclear about scope exclusion as it is stated "The scope of this report includes the interactions between the introduction of the storage of LiB containers within Mayfield Berth 4. Excluded is any identification or assessment of hazards and risks

associated with current operational activities at Mayfield Berth 4 beyond the LiB container storage". This appears to exclude an assessment of the potential conflict of loading and unloading at Mayfield Berth 4 with the proposed storage at the Mayfield Cargo Storage Facility. The department requires the hazard assessment to assess the risk of potential incidents at Mayfield Berth 4 (which currently handles combustible liquids and 2 types of Dangerous Goods (ammonium nitrate and explosives) impacting the proposal site or an incident occurring at the proposal location affecting combustible liquids and dangerous goods at Mayfield Berth 4.

3. Table 5 of the report presents the results of the hazard identification and proposed safeguards. Row three of the Table identifies mechanical damage of lithium-ion batteries as a potential hazard. The department considers that the loading and unloading of project cargo in the Mayfield Cargo Storage Facility may result in impact collision with stored batteries. These operations should be identified as a potential hazard battery storage.

It is requested that consultation be undertaken with the relevant agencies, including Transport for NSW, Environment Protection Authority, Fire and Rescue NSW and City of Newcastle, and the Community Consultative Committee (CCC). The outcomes of the engagement must be reported and addressed in the SoEE.

If you have any questions on the above, please contact Michael Young on (02) 9274 6437.

Yours sincerely

Glenn Snow
Director
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