DA 8137 (MOD 4) – Mayfield Cargo Storage Facility Southern Expansion

Modification Report

Port of Newcastle Operations Pty Ltd

21 April 2026

→ The Power of Commitment

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GHD Pty Ltd | ABN 39 008 488 373
Contact: Simon Murphy, Business Group Leader - Environmental Approvals, Air & Noise | GHD
GHD Tower, Level 3, 24 Honeysuckle Drive
Newcastle, New South Wales 2300, Australia
T +61 2 4979 9999 | **E** ntlmail@ghd.com | **ghd.com**

Executive summary

This Modification Report has been prepared by GHD Pty Ltd (GHD) on behalf of the Port of Newcastle Operations Pty Ltd (PON) to support an application to modify DA 8137 under Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Mayfield Cargo Storage Facility (DA 8137) is located on the south-western foreshore of the southern arm of the Hunter River, five kilometres north-west of the Newcastle central business district (CBD). The proposed modification is to expand the existing site boundary of the Mayfield Cargo Storage Facility to the south-west (the expansion area), increasing the storage area for general cargo, including lithium-ion battery units, by approximately six hectares. There would be no other changes to the approved activities under DA 8137. As such, the modification is substantially the same development as approved under DA 8137.

Potential environmental impacts on hazards, traffic, noise, hydrology, air quality, contamination, biodiversity and cumulative impacts have been considered and addressed in this report. Negligible impacts beyond those already assessed and approved under DA 8137 are anticipated. No new or intensified environmental or social impacts are anticipated and the modification will be appropriately managed through existing controls.

The modification would deliver notable social and economic benefits by supporting the efficient import, storage, and distribution of components critical to the State's renewable energy transition. By enhancing operational capacity and reducing potential supply chain bottlenecks, the proposed modification supports PON's diversification strategy, regional productivity and NSW's broader strategic planning and energy-transition objectives.

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1. Introduction

This Modification Report has been prepared by GHD Pty Ltd (GHD) on behalf of the Port of Newcastle Operations Pty Ltd (PON) for the proposed modification of the existing Mayfield Cargo Storage Facility approved under DA 8137.

The modification is to expand the boundary of the existing Mayfield Cargo Storage Facility to include the adjacent area to the south-west (the expansion area) to store general cargo including lithium-ion battery units, as per the existing approval.

The modification is made under section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as it would result in substantially the same development. It will support PON's diversification strategy and improve PON's capacity to store and deliver general cargo including essential components required for the renewable energy transition for NSW.

1.1 The proponent

The proponent of the modification is PON. The Port is managed and developed by Port of Newcastle Investments (trading as the Port of Newcastle) under a 98-year lease from the NSW Government which commenced on 30 May 2014. PON shareholders are The Infrastructure Fund and China Merchants Group, each owning 50 percent. These shareholders have a strong, global track record in managing large infrastructure assets. PON is committed to the long-term diversified and sustainable development of the port in collaboration with valued stakeholders, PON employees and the local community.

1.2 Mayfield Cargo Storage Facility (DA 8137)

The Mayfield Cargo Storage Facility is in Mayfield North, approximately five kilometres north-west of the Newcastle central business district (CBD). The Mayfield Cargo Storage Facility is approved under DA 8137 for the storage of general cargo including lithium-ion battery units, which are classified as Class 9 Miscellaneous Dangerous Goods under the *Australian Dangerous Goods Code* (ADG Code).

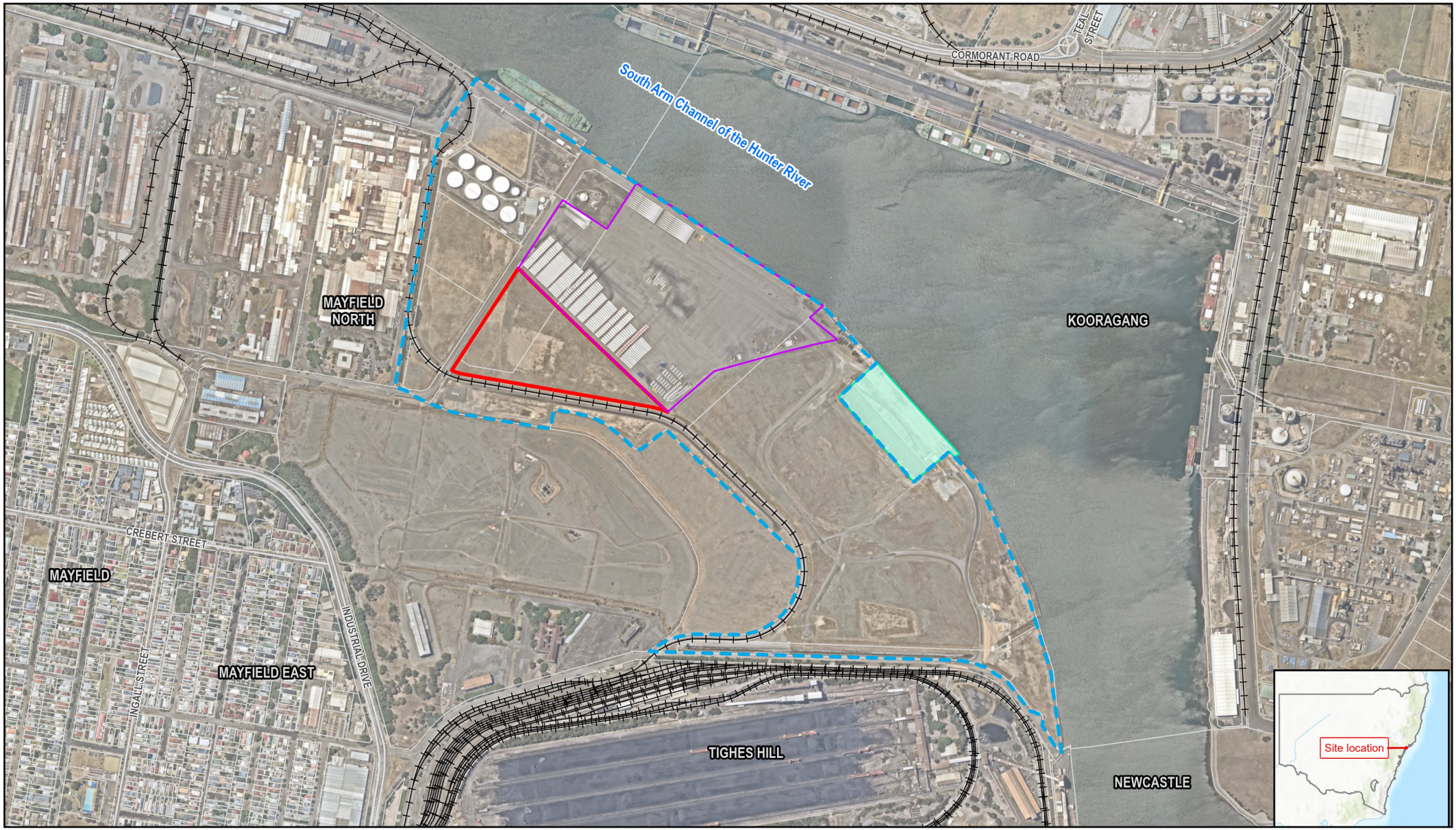
DA 8137 was initially granted under Part 4 of the EP&A Act for the use of an existing 12-hectare hardstand area for the storage of general cargo, including the loading and unloading of freight. DA 8137 has been modified three times under section 4.55(2) of the EP&A Act. Table 1.1 summarises the initial DA and subsequent modifications.

Table 1.1 Summary of Mayfield Cargo Storage Facility DA 8137 and approved modifications

Application	Modification Type under the EP&A Act	Date approved	Relevant activity approved
Initial DA 8137	-	30 June 2017	– Using an existing 12-hectare hardstand area for port facilities, including the storage of freight (the Mayfield Cargo Storage Facility). – Includes the loading and unloading of freight.
DA 8137 – MOD 1	4.55(1A)	23 June 2020	– Increase the Mayfield Cargo Storage Facility area from 12 hectares to 18.6 hectares. – Use of the additional area to store general cargo. – Including Roll-on Roll-off (RORO) as a permitted cargo type for the Mayfield Cargo Storage Facility.
DA 8137 – MOD 2	4.55(1A)	8 February 2024	– Alter the consent conditions B9 and B10 to permit operation to occur on the remediated portions of the site following Site Auditor approval.
DA 8137 – MOD 3	4.55(2)	23 September 2025	– Include the storage of lithium-ion battery units, which are a Class 9 Miscellaneous Dangerous Good under the *Australian Dangerous Goods Code*.

The Mayfield Cargo Storage Facility and the expansion area are within the Mayfield Concept Plan (MCP) area, as approved under (MP 09_0096) and the former BHP steelworks closure area per DA 293-08-00.

Figure 1.1 shows the locality of the Mayfield Cargo Storage Facility, the MCP area and the expansion area.



Legend

- Expansion Area
- Mayfield Concept Plan Area
- M4 Berth
- Mayfield Cargo Storage Facility (DA 8137)
- Railway
- Roads
- Watercourse
- Cadastre
- Waterbody

Paper Size ISO A4

0 100 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Port of Newcastle
Modification 4

Locality

Project No. **12622176**
Revision No. **A**
Date **5/03/2026**

FIGURE 1.1

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Print date: 05 Mar 2026 - 13:10

Data source: Railways, Roads, Waterways, Cadastre - NSW Spatial Services World_Hillshade: Esri, USGS
World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Nearmap WMS Server: . Created by: sgoode

1.3 The modification

This modification to DA 8137 is to expand the boundary of the existing Mayfield Cargo Storage Facility to store general cargo, including lithium-ion battery units.

The modification includes:

– Expanding the site boundary to the triangular-shaped area directly to the south-west (the expansion area), increasing the area from 18.6 hectares to 24.6 hectares.
– Using the expansion area to store general cargo including lithium-ion battery units, as per the existing consent.

1.3.1 Exclusions

The modification does not include the following activities:

– Physical works associated with hardstand. The site has approval under DA 293-08-00 to install a hardstand surface over the expansion area, which would occur prior to use as part of this modification.
– Installation of lighting, gates, fencing and driveways. These activities would occur under the exempt development provisions in Schedule 10 of the Transport and Infrastructure SEPP.

1.4 Purpose of this report

This Modification Report has been prepared to support PON's application to modify DA 8137. A modification under the provisions of section 4.55(2) of the EP&A Act is being pursued, as the modification would result in the development being substantially the same.

This Modification Report has been prepared to address the matters for consideration under Section 4.55(2) of the EP&A Act and has considered the provisions of other relevant legislation and environmental planning instruments. It assesses the potential environmental impacts of the modification and recommends mitigation measures to minimise impacts and protect the environment where possible.

Lithium-ion battery units are classified as Class 9 Miscellaneous Dangerous Goods under the *Australian Dangerous Goods Code* (ADG Code). Therefore, they are addressed specifically in this report.

1.5 Scope and limitations

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 1.4 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. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Site context

2.1 Site description

The site is located in the Mayfield Precinct of the Port within the Newcastle Local Government Area (LGA). The site is located on the south-western foreshore of the southern arm of the Hunter River, five kilometres north-west of the Newcastle CBD, within Lot 42 DP1191982, Lot 51 DP1229869 and Lot 54 DP1229869. The site is located on the former BHP Steelworks, which has a long history involving contaminated land remediation and development plans. The Mayfield Cargo Storage Facility and the expansion area are governed by various approvals and plans.

The surrounding area, site history and applicable approvals and plans are further discussed below.

2.2 Surrounding area

The surrounding area consists of industrial, rail and port related facilities, including:

North

To the immediate north of the expansion area and running parallel with the site northern boundary is the former BHP Berth No. 6 and the Koppers facility (located approximately 1 km to the west), and the Hunter River. On the opposite side of the Hunter River is coal loading facilities of the Newcastle Coal Infrastructure Group (NCIG).

South

To the immediate south of the expansion area is the Australian Rail Track Corporation (ARTC) rail line. South of the rail line lies a vacant parcel of land known as the Intertrade Industrial Site, which is the proposed site for the future Newcastle Logistics Precinct – Intertrade Project. The southern section of the Intertrade Industrial Site contains several vacant buildings that were part of the former BHP steelworks.

East

To the east is land associated with the Mayfield Multi-Purpose Terminal (MPT) (DA 293-08-00) and the Mayfield Berth No. 4 (M4). The M4 Berth is located approximately 200 m to the south-east of the Mayfield Cargo Storage Facility. The M4 Berth is a general-purpose common user berth, is 265 metres in length and has an adjoining hardstand area on 10,000 m^2.

West

To the west of the site is the Stolthaven Fuel Terminal (Stolthaven). Beyond the fuel terminal is the InfraBuild industrial complex.

The nearest sensitive receivers to the existing approved Mayfield Cargo Storage Facility are approximately 800 metres to the south-west, in the suburb of Mayfield East, refer to Figure 8.1.

2.3 Remediation of Closure Area and Multi-purpose Terminal (DA 293-08-00)

The Mayfield Cargo Storage Facility and the expansion area are located within the former Closure Area, as defined in DA 293-08-00, and are subject to the conditions of that consent (as modified).

On 14 June 2001, under former section 21 of the *Contaminated Land Management Act 1997* (CLM Act), the NSW Environment Protection Authority (EPA) declared the Closure Area site was to be remediated. In 2001, the approval (DA 293-08-00) was granted for the remediation of the Closure Area, including the demolition and removal of structures and the development of a Multi-Purpose Terminal (MPT) comprising a container terminal and a General Cargo Handling Facility (GCHF) and associated road, rail and wharf infrastructure and dredging of the south arm of the Hunter River.

Voluntary Remediation Agreement No. 26025 for the remediation of the former Closure Area was issued by the NSW Environmental Protection Agency (EPA) on 30 August 2005. The remediation included the erection of a subterranean barrier wall and a containment cell that are located within expansion area.

In March 2008, a Contaminated Site Management Plan (CSMP) for the Closure Area was prepared by HCCDC as required by the conditions for DA 293-08-00. The CSMP provided a common framework to be applied across the whole of the site for the design, implementation, completion, use and maintenance of remediation and project works. HDC completed the remediation works in two stages between 2008 and 2011. Following the completion of the remediation works, the site was capped in anticipation of future development for port and related industries.

The voluntary remediation agreement was repealed by the EPA in 2018 and replaced by Ongoing Maintenance Order No. 20142802 which works with the current CSMP to manage contamination issues at the Mayfield Cargo Storage Facility and the expansion area.

Applicable mitigation measures from the Maintenance Order No. 20142802 are summarised in Section 4.0 of the CSMP, with further maintenance, mitigation measures, and monitoring requirements applicable to Mod 4 in Section 15.0 of the CSMP.

The former BHP berth (adjacent to the Mayfield No. 4 Berth) is proposed to be remediated in late 2026. Remediation activities for the BHP berth do not form part of this proposed modification as remediation is an approved activity under DA 293-08-00. The expansion area will be hardstanded under DA 293-08-00. As such, the relevant conditions of DA 293-08-00 to this modification report are listed in Table 2.1

Table 2.1 Relevant Conditions of DA 293-08-00

Condition	Applicability to Mod 4
2.1 The Applicant must implement all practicable measures to prevent or minimise any harm to the environment that may result from the construction, operation, and where relevant, the decommissioning of the development	Mitigation measures are discussed in Section 9.
3.1 Throughout the life of the development, the Applicant must secure, renew, maintain, and comply with all the relevant statutory approvals applying to the development	Applicable legislation and regulation is provided in Section 6.
5.7 Noise emissions arising from demolition and site remediation of the closure area and construction of the MTP, and associated activities must not exceed …..	Noise is addressed in Section 8.4.
5.15 Activities occurring at the premises must be carried out in a manner that will minimise emissions of dust from the premises	Air quality is addressed Section 8.6.
5.17 The Closure Area as identified in Figure 1.3 of the EIS: Layout of the Steelworks Site Showing the Closure Area and MPT, other than the proposed hard stand paved areas, and pre-construction surfaces must:	-
(a) have a seal bearing layer consisting of a properly designed and engineered layer of material. This layer must consist of a material at least 500 mm thick and have a permeability less than K = 10-7ms-1; and	Description of capping provided in Section 5.2.
(b) be constructed and maintained to permit free drainage and to avoid surface water ponding; or	Description of drainage is provided in Section 8.5.
(c) an alternative seal bearing layer that meets the objectives of (a) and (b) above and demonstrates a high level of engineering reliability may be approved in writing by the EPA.	Hardstand for the expansion area to be completed to meet this condition.

2.4 Mayfield Concept Plan (MP 09_0096)

The Mayfield Cargo Storage Facility and the expansion area are within the Mayfield Concept Plan (MCP) area and are subject to the conditions of the MCP approval (MP 09_0096) as modified.

The MCP was approved by the Minister under section 75M of the EP&A Act on 16 July 2012 to enable development within the remediated portion of the former Closure Area. The MCP covers 90 hectares of port-side land to be developed for land-based port facilities serving a mix of cargo types. The MCP also includes supporting road and rail infrastructure to service the port facilities.

This Modification Report considers the relevant requirements of the MCP approval, specifically the conditions listed in Table 2.2. The development as modified will be generally consistent with the MCP.

Table 2.2 Relevant Conditions of the Mayfield Concept Plan

Condition	Applicability to Mod 4
2.1 Under section 75P(2)(c) of the Act, the following environmental assessment requirements apply with respect to future development that is subject to Part 4 (other than complying development) or Part 5 of the Act:	-
(a) demonstration that the project is generally consistent with the requirements of this approval and with the scope and intent of the Concept Plan outlined in the documents under requirement 1.1 of this approval	Refer to this table (Table 2.2).
(b) detailed project description, including construction, operation, maintenance, and staging; and the design and location of ancillary infrastructure (including consideration of the Utilities Infrastructure Plan prepared as a requirement of this approval)	Refer to Section 5.
(c) details of the consultation process and outcomes with relevant stakeholders, including with (but not limited to): (i) Government authorities, such as DP&I, OEH, EPA, DPI, Transport for NSW, HDC and Council. (ii) Service and infrastructure providers, such as ARTC, RailCorp, Ausgrid, Hunter Water Corporation and Jemena. (iii) Special interest groups and the public, including adjoining and affected landowners.	Consultation outcomes with applicable stakeholders are provided in Section 7.
(d) an updated environmental assessment of relevant statutory matters and Issue Specific requirements for construction and operation (including cumulative impacts of existing and approved development on the site and on adjoining sites) and the identification of relevant avoidance, mitigation, and management measures to address associated impacts.	An environmental assessment is provided in Section 8. Cumulative impacts and mitigation measures are discussed in Section 8.9 and Section 9, respectively.
(e) a Transport Assessment that assesses the transport, access and traffic impacts from projects associated with this Concept Plan. The assessment shall:	Traffic impacts are discussed in Section 8.2.
(i) Consider the transport limits and objectives of the Concept Plan, including the objective of not exceeding the total truck movement limits identified in requirement 2.3.	The modification is consistent with the limits and objectives of the MCP. The proposed movements do not exceed the total truck movement limits as detailed in Section 8.3.2.
(ii) Consider freight volume forecasts and transport demand.	Freight volumes are discussed in Section 8.3.2.
(iii) Consider the Transport Infrastructure Strategy (if required) and identified infrastructure, service improvements or management measures (if identified).	N/A
(iv) Consider the traffic performance and functionality of the local, regional, and State road network and site access, including the consideration of development within the vicinity of the Concept Plan site (including connecting road networks) and the cumulative impacts from adjoining development	Traffic performance and functionality is assessed in Section 8.3.2.
(v) Consider rail impacts associated with the Proposal, including network capacity and the availability of rail access and paths, rail operations on the Port Waratah and Bullock Island loops, and rail access and interface agreements	This modification will not have any impacts on rail services or infrastructure.
(vi) Consider the Transport Monitoring and Review results undertaken as a requirement of this approval	PON would continue to undertake reporting as required by the MCP *Traffic Monitoring and Review Plan.*
(vii) Identify rail and road infrastructure requirements, including those specified in this approval and the corresponding exceptions	No adjustments to road and rail infrastructure would be required under the proposed modification.

Condition		Applicability to Mod 4
(viii)	Identify traffic management measures consistent with the requirements of the Traffic Management Plan required under this approval	No new traffic management measures are required as detailed in Section 8.3.3.
(ix)	Identify rail service and infrastructure changes and upgrades, and initiatives to facilitate an increased rail share of freight movements	This modification will not have any impacts on rail services or infrastructure. No service or infrastructure changes are proposed.
(x)	Consider construction traffic routes and associated traffic impacts, including capacity constraints, changes to access and safety impacts, and	No construction activities are proposed.
(xi)	Include consideration of relevant road and rail design standards including but not limited to Austroads Guide to Road Design 2009 (with Transport for NSW supplements), Australian Standards, and Newcastle Development Control Plan 2005 – Element 4.11 (Subdivision).	No construction activities are proposed.

3. Strategic context

3.1 NSW Climate Change Policy Framework

The NSW Government released the NSW Climate Change Policy Framework (NSW Government, 2016), which commits NSW to the aspirational objectives of achieving net zero emissions by 2050 and helping NSW to become more resilient to a changing climate.

The policy framework defines the NSW Government's role in reducing carbon emissions and adapting to the impacts of climate change. The Net Zero Plan Stage 1: 2020–2030 (Net Zero Plan) outlines how the NSW Government's climate change objectives will be achieved and is released in stages to enable evolving technologies to be incorporated into future stages and to allow for continual improvement over time with the aim of achieving net zero emissions by 2050.

Net Zero Plan Stage 1: 2020-2030

The Net Zero Plan outlines four key priorities in regard to emission reductions to 2030. These are:

– Drive uptake of proven emission reduction technologies.
– Empower consumers and businesses to make sustainable choices.
– Invest in the next wave of emissions reduction innovation.
– Ensure the NSW Government leads by example.

As one of three global ports in NSW, PON is well placed to accommodate the import and storage of renewable components, including lithium-ion battery units. PON currently supplies the Hunter, New England, and Central-West Orana Renewable Energy Zones (REZs) with essential components to build wind turbines and battery storage systems. PON will continue to have a key role in the delivery and supply chain of renewable energy projects that are essential to meeting the NSW Government emission targets.

The modification is consistent with the focus on renewables and the vision of the Net Zero Plan.

3.2 Freight Policy Reform Program

The NSW Freight and Ports Plan 2018–2023 has expired. In June 2025, the NSW Government endorsed and released the Freight Policy Reform final paper, *Delivering Freight Policy Reform in NSW.* The Freight Policy Reform Program now provides the roadmap for short, medium, and long-term actions to enhance safe, productive, and sustainable freight systems across NSW. It responds to the evolving needs of industry, government, and communities. The paper confirms:

> *"The uncertain future of the Port of Newcastle, the world's largest coal terminal, justifies the port's plans for diversification and expanding into container trade and other opportunities"* (Transport for NSW, 2025).

The modification is consistent with the Freight Policy Reform Program as it is expanding the capability to store the general cargo including lithium-ion battery units to support the energy transition and emerging sector trade.

3.3 Hunter Regional Plan 2041

The Hunter Regional Plan 2041 (DPE, 2022) sets the strategic land use framework for continued economic growth and diversification in one of Australia's most diverse and liveable regions, with the aim to unlock sustainable growth opportunities and investments.

The modification aligns with Objective 1 (Diversifying the Hunter's mining, energy, and industrial capacity) and Objective 7 (Reach net zero and increase resilience and sustainable infrastructure) of the plan by supporting the development of renewable energy industries as coal fired power stations in the region are decommissioned.

3.4 Greater Newcastle Metropolitan Plan 2036

The Greater Newcastle Metropolitan Plan 2036 (DPE, 2018) plan positions Newcastle as being an emerging hub for lifestyle and environmental resilience. Transitioning to a service, creative and knowledge city will better equip Newcastle to be able to adapt to changing global environmental priorities and needs.

Four key priorities have been identified:

– Create a workforce skilled and ready for the new economy.
– Enhance environment, amenity, and resilience for quality of life.
– Deliver housing close to jobs and services.
– Improve connections to jobs, services, and recreation.

The modification would align with *Strategy 3 - Increase domestic and global trade capabilities at Newcastle Port*, as it would increase domestic and global trade capabilities at the Port. The modification would also align with *Strategy 15 - Plan for a Carbon Neutral Greater Newcastle by 2050*, as it would support grid-scale battery projects within the region to move the city to a Carbon Neutral position by 2050.

3.5 Port Master Plan 2040

The Port Master Plan 2040 (PON, 2019) is a strategic blueprint for the region and underlines significant investment opportunities that will support the prosperity and diversification of the Newcastle and Hunter economies into the future. PON is a major seaport with connectivity to a world-class national rail and heavy vehicle road system, a shipping channel that is currently only operating at 50 percent capacity and supported by vacant portside land that can be developed.

The PON has embarked on an ambitious diversification strategy. Whilst coal exports provide a stable foundation for growth, the Port Master Plan 2040 is driven by the need to grow and diversify to meet the demands of customers and the containerisation of some trades.

The modification is consistent with the Port Master Plan 2040 as it is aligned with the objectives of sustainable, diversified growth as well as meeting future demands for imports from emerging sectors such as grid scale batteries and wind farms, supporting the renewable energy transition.

4. Modification alternatives

4.1 Alternative sites

Available land elsewhere within the MCP area was considered as an alternative to expanding the Mayfield Cargo Storage Facility to the south-west. These areas were subsequently excluded as it was considered more appropriate to modify DA 293-08-00. A modification to DA 239-08-00 would be sought separately.

4.2 Do-nothing option

The do-nothing option is not appropriate as it will not result in the benefits of the modification, including:

– Not increasing PON's capacity to support renewable energy projects and the energy transition in the region.
– Not maximising opportunities to diversify PON's commercial offerings in line with the Port Master Plan 2040, regional plans and freight policy reform program.

Existing operations could continue, however the efficiency and functionality of the Mayfield Cargo Storage Facility would be constrained long term as the site nears capacity. The do-nothing option is not considered a feasible long-term solution.

4.3 Preferred option

The proposed area selected for additional general cargo storage has the below necessary characteristics:

– Access to a deep-water channel and berth.
– Access to a berth with landside design capacities to manage large and heavy loads.
– Connection to the arterial road network to enable land transportation.

The expansion area is ideally located adjacent to the existing approved Mayfield Cargo Storage Facility, and is suitable to store large renewable energy project components.

5. Modification description

5.1 Overview

The proposed modification is to expand the boundary of the existing Mayfield Cargo Storage Facility to include the adjacent area to the south-west (the expansion area) to store general cargo including lithium-ion battery units, as per the existing approval.

The modification is consistent with the previously approved DA 8137, MP 09_0096 and DA 293-08-00.

The entire expansion area would be used for the storage of cargo. No new uses or cargo types are proposed, and no changes to site operations are required.

5.2 Expansion area

The expansion area is approximately six hectares in area, and triangular in shape. The north-western boundary is approximately 275 metres long and runs alongside Steelworks Road from the ARTC railway line, up to the existing boundary of the Mayfield Cargo Storage Facility.

The southern boundary is approximately 470 metres long and runs from Steelworks Road, alongside the ARTC railway line to the southern-most extent of the existing Mayfield Cargo Storage Facility boundary. Fencing along the southern boundary will be setback from the railway line in accordance with the easements listed on the title.

The north-eastern boundary is 440 metres long and adjoins the southern boundary of the Mayfield Cargo Storage Facility.

The area is highly disturbed and is currently characterised by scour protection and grass coverage. Remediation works for the former BHP Steelworks occurred on the site in two stages between 2008 and 2011, in accordance with the CSMP for DA 293-08-00. These remediation works included capping with a 500-millimetre virgin excavated natural material (VENM) layer and aggregate scour protection.

The expansion area includes a portion of a subterranean barrier wall installed as part of the site remediation (refer to Section 2.3) and is located towards the western boundary. A subterranean containment cell is present in the centre of the expansion area.

Figure 5.1 shows the locations of the existing Mayfield Cargo Storage Facility boundary, the expansion area boundary, the barrier wall and the containment cell.

Paper Size ISO A4

0 100 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

Port of Newcastle
Modification 4

DA 8137 Mod 4 – Proposed modification layout

Project No. **12622176**
Revision No. **A**
Date **5/03/2026**

FIGURE 5.1

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Print date: 05 Mar 2026 - 13:18

Data source: Railways, Roads, Waterways, Cadastre - NSW Spatial Services World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. World_Hillshade: Esri, Geoscience Australia, NASA, NGA, USGS, Nearmap WMS Server: . Created by: sgoode

5.3 Use of the expansion area

The use of the expansion area would be the same as per the existing consent for the Mayfield Cargo Storage Facility, which is for an open-air cargo storage facility includes storage for (but is 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 such as steel or timber products.
- Containerised cargo.
- Lithium-ion battery units.

The entire expansion area is proposed to be used for the storage of cargo. No new use or cargo type to be stored are proposed. No change to the site operations is proposed.

5.4 Dangerous goods – Lithium-ion battery units

Lithium-ion battery units are classified as Class 9 Miscellaneous Dangerous Goods under the *Australian Dangerous Goods Code* (ADG Code). As the existing consent includes storage of lithium-ion battery units, the preliminary hazard analysis (PHA) for DA 8137 - Modification 3 (GHD 2025) has been updated (Appendix A) to include the storage of lithium-ion battery units within the expansion area. The updated PHA is summarised in Section 8.1.

5.5 Workforce

The modification does not propose changes to the workforce requirements outlined in the approval.

5.6 Equipment

The modification does not propose changes to the approved equipment requirements outlined in the approval.

5.7 Operating hours

The Mayfield Cargo Storage Facility has approval to operate 24 hour per day, seven days per week. The modification does not propose changes to the approved operating hours.

5.8 Access

The modification does not propose changes to the existing site access to Industrial Drive, which is managed in accordance with the MCP Traffic Management Plan.

5.9 Services

No service or utility connections are proposed as part of the modification. No further consideration of the MCP *Utilities Infrastructure Plan* (AECOM, 2015) is required.

5.10 Proposed amendments to conditions of consent

Conditions relevant to the proposed modification for both DA 8137 and MP09_0096 are provided in Table 5.1.

Table 5.1 Existing conditions of consent relevant to the proposed modification

Relevant Condition	Consistency with the proposed modification
DA 8137	
B1. The Development is permitted to operate the development 24 hours-a-day, seven days-a-week.	The proposed modification does not seek to change hours of operation for the development.
B2. The Applicant must ensure that noise generated by the development does not exceed the noise limits in Table 1.	The proposed modification does not seek to change noise limits approved under DA 8137.
B3. The Applicant must: a) ensure noise from the site does not exceed the noise quotas provided by the PoN in accordance with the Site Noise Model; and b) comply with the directions of the PoN in relation to the management of noise from the Site.	
B4. The Applicant must: a) implement all reasonable and feasible noise management and mitigation measures to prevent and minimise noise from the site; b) implement, where possible, a safe system so that tonal movement alarms, such as reversing beepers, are not needed on the site; c) maintain the effectiveness of any noise suppression equipment or plant at all times and ensure defective plant that may generate offensive noise is not used operationally until fully repaired; and d) regularly assess noise monitoring data and relocate, modify and/or stop operations to ensure compliance with the relevant conditions of this consent.	
B20. The storage and handling of lithium-ion battery units must be undertaken in accordance with: a) Fire and Rescue NSW position statements:… b) Preliminary Hazard Analysis dated02 May 2025 prepared by GHD Pty Ltd and the Preliminary Hazard Analysis Addendum dated 09 July 2025 prepared by GHD Pty Ltd	The proposed modification does not seek to change storage and handling procedures associated with lithium-ion battery units approved under DA 8137.
MP09_0096	
2.2 Projects associated with this Concept Plan shall be operated with the objective of not exceeding the capacity of the transport network, including the local, regional and State road network, and the container freight road volume and traffic movements identified in Table 1, subject to the identified exceptions, which will be considered in future project assessments.	The proposed modification does not seek to change traffic movement limits approved under MP09_0096.
2.3 Projects associated with this Concept Plan, involving the movement of container freight by road, shall not exceed the total limits presented in Table 1, except as identified.	
2.18 The Proponent shall, in relation to any project associated with the Concept Plan in the Container Terminal Precinct, assess and implement feasible and reasonable noise mitigation measures to reduce traffic noise impacts associated with the total Concept Plan (including container road freight movements up to 700,000 TEU) on sensitive receivers where exceedances of traffic noise criteria have been predicted. The application of mitigation measures shall be consistent with the requirements of the NSI4/ Road Norse Policy (DECCW, 2011).	
2.11 Projects associated with this Concept Plan approval shall be designed, constructed and operated with the objective of meeting the overall site pollutant performance criteria described in Table 11-6 (or as may be updated in the source documents), of the document referred to in requirement 1 .1b), including the utilisation of industry accepted air quality management measures for the transport, handling and storage of pollutant sources.	The proposed modification does not seek to change the material classes approved for storage.
2.17 Projects associated with this Concept Plan approval shall be designed and operated with the objective of complying with the amenity noise goals at sensitive residential receivers as detailed in Table 4.	The proposed modification does not seek to change noise limits approved under MP09_0096.

5.11 Comparison between the approved project and the modification

A comparison of the approved project and the proposed modification is provided in Table 5.2.

Table 5.2 Comparison between the approved project and the modification

Project Activity	Approved Project	Proposed modification
Boundary	18.6 hectares	Addition of 6 hectares to the south-west of the approved Mayfield Cargo Storage Facility (the expansion area), increasing the area to 24.6 hectares
General cargo storage	General cargo storage at the Mayfield Cargo Storage Facility	No change
Dangerous goods	Lithium-ion battery unit storage at the Mayfield Cargo Storage Facility	No change
Workforce	Approx. 18 staff to operate the Mayfield Cargo Storage Facility	No change
Equipment	Use of trucks, forklifts, etc.	No change
Operating hours	24 hour per day seven days per week	No change
Access	Access through Selwyn Street, Quayside Close and an internal PON road	No change
Services	No services are connected to the Mayfield Cargo Storage Facility	No change

6. Legislation and regulation

6.1 Newcastle Local Environmental Plan 2012

The expansion area is located within the Newcastle LGA which is generally subject to the provisions of the *Newcastle Local Environmental Plan 2012* (LEP 2012). However, the expansion area is located within the Lease Area, as defined by the Transport and Infrastructure SEPP. As detailed in Chapter 5 of the Transport and Infrastructure SEPP, the LEP 2012 does not apply to the modification and no further consideration of the LEP 2012 is required.

6.2 New South Wales legislation

6.2.1 *Environmental Planning and Assessment Act 1979*

The EP&A Act and *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) provide the framework for environmental planning in NSW and include provisions to ensure that proposals which have the potential to impact the environment are subject to detailed assessment and provide the opportunity for public involvement. This modification would be assessed by the NSW Department of Planning, Housing and Infrastructure (DPHI) under Part 4 of the EP&A Act.

The EP&A Act requires a proposed modification to be assessed against matters for consideration included in section 4.55(2). Table 6.1 below summarises the consistency of the proposed modification with section 4.55(2) of the EP&A Act.

Table 6.1 Consistency of the modification with section 4.55 (2) of the EP&A Act

Matter for consideration	Consistency with EP&A Act section 4.55 (2)	Comment
4.55 (2) Other modifications. A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if –	Consistent	The Proponent can apply for a modification to the consent.
a. it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and	Consistent	The modified development will be substantially the same development as the development for which the consent was originally granted. No changes are proposed to the category of cargo storage, hours of operation, workforce requirements, and services and utilities. The modified development will operate in accordance with the existing development consent and applicable management plans.
b. it has consulted with the relevant Minister, public authority, or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and	Consistent	The modification is not anticipated to result in any changes to the conditions of the consent.

Matter for consideration	Consistency with EP&A Act section 4.55 (2)	Comment
c. it has notified the application in accordance with –	N/A	-
i. the regulations, if the regulations so require, or	N/A	-
ii. a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising applications for modification of a development consent.	N/A	A development control plan is not relevant to this modification.
d. It has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.	Consistent	The Proponent will respond to any submissions received during the assessment period. Consultation is further detailed in Section 7 - Consultation.

6.2.2 *State Environmental Planning Policy (Transport and Infrastructure) 2021*

Chapter 5 of the Transport and Infrastructure SEPP is the relevant planning instrument for the subject site, as it is located within the Lease Area of the SEPP.

Permissibility

Pursuant to Chapter 5 of the Transport and Infrastructure SEPP the site is zoned SP1 - Special Activities. The objectives of this zone, prohibited development and development permissible with and without consent are defined below:

Zone SP1 Special Activities

1 Objectives of zone

- *To provide for special land uses that are not provided for in other zones.*
- *To provide for sites with special natural characteristics that are not provided for in other zones.*
- *To facilitate development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land.*
- *To maximise the use of waterfront areas to accommodate port facilities and industrial, maritime industrial, freight and bulk storage premises that benefit from being located close to port facilities.*
- *To enable the efficient movement and operation of commercial shipping and to provide for the efficient handling and distribution of freight from port areas through the provision of transport infrastructure.*
- *To provide for port related facilities and development that support the operations of Port Botany, Port Kembla, and the Port of Newcastle.*
- *To facilitate development that by its nature or scale requires separation from residential areas and other sensitive land uses.*
- *To encourage employment opportunities.*

2 Permitted without consent

Jetties; Moorings; Roads

3 Permitted with consent

Capital dredging; Environmental facilities; Environmental protection works; Food and drink premises; Maintenance dredging; Navigation and emergency response facilities; Neighbourhood shops; Port facilities; Wharf or boating facilities; Any other development not specified in item 2 or 4

4 Prohibited

Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Artisan food and drink industries; Camping grounds; Caravan parks; Cemeteries; Centre-based child care facilities; Commercial premises; Community facilities; Correctional centres; Crematoria; Early education and care facilities; Eco-tourist facilities; Educational establishments; Entertainment facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Funeral homes; Health services facilities; Highway service centres; Home businesses; Home occupations; Home occupations (sex services); Industrial retail outlets; Mortuaries; Open cut mining; Places of public worship; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Residential accommodation; Respite day care centres; Restricted premises; Rural industries; Sex services premises; Tourist and visitor accommodation; Veterinary hospitals; Wholesale supplies

The modification would be characterised as port facilities, being "facilities on land in the Lease Area used in connection with the carrying of freight and persons by water from one port to another for business or commercial purposes, and includes … facilities for the loading or unloading of freight onto or from vessels and freight receival, processing, land transport and storage facilities". The land use is permissible with consent in the SP1 zone.

The modification is consistent with the objectives of this zoning in that the modification will expand the freight handling capacity of the port. The modification satisfies the objective of the zone to "maximise the use of waterfront areas to accommodate port facilities and industrial, maritime industrial, freight and bulk storage premises that benefit from being located close to port facilities".

6.2.3 State Environmental Planning Policy (Resilience and Hazards) 2021

The *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) contains provisions which require consideration against three primary areas, being:

– Remediation of land
– Hazardous and offensive development
– Coastal management

6.2.3.1 Remediation of land

Chapter 4 of the Resilience and Hazards SEPP provides a state-wide planning approach for the remediation of contaminated land. Clause 7 of the Resilience and Hazards SEPP requires a consent authority to consider whether the land is contaminated and whether it is suitable (or can be made suitable) for the proposed development. A CSMP applies to the entire Closure Area (the former BHP Steelworks site), which forms part of the voluntary remediation agreement prepared under the CLM Act.

The expansion area was subject to remediation works outlined within the voluntary remediation agreement, including capping of the area and erection of a subterranean barrier wall and a containment cell. The EPA determined that the contamination at the land is no longer considered to be significant enough to warrant regulation and replaced the voluntary remediation agreement with an Ongoing Maintenance Order (No. 20142802), under Section 28 of the CLM Act, which works with the adopted CSMP to manage contamination issues.

Contamination is discussed further in Section 8.2 of the environmental impact assessment.

6.2.3.2 Hazardous and offensive development

Chapter 3 of the Resilience and Hazards SEPP regulates the determination of development applications to carry out development for the purposes of a potentially hazardous industry or potentially offensive industry. The modification would storage of lithium-ion battery units, which are classified as Class 9 Miscellaneous Dangerous Goods. To assess if the proposed modification is potentially hazardous, the PHA prepared for Mod 3 to DA 8137 has been revised for the modification in accordance with the DPHI Hazardous Industry Planning Advisory Papers (HIPAPs) No.4 and No.6, as well as *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines,2011* (DoP, 2011). The findings of this assessment are summarised in Section 8.1 and in full in Appendix A.

6.2.3.3 Coastal management

Chapter 2 of the Resilience and Hazards SEPP does not apply in the Lease Area, therefore the coastal protection development controls in the Resilience and Hazards SEPP have not been considered for the modification. Refer to Clause 2.5 (2) below

> ***2.5 Relationship with other environmental planning instruments***
>
> *(1) In the event of an inconsistency between this Chapter and another environmental planning instrument, whether made before or after the commencement of this Chapter, this Chapter prevails to the extent of the inconsistency.*
>
> *(2) This Chapter does not apply to land within the Lease Area within the meaning of* ***State Environmental Planning Policy (Three Ports) 2013****.*

6.2.4 *Protection of the Environment Operations Act 1997*

The *Protection of the Environment Operations Act 1997* (POEO Act) prohibits any person from causing pollution of waters or air and provides penalties for air, water, and noise pollution offences.

Schedule 1 of the POEO Act identifies 'scheduled activities' that are required to be licensed by the NSW EPA.

The storage of lithium-ion battery units does not fall within the scope of Clause 9 (chemical storage) of Schedule 1 of the POEO Act, given batteries are defined under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* (the Code) as an Article. This is because batteries are a finished product, not a chemical substance being stockpiled or otherwise stored. Reference is made to Clause 9 of Schedule 1:

> *POEO Act – Schedule 1:*
>
> *9 Chemical storage*
>
> *1 - This clause applies to the following activities—*
>
> *general chemicals storage, meaning the storage or packaging in containers, bulk storage facilities or stockpiles of any* ***chemical substance*** *classified as a dangerous good in the* ***Transport of Dangerous Goods Code****, other than the following—*
>
> *(a) petroleum or petroleum products,*
>
> *(b) radioactive substances within the meaning of the Protection from Harmful Radiation Act 1990.*

The Code generally refers to dangerous goods as either substances or articles, for instance Section 3.1.1.2 of the Code states:

> *Where a* ***substance or article*** *is specifically listed by name in the Dangerous Goods List, it must be transported in accordance with the provisions in the List which are appropriate for that* ***substance or article****.*

While "substance" is not defined in the Code, the Code does define "article" as follows:

> ***Article***** means a* ***manufactured item****, other than a fluid or particle, that:*
>
> *is formed into a particular shape or design during manufacture; and*

(b) has hazard properties and a function that are wholly or partly dependent on the shape or design – and includes automotive and marine batteries and ***other large batteries*** *such as those used in telecommunications facilities, small and other assorted batteries, aerosols, gas-filled lighters, seat belt pre-tensioners and refrigerating machines.*

As a result, the lithium-ion battery units are not considered a “chemical substance” for the purposes of the POEO Act, and their storage is therefore not a scheduled activity under the POEO Act. The modification does not trigger the need for an EPL.

6.3 Commonwealth legislation

6.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Environment and Energy for actions that may have a significant impact on matters of national environmental significance (MNES).

The matters listed in the EPBC Act that must be addressed when assessing the environmental impacts of a development are:

– World heritage properties.
– National heritage places.
– Ramsar wetlands of international significance.
– Threatened species and ecological communities.
– Migratory species.
– Nuclear actions (including uranium mining).
– Commonwealth marine areas.
– Great Barrier Reef Marine Park.
– A water resource in relation to coal seam gas development and large coal mining development.

The modification does not anticipate impact on MNES listed under the EPBC Act.

Section 7.17 of the BC Act specifically relates to modifications of planning approvals and requirements for further biodiversity assessment reports. Section 7.17(2)(c) is relevant to the proposed modification, given that the expansion area will not increase impact on biodiversity values and a biodiversity development assessment report is not required.

7. Consultation

7.1 Agency and stakeholders

Agencies and stakeholders were notified about the proposed modification via letter on 24 November 2025 and given the opportunity to provide comments. This includes:

– NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)
– City of Newcastle
– Stolthaven
– Fire and Rescue NSW
– NSW EPA
– Transport for NSW (TfNSW)

InfraBuild, the Rail Infrastructure Manager of the rail siding at Mayfield, were also notified about the Modification on 20 March 2025.

Table 7.1 outlines the comments received from each stakeholder.

7.2 Community

PON has quarterly meetings with the community liaison group. At the meeting on 25 November 2025, PON briefed the group on the proposed modification and provided an opportunity for discussion. No concerns or issues were raised, rather the proposal was received positively.

PON will continue to discuss the modification at future meetings, as it progresses through the assessment process and ultimately operation.

Table 7.1 Relevant stakeholders and comments received to date

Stakeholder	Notification date	Response date	Response comments	PON Response
DCCEEW	24/11/2025	22/12/2025	Hunter-Central Coast for DCCEEW's Conservation Programs, Heritage & Regulation Group (CPHR) acknowledged the letter, and raised questions about potential flood impacts.	PON acknowledged the response comments. The expansion area is not subject to flooding, therefore flooding impacts are not considered further in the Modification Report.
City of Newcastle	24/11/2025	3/12/2025	City of Newcastle acknowledged the letter and enquired about the approval authority.	PON acknowledged the response comments and clarified the application process. The Minister for Planning and Public Spaces (or their delegate) is the consent authority for applications within the Lease Area.
Stolthaven	24/11/2025	3/12/2025	Stolthaven acknowledged the consultation letter and raised queries about potential impacts for hazards and traffic.	PON provided a written response to enquiries from Stolthaven following an in-person discussion with the stakeholder on 17 December 2025.
Fire and Rescue NSW	24/11/2025	None	At the time of preparing this Modification Report, a response from Fire and Rescue NSW was not received.	N/A
NSW EPA	24/11/2025	None	At the time of preparing this Modification Report, a response from the EPA was not received.	N/A
TfNSW	24/11/2025	None	At the time of preparing this Modification Report, a response from Transport for NSW was not received.	N/A
InfraBuild	20/03/2026	None	At the time of preparing this Modification Report, a response from InfraBuild was not received.	N/A

8. Environmental impact assessment

Based on the environmental considerations of the site and surrounds, the exiting approved project and the proposed modification, the following environmental aspects have been identified and assessed in this Modification Report:

- Hazard and risk
- Contamination
- Traffic
- Noise
- Hydrology
- Air quality
- Biodiversity

8.1 Hazard and risk

8.1.1 Overview

The potential hazards and risks for the modification have been identified and analysed to assess any potential impacts, associated with using the expansion area to store lithium-ion battery units.

The PHA report developed for DA 8137 - Modification 3 (GHD 2025) has been updated for this modification (refer to Appendix A). The PHA identified the potential hazards; analysed the hazards in terms of their impact to people and the environment and their likelihood of occurrence; quantified the resulting risk to surrounding land uses; and assessed the risk to demonstrate the proposal would not impose an unacceptable level of risk.

8.1.1.1 Methodology

The NSW Department of Planning, *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines,2011* (Applying SEPP 33) (DoP, 2011) 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 the hazards and risks assessment.

The Chapter 3.1 of the Resilience and Hazards SEPP defines potentially hazardous or offensive industries, where:

> ***potentially hazardous industry*** *means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality—*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment,*
>
> *and includes a hazardous industry and a hazardous storage establishment.*
>
> ***potentially offensive industry*** *means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.*

The following assessments were undertaken to determine the risk profile of the modification:

1. Risk screening

A risk screening was completed, as required by the Resilience and Hazards SEPP, to identify if the development including the modification would be potentially hazardous or potentially offensive according to the Applying SEPP 33.

The risk screening process concentrated on the storage of specific dangerous good classes that have the potential for significant off-site effects. Specifically, the assessment involved 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 were assessed against the Applying SEPP 33 threshold quantities to identify any exceedances required a PHA to be prepared.

2. Hazard identification process

Following screening, a hazard identification (HAZID) process was undertaken, as per the Applying SEPP 33, to determine whether the development including the modification poses significant risk or offence.

The HAZID process is a desktop assessment involving a systematic process to identify any potential off-site impacts. The HAZID process identified potential hazards and highlighted any risks associated with the interaction of the project (as a whole) with the surrounding environment.

The HAZID process identifies the scenarios relevant to the PHA, should it be required.

3. Preliminary Hazard Analysis

Based on the risk screening results, the approved development including the modification does not exceed the Applying SEPP 33 Guidelines thresholds and the development is not classified as 'potentially hazardous'.

A PHA is not strictly required, however GHD conducted an analysis and updated the DA 8137 - Modification 3 PHA to confirm the modification does not pose any significant risk or offence and is consistent with the existing approval.

8.1.2 Impact assessment

8.1.2.1 Risk screening

Dangerous goods screening

A summary of the dangerous goods proposed to be stored onsite during operation of the proposed modification, combined with the existing approved projects, is shown in Table 8.1, including whether the dangerous goods cumulatively exceed the Resilience and Hazards SEPP threshold. Lithium-ion battery units are Class 9 Miscellaneous Dangerous Goods, which are considered to pose little threat to people or property and have no threshold limit within the Applying SEPP 33 risk screening process.

Table 8.1 Dangerous goods proposed to be stored on site

Chemical/ product	UN #	DG class	Packing group	Expected storage quantity	SEPP (Resilience and Hazards) storage threshold	Exceedance of SEPP (Resilience and Hazards) threshold
Lithium-Ion Batteries – **Approved** in Mod 3	3480	9	N/A (contained units)	55 full clusters (50 m x 50 m) and 10 part-clusters (less than 50 m x 50 m)	N/A	Pass (excluded)
Lithium-Ion Batteries – **Proposed** in Mod 4	3480	9	N/A (contained units)	11 full clusters (50 m x 50 m) and 5 part-clusters (less than 50 m x 50 m)	N/A	Pass (excluded)

Chemical/ product	UN #	DG class	Packing group	Expected storage quantity	SEPP (Resilience and Hazards) storage threshold	Exceedance of SEPP (Resilience and Hazards) threshold
Total project (cumulative)	3480	9	N/A (contained units)	66 full clusters (50 m x 50 m) and 15 part-clusters (less than 50 m x 50 m)	N/A	Pass (excluded)

The dangerous good screening indicate that the proposed additional lithium-ion battery storage does not exceed the thresholds within the Resilience and Hazards SEPP. The modification is therefore not considered a 'potentially hazardous or potentially offensive industry'.

Transport screening

This Applying SEPP 33 transport screening relates to the carriage of dangerous goods to and from the port. Table 8.2 shows the transport screening for the operation of the development including the modification. This includes the expected vehicle movements of each dangerous good class and the vehicle movement thresholds according to Applying SEPP 33.

The lithium-ion battery units would typically be transported to the Mayfield Cargo Storage Facility from a berth within the Port of Newcastle. Transport from the port to their final location will be dictated by the customer requirements and occur via trucks (typically two lithium-ion battery units per truck depending on individual unit size), with potentially 300 units requiring movement offsite per month.

Table 8.2 Transport screening

DG Class	Chemical/ product	Combined quantity	Combined transport movements	Transport movements threshold	Exceedance of Applying SEPP 33 threshold
9	Lithium-Ion Battery units (outgoing – via truck)	2 units / truck	38 per week (150 truck movements per month)	>60 per week	Does not exceed threshold

The modification would not increase transport movements above the approved limits specified in the MCP. The transport screening indicates that the existing and proposed movements do not exceed the thresholds within the Resilience and Hazards SEPP.

Other emissions

Lithium-ion battery unit storage will not result in emissions to the environment, given they are not connected/active during storage, and they will not be charged/discharged, there is no noise or vibration emitted. The modification would not be considered 'potentially offensive'.

Risk screening results

The results of the screening indicate that the project (existing and proposed cumulatively) does not exceed any of the thresholds, so the storage of lithium-ion battery units as a whole is not considered 'potentially hazardous' to which a PHA is required. However, based on industry knowledge of battery storage technology and the associated fire risk, a PHA has been prepared.

8.1.2.2 Hazard identification process

Table 8.3 lists the hazards identified for the modification. This analysis of the identified hazards, their potential consequences and proposed mitigation measures has identified that project risks will be controlled to acceptable levels.

Table 8.3 Hazard identification

Risk	Causes	Consequence	Potential for offsite impact
Vehicle interactions within the project area	Vehicle movements in vicinity of personnel	Personal injury	No
Natural hazards	Flooding, earthquake, lightning, fire	Personal injury Asset Damage	No
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 of batteries resulting in impacts between battery units or with other stored cargos[1]	Personal injury / fatality Asset Damage	Yes
Electrical damage of lithium-ion battery units	Rapid heating of individual cells (e.g. lack of venting, thermal runaway reactions) Latent battery fault within individual cells (e.g. OEM design)	Personal injury / fatality Asset Damage	Yes
Thermal damage of lithium-ion battery units	Rapid heating of individual cells (e.g. lack of venting, thermal runaway reactions) Extreme ambient temperatures during summer	Personal injury / fatality Asset Damage	Yes

Note - As no other dangerous goods are permitted to be stored at the Mayfield Cargo Storage Facility, no further consideration of battery interactions with other dangerous goods have been considered.

8.1.2.3 Preliminary Hazard Analysis

The results of the dangerous goods and transport screening indicate that the project does not exceed the Applying SEPP 33 Guidelines thresholds, so the modification is not considered 'potentially hazardous'. However, based on industry knowledge of battery storage technology and the associated fire risks identified in the HAZID process, the PHA from Mod 3 was updated to include the expansion area.

Hazardous materials

Lithium-ion battery units are classified as Class 9 Miscellaneous Dangerous Goods and could cause off-site impacts from a hazardous event.

Thermal runaway is a potential hazard associated with lithium-ion battery units. Thermal runaway is defined as rapid heating with subsequent fire and explosion. Thermal runaway associated with lithium-ion battery units is generally related to damage to or fault of the unit. No operation, only storage, of the lithium-ion battery units is proposed for the modification therefore, the occurrence and risks associated of thermal runaway are significantly minimised.

Consequence determination

A summary of the predicted radiant heat from thermal runaway hazard scenarios is detailed in Table 8.4.

Table 8.4 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

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. The nearest offsite facility, Stolthaven, is approximately 20 metres from the Mayfield Cargo Storage Facility (and 100 m from the expansion area). At this distance radiation from any fire would be negligible.

Risk assessment

The risk criteria for land use and safety planning within HIPAP 4 (DoP, 2011) include onsite and offsite fatality, as well as offsite injury and property damage. The HIPAP 4 fire and explosion risk criteria are detailed in Table 8.5.

Table 8.5 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 Table 8.6.

Table 8.6 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

Based on the updated PHA, the modification is not expected to generate offsite impacts. The risk of injury, fatality or property damage from the modification is negligible and complies with HIPAP 4.

The nearest offsite facility, Stolthaven, is approximately 20 meters from the Mayfield Cargo Storage Facility, and 100 metres away from the expansion 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.

8.1.2.4 Impact summary

The updated PHA for the modification concluded that risk would not exceed the individual fatality or injury risk criteria specified in HIPAP No. 4. Therefore, the modification does not pose any significant risk or offence, consistent with the existing approval.

8.1.3 Mitigation measures

The modification would not require any new or revised mitigation measures.

The modification will be managed by the existing Battery Storage Management Plan and the Battery Fire Emergency Plan, which have been prepared in consultation with Fire Rescue NSW.

8.2 Contamination

8.2.1 Background

The site is on the former BHP Steelworks, which has a long history of contamination and remediation (refer to Section 2.3). The expansion area is managed according to the CSMP, which included the installation of a subterranean barrier wall and a containment cell, both of which are within the boundary of the expansion area. Both the barrier wall and containment cell are shown in Figure 5.1.

The barrier wall is a subterranean groundwater cut-off wall primarily constructed from a mix of soil and bentonite. It was constructed by Regional Land Management Council in 2008, as part of the Stage 1 Remediation Works. It extends 1.2 m below the ground surface to the bottom of the natural sand and alluvial deposits of the Hunter River (30 m to 49 m depth).

Contaminated materials encountered during site earthworks were excavated, classified and placed on site in accordance with a Materials Management Plan. Depending on the classification, some high-risk contaminated material, such as asbestos and benzene, was placed into the sub-surface containment cell during Stage 2B for capping of the site. The containment cell is approximately 6-7 m below the surface.

8.2.2 Impact assessment

The proposed modification is consistent with existing operations and would not change the management of contaminated land. The site will be hardstand prior to use, under DA 293-08-00, to prevent the exposure of contaminated material.

The modification may result in traffic movements over the subterranean barrier wall within the expansion area, however, this is considered low risk. The CSMP states there is a risk of surface and subsurface displacement damaging the integrity of the barrier wall, causing contaminated material and potentially groundwater to escape the remediation cell and enter the surrounding environment, including the Hunter River. The likelihood of this impact occurring is low as the barrier wall has been designed to withstand sustained heavy loads associated with port operations, according to Australian code SM1600 for heavier freight vehicles. Any plant and equipment travelling over the barrier wall would be required to be under the maximum vehicle loading requirements, in accordance with the controls identified in the existing CSMP.

8.2.3 Mitigation measures

No additional mitigation measures are required for the proposed modification. The modification will be managed in accordance with the existing CSMP.

8.3 Traffic

8.3.1 Background

Traffic associated with Mayfield Cargo Storage Facility is managed under the MCP Operational Environmental Management Plan (OEMP) and the MCP Traffic Management Plan (Appendix B).

The OEMP includes the requirement to:

– Detail measures to manage traffic in accordance with the MCP Traffic Management Plan.
– Detail a reporting program in accordance with the MCP's Traffic Monitoring and Review Plan. The reporting program shall include details of traffic movements associated with approved development applications under the MP 09_0096.

Mayfield Concept Plan

Schedule 3 Condition 2.3 of MP 09_0096 states that projects associated within the MCP shall not exceed the total truck movement limits shown in Table 8.7. These are reported on a bi-monthly basis.

Table 8.7 MCP truck movement limits

Total truck movements per annum	Total truck movements per day	Total truck movements in peak periods
462,104	1,268	95

Currently only two projects are operational within the MCP, the Mayfield Cargo Storage Facility and the Stolthaven Fuel Terminal (SSD 7065).

DA 293-08-00

DA 293-08-00 requires an OEMP and Traffic Management Plan describing. The following details from these plans are applicable to traffic movements:

– Truck movements into and out of the site will be steady throughout normal business hours at around five to ten truck movements per hour, peaking at up to 15 to 20 truck movements per hour in line with normal traffic peak hours. When ships are being unloaded or loaded directly onto road transport this may be up to 35 to 40 truck movements per hour.
– At Year 10, peak vehicle movements on a day when a ship is at the berth, including personnel vehicles, may total 800 vehicle movements per day.
– Establishes the heavy vehicle route and sets performance measures for operations by stevedores.

Operational traffic applicable to DA 293-08-00 is managed under the MCP Traffic Management Plan, and reported under the MCP Traffic Monitoring and Review Plan.

Existing traffic movements

The existing traffic movements within the MCP boundary has been drawn from:

– Stolthaven Bi-monthly report (July and August 2024) (Stolthaven Newcastle, 2024).
– MCP (MP 09_0096) Bi-Monthly Traffic Report (September and October 2025) (PON, 2025).

The existing traffic movements as per the abovementioned reports were reviewed against the maximum MCP truck movement limits (Table 8.7) to calculate the remaining total truck movements permitted once the proposed modification is operational. Table 8.8 shows the total existing truck movements (based on 2024 and 2025 data) to then calculate the remaining truck movements permitted under the MCP. This demonstrates the site can accommodate increased traffic movements as a result of the proposed modification, as the site is currently operating well within the approved truck limits set out by MP 09_0096.

Table 8.8 Existing and available truck movements within the MCP

Source	Total truck movements per annum	Total truck movements per day	Total truck movements in peak periods
Existing truck movements	92,023	247	20
Remaining truck movements	372,081	1,021	75

8.3.2 Impact assessment

The modification does not propose changes to the existing traffic routes or the approved traffic limits.

During unloading, trucks would move on internal roads between Port of Newcastle berths, such as M4 and the expansion area. Transport to and from the expansion area would generate approximately 150 truck movements per month. Transport of cargo would occur via approved TfNSW heavy vehicle approved routes.

8.3.3 Mitigation measures

No additional mitigation measures are required, and the proposed modification will be managed under the existing OEMP and Traffic Management Plan.

8.4 Noise

8.4.1 Background

The proposed modification is subject to approval conditions under DA 8137, DA 293-08-00 and MP 09_0096 to manage the impacts of noise.

There is substantial port related and industrial development to the west and east of the expansion area, including the M4 berth, coal storage and shipping, manufacturing, and chemical production. The expansion area is also located near Industrial Drive, which is a main arterial road and approved B-double route connecting industrial facilities in Mayfield and Carrington to major transport routes.

The nearest residential areas are located to the south-west of the expansion area, with closest on Crebert Street, Mayfield approximately 510 metres away. The sensitive receivers on Crebert Steet include low-density residences, an aged care facility and a primary school (refer to Figure 8.1 and Table 8.8).

Paper Size ISO A4

0 100 200 300 400

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Port of Newcastle
Modification 4

Project No. **12622176**
Revision No. **A**
Date **5/03/2026**

Sensitive Receivers

FIGURE 8.1

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Print date: 05 Mar 2026 - 13:03

Table 8.9 Nearest noise sensitive receivers resulting from the modification

Nearest sensitive receiver		
Type	**Address**	**Approximate distance from expansion area (m)**
Residential	Crebert St, Mayfield East	510
Aged care	Crebert St, Mayfield East	550
Education (Mayfield East Public School)	Crebert St, Mayfield East	630

Operational noise sources

The modification would extend the existing operations of the Mayfield Cargo Storage Facility into the expansion area to the south-west. No changes are proposed to operational activities that produce noise. No noise emissions are associated to the storage of general cargo.

Operational noise limits

Section B2 of DA 8137 presents the operational noise limits that apply to the existing approval (see Table 8.10). Sleep disturbance criteria (L_{A1}) is also provided in Table 8.10.

Table 8.10 Operational noise limits

No.	MCP Receiver	Location	Day	Evening	Night		
			LAeq (15min)	LAeq (15min)	LAeq (15min)	LAeq (9hr)	L_{A1} (11min)
R1	A	1 Arthur Street, Mayfield	35	35	35	35	46
R2	B	2 Crebert Street, Mayfield	39	39	39	35	51
R3	-	24 Crebert Street, Mayfield	40	39	39	35	52
R4	C	32 Elizabeth Street, Carrington	35	35	35	35	41
R5	D	186 Fullerton Road, Stockton	35	35	35	35	40

Mayfield Concept Plan – cumulative amenity noise requirements

The proposed modification is subject to the noise requirements of MP 09_0096, namely Conditions 2.16 to 2.20.

Specifically, Condition 2.17 sets out limits for the cumulative noise impact of all projects associated with MCP. This condition is addressed by allocating a noise quota to individual sites. DA 8137 states:

"B3. The Applicant must:

a. ensure noise from the site does not exceed the noise quotas provided by the PON in accordance with the Site Noise Model; and

b. comply with the directions of the PON in relation to the management of noise from the Site."

PON developed a Cumulative Environmental Noise Management Tool (CENMT) and a Site Noise Model as required by Condition 2.16 to address those matters listed in Condition 2.19. The noise quota for the Mayfield Cargo Storage Facility, derived using the CENMT, is presented in Table 8.11.

Table 8.11 MCP noise quota for existing Mayfield Cargo Storage Facility

Noise Monitoring Location	Mayfield Cargo Storage Facility specific MCP noise quota, $L_{Aeq, period}$, dB(A)		
	Day (7:00 am to 6:00 pm)	Evening (6:00 pm to 10:00 pm)	Night (10:00 pm to 7:00 am)
A – 1 Arthur Street, Mayfield	51	40	34
B – 2 Crebert Street, Mayfield	51	41	34
C – 32 Elizabeth Street, Carrington	46	33	34
D – 186 Fullerton Road, Stockton	45	27	27

Should there be any inconsistencies between the noise levels prescribed in MP 09_0096 and DA 8137, MP 09_0096 prevails.

8.4.2 Impact assessment

The modification does not propose changes to noise levels to those experienced during operation of the Mayfield Cargo Storage Facility. The proposed modification would operate within the noise quota limits set by MP 09_0096.

The boundary of the Mayfield Cargo Storage Facility would be expanded and as a result, become closer to sensitive receivers. However, the distance from sensitive receivers is still greater than 500 m, with a substantial buffer from the Intertrade Industrial Site, and Industrial Drive. Despite this, the expansion area is within the MCP area and is a use consistent with that consent

The modification is considered to have a negligible impact on noise.

8.4.3 Mitigation measures

No additional mitigation measures are proposed for the modification. The modification will be appropriately managed by the existing OEMP.

8.5 Hydrology

8.5.1 Background

The Mayfield Cargo Storage Facility area is fully sealed hardstand. The expansion area presently consists of exotic grasses and gravel but would be hardstand under DA 293-08-00.

Surface water runoff from the expansion area is directed via overland flow to the MCP drainage system along the northern boundary. Runoff entering this culvert is then transferred by an underground pipe and discharged directly into the Hunter River. A small portion on the western side of the expansion area drains towards the west via sheet flow into the MCP Western Trunk Drain which then connects directly to the Hunter River. A subterranean barrier wall has been constructed as part of the Stage 1 remediation of the MCP area. It is located under a portion of the expansion area. The barrier wall contains contaminated groundwater from the Hunter River.

The MCP Stormwater Management System report (AECOM, 2015) indicates that the expansion area is not subject to flooding from either oceanic or riverine events under the one percent Annual Exceedance Probability or Probably Maximum Flood scenarios. Accordingly, the potential impacts of flooding have not been further considered.

8.5.2 Impact assessment

Surface water

No modifications to current drainage infrastructure or the MCP Stormwater Management System (Appendix C) are proposed for the expansion area.

The modification would have negligible impact on surface water flows, as runoff is anticipated to be directed to the established drainage network.

There is potential for spills from plant and machinery conducting activities entering the stormwater system and the Hunter River. Stormwater quality is monitored quarterly under the MCP Site Management System, testing for parameters such as oil, grease, and heavy metals to track environmental performance. The modification would not alter the type of plant and machinery at the site, so the impact is anticipated to be negligible.

Groundwater

The modification has the potential to increase traffic movement and loads over the subterranean barrier wall. If not managed appropriately, this could damage the barrier wall and cause contaminated groundwater to escape and flow into the surrounding area and the Hunter River.

The likelihood of this impact occurring is low as the barrier wall has been designed to withstand sustained heavy loads associated with port operations, according to Australian code SM1600 for heavier modern freight vehicles.

Any plant and equipment travelling over the barrier wall would be required to be under the maximum vehicle loading requirements, in accordance with the existing CSMP.

8.5.3 Mitigation measures

No additional mitigation measures for surface water or groundwater are required. The proposed modification will be appropriately managed by existing plans, including the MCP Stormwater Management System, OEMP and CSMP.

8.6 Air quality

8.6.1 Background

The Mayfield Cargo Storage Facility is an open area for storage of cargo, including lithium-ion battery units. The wider area is used for port facilities and industrial land uses, with the main activities being coal handling and export, petroleum storage, manufacturing, shipping, and heavy vehicle transport.

Due to its close coastal location, sea spray is also a characteristic of the air quality environment. These factors combine to generate a relatively high level of background particulate matter in Newcastle.

As the expansion area is located within the MCP, consideration is required of the:

– MCP Site Air Quality Model, and
– MCP Air Quality Monitoring Program

These plans require cumulative consideration of the existing air quality emissions in the MCP area. Monitoring data is published to the PON website (PON, 2025).

8.6.2 Impact assessment

The primary sources of emissions generated by the modification would be from combustion emissions from trucks, vehicles, and plant such as forklifts. These emissions include both products of combustions such as oxides of carbon and nitrogen, as well as particulate matter.

No changes are proposed to the sources of air pollution, including trucking or shipping movements. The storage of general cargo would not generate any air emissions.

8.6.3 Mitigation measures

No additional mitigation measures are required for the proposed modification and air quality will be appropriately managed by the existing OEMP.

8.7 Biodiversity

8.7.1 Background

The expansion area is highly disturbed and of very limited ecological value. The NSW State Vegetation Type Map identified the expansion area as PCT 0 – No native vegetation.

Located about 120 metres south-west of the expansion area is PCT 4020 “Coastal Creekflat Layered Grass-Sedge Swamp Forest”, which is present in small patches. PCT 4020 is associated with the following TECs:

– *Biodiversity Conservation Act 2026* (BC Act) “Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions” – Listed as Endangered.
– EPBC Act “Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions” – Listed as Endangered.

The Swift Parrot (*Lathamus discolor*), listed as critically endangered (EPBC Act) and endangered (BC Act), was sighted once in 2022, about 483 metres from the expansion area. No other sightings in the last 20 years have been recorded. No suitable habitat for this species is available in the proposed modification area.

8.7.2 Impact assessment

The expansion area will not increase impact on biodiversity values.

No threatened flora or fauna is anticipated to be impacted directly or indirectly by the modification.

The expansion area holds minimal quality habitat features for fauna and threatened fauna species. As there are no canopy species, or mid-storey present, foraging and breeding habitat for birds and mammals is not supported.

Due to the disturbed nature of the expansion area, and lack of appropriate breeding and foraging habitat available, it is unlikely that the Swift Parrot would be present within the expansion area or be significantly impacted by the modification. Mitigation measures

No additional mitigation measures to manage potential biodiversity impacts and the modification will occur in accordance with the OEMP and CSMP.

8.8 Other matters

Environmental impacts for other matters are anticipated to be very low, as detailed in Table 8.12.

Table 8.12 Summary of other environmental impact considerations

Environmental Matter	Impact Assessment
Visual	The expansion area is currently partially fenced and primarily consists of a maintained open exotic grassed area with no distinguishing above-ground features. The ARTC railway line runs adjacent to the expansion area, refer to Figure 5.1. The nearest industrial facility is Stolthaven, which is approximately 100 metres to the north-west of the expansion area. The nearest sensitive receivers are located approximately 510 metres and 550 metres south-west of the expansion area. These sensitive receivers consist of residential and aged care premises respectively. Mayfield East Public School is approximately 630 metres south-west of the expansion area. Refer to Table 8.5. The modification does not include any permanent buildings or tall structures. Due to the distances to the nearest sensitive receivers, and surrounding built and industrial landscape, the modification is not expected to impact on the visual amenity or adversely impact on the nearest sensitive receivers.

Environmental Matter	Impact Assessment
Waste	It is expected that small amounts of packaging waste may be generated during the unpacking of general cargo stored at the expansion area. Additional materials, such as timber or similar materials used to secure cargo during shipping, may also be present. Where suitable, this material may be reused during storage operations; otherwise, it would be classified in accordance with the Waste Classification Guidelines (EPA, 2014) and either recycled or disposed of appropriately. There would be negligible change to waste generation, and management compared to the existing approved operations. PON maintains established management practices for handling all materials unloaded from ships, in compliance with Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) quarantine requirements. Once cargo has been unloaded from the ship and placed within the designated storage area, ongoing waste generation is anticipated to be minimal during normal operations.
Social and economic	The modification would service a supply chain need for the wider region by expanding the capacity to store general cargo, including lithium-ion battery units. Lithium-ion battery units play a key component in the development of the renewable energy network within the Hunter Region and across NSW. Several grid-scale battery projects have already been announced as part of the Hunter Central Coast REZ. Importing lithium-ion battery units on an 'as needs' basis is subject to global supply chains, which can be unreliable and cause project delays. The modification would enable for the storage of lithium-ion battery units, so that the risk of delay to projects would be reduced. Therefore, the modification would support social and economic benefits generated though the implementation of renewable projects within the Hunter Region and further across NSW. It is considered that the modification can be undertaken within minimal impact to the environment or community so overall the modification is considered to have a positive social and economic benefit.
Aviation safety	The expansion area is located within 15 kilometres from the Newcastle (Williamtown) Airport. In accordance with the Civil Aviation Safety Authority (CASA) Advisory Circular *AC139-08(0)-Reporting of Tall Structure* any permanent or temporary structure 30 metres or taller within 15 kilometres of the airport requires reporting and approval from the airport. The modification is not proposing any new permanent or temporary structures and therefore would not generate impacts to aviation safety.

8.9 Cumulative impacts

8.9.1 Background

The cumulative impacts of the modification has been considered in relation to the broader MCP area and the Lease Area and its proximity to surrounding industrial and residential areas.

The projects within the area with the potential for cumulative impact include:

– The Newcastle Logistics Precinct – Intertrade Project, to the south.
– Stolthaven, a bulk fuel terminal to the west.

The updated PHA in Appendix A includes a review of the Port of Newcastle Land Use Safety Study (LUSS) (2017), which provides the cumulative risk profile for the Lease Area as well as a future cumulative risk profile taking into account potential developments. The PHA concluded that the modification would not increase cumulative risk.

8.9.2 Impact assessment

Newcastle Logistics Precinct – Intertrade Project

In March 2025 EnergyCo submitted a Scoping Report for the Newcastle Logistics Project to be located on the adjoining Intertrade site located on the opposite side of the rail line to the modification.

Key components of the project include:

– Construction of hardstand and internal roads used for the unloading, loading and storage of materials and equipment for renewable energy projects.
– Operation of mobile equipment comprising of forklifts, cranes, reach stackers and road trucks for movement of materials and equipment for renewable energy projects.
– Stormwater management.
– Construction of bridges over existing stormwater channels, for the provision of access and egress from the hardstand area.
– Internal roads, staff amenity buildings, carpark and other ancillary infrastructure to facilitate operation of the project.
– Utility adjustments.

The Scoping Report indicated construction of the project would commence in late 2026 and operations would commence in 2027. No detailed Environmental Impact Statement was available at the time of writing this Modification Report to allow for a detailed cumulative assessment.

Given the minor nature of the modification, cumulative impacts with the Newcastle Logistics Precinct are considered negligible. Furthermore, any approval granted for the Newcastle Logistics Precinct would need to consider the existing Mayfield DA's including the MP 09_0096 and DA 293-08-00.

Stolthaven Fuel Terminal

Stolthaven Fuel Terminal (SSD 6664) is an approved bulk fuel trade and storage facility, which includes infrastructure for diesel, biodiesel and additive storage tanks, pumping and wharf pipelines, and a four bay truck loading gantry. The operation utilises Mayfield Berth No.7 and receives fuel via ship transfer by pipeline and then distribution of fuels by truck from the facility. Stolthaven Newcastle, the proponent of Stolthaven Bulk Fuel Terminal, also have an SSD approval (SSD 7065) to expand the site to have additional storage capacity for petroleum, diesel, ethanol and jet fuel, and the construction of ancillary infrastructure. SSD 7065 also allows the facility to increase throughput from 1,300 megalitres (ML) per annum to 3,500 ML.

The nature of Stolthaven operations (i.e. fuel handling and storage tanks) have the potential for cumulative hazards associated with thermal runaway resulting from the storage of lithium-ion battery units. Thermal runaway associated with lithium-ion battery units is generally related to damage to or fault of the unit. No operational use (only storage), of the lithium-ion battery units is proposed for the modification therefore, the occurrence and risks associated of thermal runaway are significantly minimised. Notable setbacks are proposed between the nearest lithium-ion battery unit cluster and the Stolthaven Fuel Terminal boundary.

Cumulative impacts of the modification with Stolthaven are anticipated to be minimal due to design setbacks and proposed mitigation measures.

8.9.3 Mitigation measures

No additional mitigation measures are required for the modification. Cumulative impacts associated with the proposed modification will be adequately managed by existing plans.

9. Summary of mitigation measures

The existing operational management plans in place appropriately address the proposed modification and no other mitigation measures are required.

Table 9.1 Summary of potential impacts and required mitigations

Environmental aspect	Potential impact of modification	Substantially the same development	Existing mitigation measures	Additional measures required for the modification
Hazard and risk	Minimal	Yes	– OEMP – Battery Storage Management Plan – Battery Fire Emergency Plan	Nil
Contamination	Minimal	Yes	– OEMP – CSMP	Nil
Traffic	Minimal	Yes	– OEMP – Traffic Management Plan	Nil
Noise	Minimal	Yes	– OEMP	Nil
Hydrology	Minimal	Yes	– Stormwater Management Strategy – OEMP – CSMP	Nil
Air Quality	Minimal	Yes	– OEMP	Nil
Biodiversity	Minimal	Yes	– OEMP – CSMP	Nil
Cumulative	Minimal	Yes	– OEMP – Traffic Management Plan – CSMP – Battery Storage Management Plan – Battery Fire Emergency Plan	Nil

10. Justification and conclusion

This modification is an extension of the DA 8137 boundary (the expansion area) to provide additional storage capacity for general cargo, including lithium-ion battery units.

The proposed modification would enable the Mayfield Cargo Storage Facility to handle the existing approved activities with greater operational efficiency. No other changes are proposed to the approved project, therefore the modification is substantially the same development as approved under DA 8137.

The expansion area is located within land zoned for port and industrial activities and is surrounded by compatible uses. Its proximity to freight networks, deep-water berths, and the State's transmission network positions it as an essential component of NSW's renewable energy supply chain, particularly for the Hunter, New England and Central-West Orana Renewable Energy Zones.

Negligible impacts beyond those already assessed and approved under DA 8137 are anticipated from the proposed modification. No new mitigation measures are required as the modification will be appropriately managed by existing plans and mitigation measures.

The modification would deliver notable social and economic benefits by supporting the efficient import, storage, and distribution of components critical to the State's renewable energy transition. By enhancing operational capacity and reducing potential supply chain bottlenecks, the proposed modification supports PON's diversification strategy, regional productivity and NSW's broader strategic planning and energy transition objectives.

The modification is well-justified and merits approval.

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Appendices

Appendix A

Preliminary Hazard Analysis

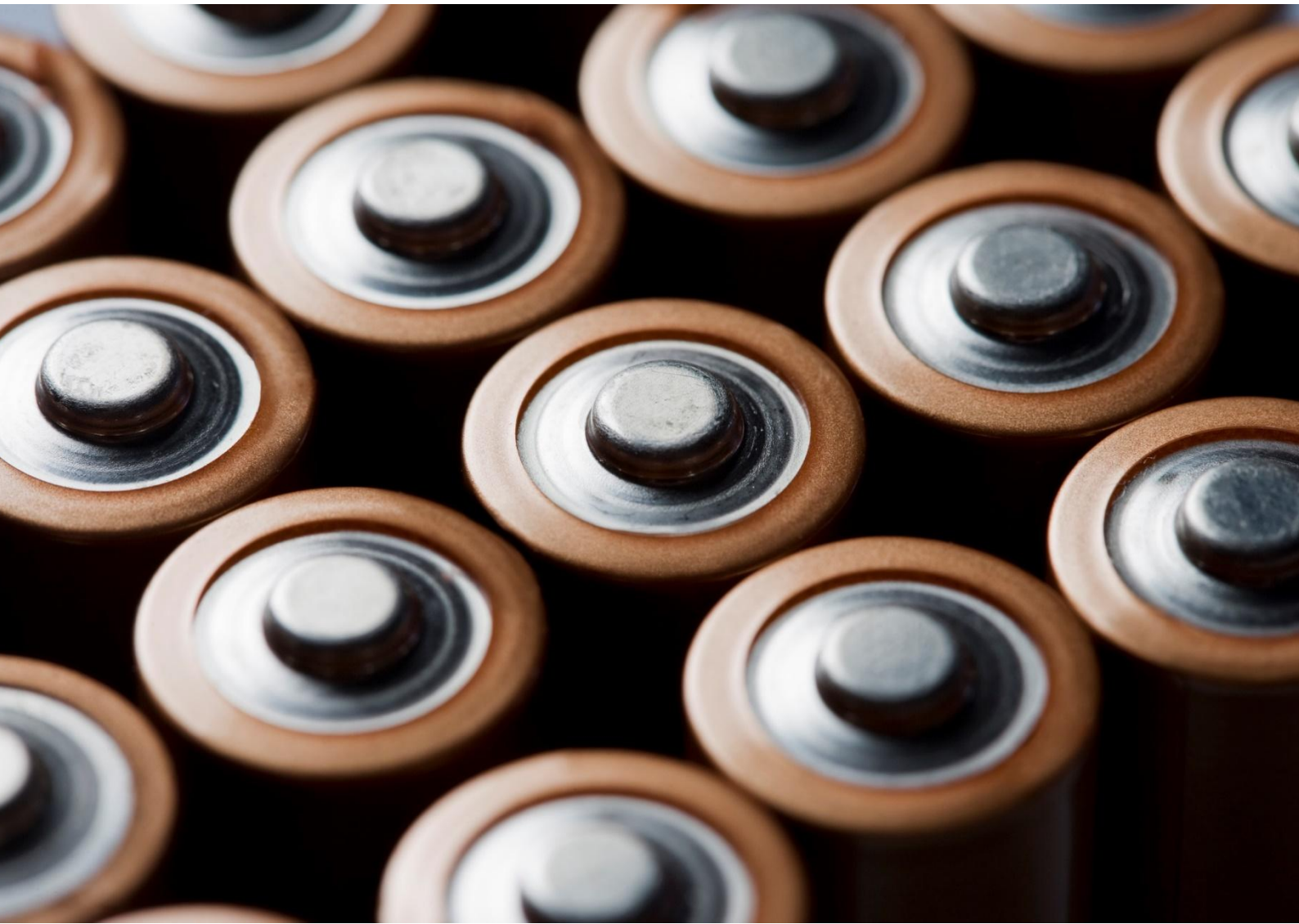
Preliminary Hazard Analysis

Battery Import Project

Port of Newcastle Operations Pty Ltd

20 March 2026

→ The Power of Commitment



Project name		MOD 4 PHA					
Document title		Preliminary Hazard Analysis | Battery Import Project					
Project number		12622176					
File name		12622176-RPT-07-LiB MOD4 PHA.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
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S3	4A	F. Duncan	L. Barnes		S. Murphy		14/01/2026
S4	4	F. Duncan	L. Barnes		S. Murphy		30/01/2026
S4	5	F. Duncan	S. Murphy		S. Murphy		27/02/2026
S4	6	F. Duncan	S. Murphy		S. Murphy		06/03/2026
S4	7	F. Duncan	S. Murphy		S. Murphy		20/03/2026

GHD Pty Ltd | ABN 39 008 488 373
Contact: Fiona Duncan, Executive Advisor | GHD
GHD Tower, Level 3, 24 Honeysuckle Drive
Newcastle, New South Wales 2300, Australia
T +61 2 4979 9999 | **F** +61 2 9475 0725 | **E** ntlmail@ghd.com | **ghd.com**

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Abbreviations

Abbreviation	Description
ADG Code	Australian Dangerous Goods Code
AEP	Annual Exceedance Probability
ALARP	As Low as Reasonably Practicable
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
BESS	Battery Energy Storage System
BMS	Battery management system
°C	Degrees Celsius
DA	Development Application
DG	Dangerous Good
DPHI	NSW Department of Planning, Housing and Infrastructure
EPA	Environmental Protection Authority
EP&A Act 1979	Environmental Planning and Assessment Act 1979
FRNSW	Fire and Rescue NSW
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	Kilometre
kWh	Kilowatt hour
kW/m^2	Kilowatt per square meter
L	Litre
LFP	Lithium Iron Phosphate
LiB	Lithium-Ion Battery
LUSS	Land Use Safety Study
m	Meter
m^3	Cubic meter
Mod 3	Modification 3
Mod 4	Modification 4
N/A	Not Applicable
NMC	Lithium Nickel Manganese Cobalt Oxide
NSW	New South Wales
PG	Packing Group
PHA	Preliminary Hazard Analysis

Abbreviation	Description
pmpa	Per million per annum
PON	Port of Newcastle
SDS	Safety Data Sheets
SEE	statement of environmental effects
SEPP	State Environment Planning Policy
SOC	State of Charge
UN	United Nations

1. Introduction

1.1 Background

Port of Newcastle (PON) has modified its Development Application (DA) (DA 8137) to allow storage of imported lithium-ion battery units in the existing Mayfield Cargo Storage Facility, prior to being transported to various final installation locations where they may form part of a battery energy storage systems (BESS). Modification 3 (Mod 3) to DA 8137 was approved for lithium-ion battery storage on the existing hardstand on 23 September 2025. Modification 4 (Mod 4) is being prepared to expand the storage to include the remaining area to the south. As part of the DA modification application, an update to the preliminary hazard analysis (PHA) report, as dictated by the *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP (Resilience and Hazards)) is required.

1.2 Purpose of this report

PON have engaged GHD Pty Ltd (GHD) to update the Mod 3 PHA to accompany the Statement of Environmental Effects (SEE) for Mod 4, as per SEPP (Resilience and Hazards), to determine if the proposed storage of lithium-ion battery units at the Mayfield Cargo Storage Facility and southern expansion is 'potentially hazardous or offensive'.

This report provides sufficient information and assessment of risks to show that the modification satisfies the risk management requirements of the NSW Department of Planning, Housing and Infrastructure (DPHI) and Fire and Rescue NSW 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) 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 lithium-ion battery units 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 lithium-ion battery 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 lithium-ion battery with other dangerous goods 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 1.4 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 goods quantities provided are true and correct at the time of the screening.
- The chemical data (United Nations (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.

1.5 Revision history

This PHA Revision 4 has been prepared to support the modification to the project as described in Section 5 of this report, and the accompanying SEE for DA 8137 Mod 4.

The PHA Revision 3 (dated 02 May 2025) and associated PHA Addendum (dated 09 July 2025), related to the approved Mod 3 for DA 8137.

A summary of changes include:

- Inclusion of lithium-ion battery unit storage in the expansion area.
- Update of the cumulative risk and sensitive receivers.
- Inclusion of no storage time limits.

2. Legislation and policy context

2.1 State Environmental Planning Policy (Resilience and Hazards)

The NSW DPHI 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, *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines,2011* (Applying SEPP 33), 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, 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 screening indicates a development is potentially hazardous.

2.3 Hazardous Industry Planning Advisory Paper No 6

The Department of Planning, 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.

2.4 Open yard storage of battery energy storage systems

Effective 5 December 2024, Fire and Rescue NSW (FRNSW) published the *Open yard storage of battery energy storage systems (BESS)* position statement that outlines the recommended measures for storing multiple BESS units. This document is used to identify potential mitigation measures.

2.5 Port of Newcastle land use safety study

The Port of Newcastle Land Use Safety Study (LUSS) (2017) provides the cumulative risk profile for the port area as well as a future cumulative risk profile taking into account potential developments. This document is used to determine the cumulative risk impact that the project imposes on the area.

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 Authority (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 that 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 the project is potentially hazardous, and 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.

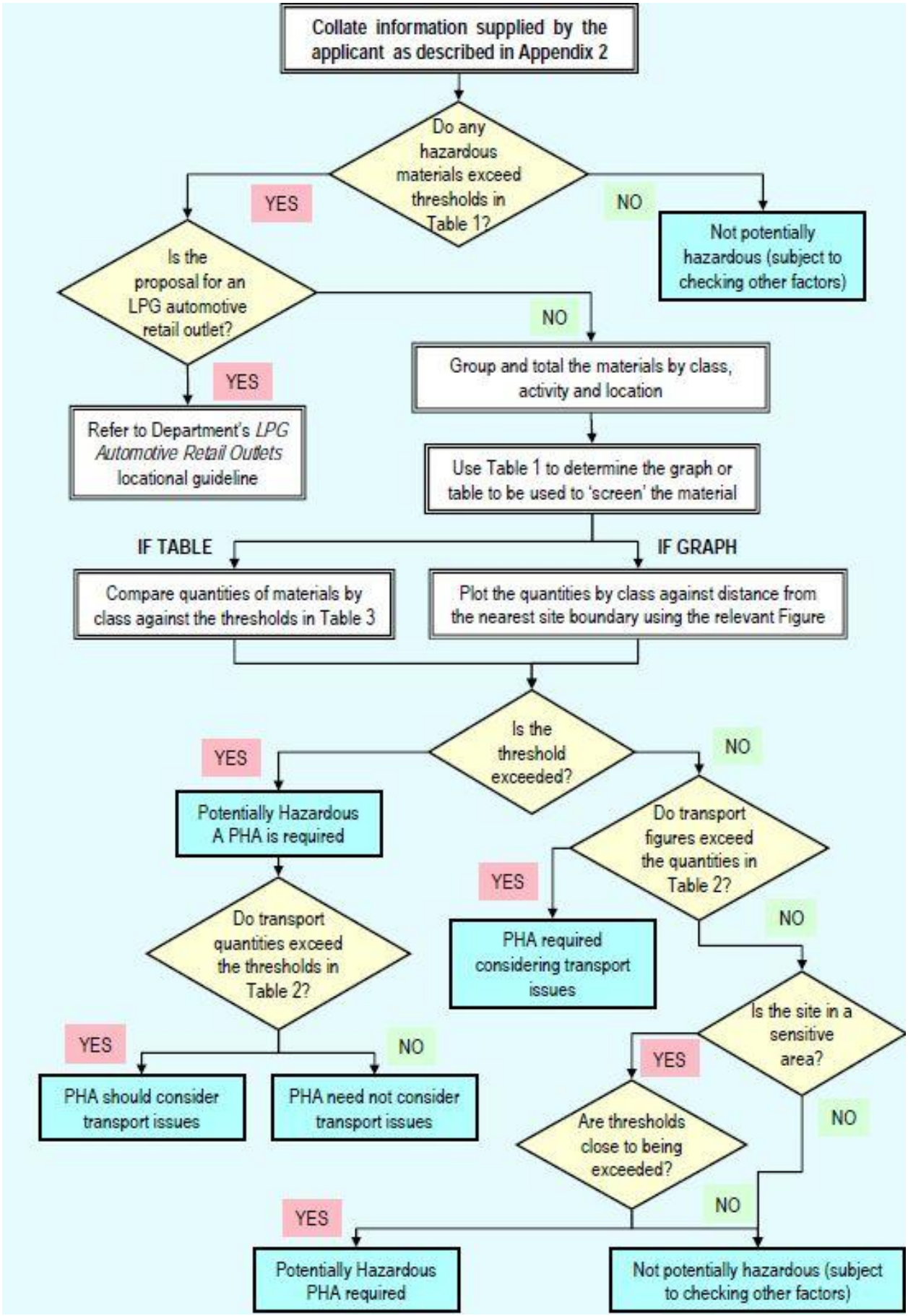

Figure 3.1 SEPP (resilience and hazards) risk screening process

3.2 Hazard identification

Following screening, Applying SEPP 33 requires a determination of whether the project poses significant risk or offence. This requires identification of potential hazards to highlight any risks associated with the interaction of the project (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 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 is classified as a 'hazardous industry'. If this is the case, the development proposal may not be permissible within most industrial, or similar zonings such as Specials Purpose zoning in the port, 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 project 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 project 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 Cumulative risk

At the conclusion of the PHA, an assessment of the cumulative risk is undertaken to evaluate the combined risks from multiple sources/projects that may interact within a shared environment.

The desktop approach will qualitatively assess how the new project might amplify/reduce or alter/not alter existing risks, such as environmental damage, infrastructure strain, or public exposure, when layered onto ongoing operations. The Port of Newcastle LUSS is used to inform the relevant criteria used in the assessment.

4. Mayfield Cargo Storage Facility

4.1 Use of land

The Mayfield Cargo Storage Facility is in the Port of Newcastle on the southern side of the South Arm Channel of the Hunter River. 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 Mayfield Cargo Storage Facility forms part of the Mayfield Concept Plan Area. 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 and cargo. Modification 1 to DA 8137 expanded the storage area boundary and Mod 3 approved the storage and handling of lithium-ion battery (designated a class 9 dangerous good) in the boundary. The proposed Mod 4 expands the area approved for the storage and handling of cargo further, including for storage and handling of lithium-ion battery. These details are shown in Figure 4.2.

4.2 Existing environment

The project is in the suburb of Mayfield North. Mayfield North is predominantly comprised of port infrastructure and associated industrial land uses. Further south-west are the residential suburbs of Mayfield and Mayfield East.

The City of Newcastle Council flood maps, indicate the Mayfield Cargo Storage Facility is in a very low risk area for flooding (i.e., the full extent of the flood prone area is outside of the 1% Annual Exceedance Probability event, but where larger less frequent floods up to the Probable Maximum Flood can occur).

Surrounding the site, the built environment comprises port facilities, industrial development, rail infrastructure, and residential development. Table 4.1 lists the approximate distance from the closest project site boundary to the closest area of interest identified. These are also shown on Figure 4.1.

Table 4.1 Approximate separation distance of the project to areas of interest

Closest areas of interest	Separation distance (metres)	Direction (from the project)
SCE recycling plant and heavy industry	135	West
Stolthaven Fuel Terminal (existing fuel storage tanks)	20	West
InfraBuild manufacturing	132	West
Rail siding	8	South
Newcastle Logistics Precinct – Intertrade site	75	South
Port Waratah Coal Service	725	South
Mayfield Berth 4	120	East
Mayfield East residential area	510	South-west

Paper Size ISO A4

0 100 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

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Port of Newcastle
Modification 4

Locality

Project No. **12622176**
Revision No. **A**
Date **5/03/2026**

FIGURE 4.1

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Data source: Railways, Roads, Waterways, Cadastre - NSW Spatial Services World_Hillshade: Esri, USGS
World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Nearmap WMS Server: . Created by: sgoode

Paper Size ISO A4

0 100 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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Port of Newcastle
Modification 4

Approved Facility under DA 8137, including MOD 1 - MOD 3

Project No. **12622176**
Revision No. **A**
Date **5/03/2026**

FIGURE 4.2

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5. Modification description

PON is proposing to expand the Mayfield Cargo Storage Facility south of the existing boundary, (the expansion area). The expansion area would be used to store cargo including lithium-ion battery units, which are a class 9 dangerous good, as per the existing consent. An example of a lithium-ion battery unit is shown in Figure 5.1.

As per the existing consent, the storage layout of the expansion area is not expected to be filled solely by lithium-ion battery units, but will include other cargo and energy generation infrastructure such as wind turbine blades etc.

From a worst-case scenario, where only lithium-ion battery units are stored, the entire site could accommodate:

– 55 full clusters (50 m x 50 m) and 10 part-clusters (less than 50 m x 50 m) in the existing site; and
– 11 full clusters (50 m x 50 m) and 5 part-clusters (less than 50 m x 50 m) in the expansion area.

This maximum capacity is based off the setback recommendations in the Fire and Rescue NSW position statement *Open yard storage of battery energy storage systems (BESS),* and existing site conditions.

The revised cluster details are shown in Figure 5.2 and is indicative only, given the potential for other cargo to be present at any given time. The lithium-ion battery units will then be transported to their ultimate installation location. The result is that there will be a continual turnover of lithium-ion battery units as they will be shipped in and trucked out.

The cargo will be received and managed as follows:

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

Figure 5.1 An example of a lithium-ion battery unit

Paper Size ISO A4

0 100 200

Meters

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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Port of Newcastle
Modification 4

Project No. **12622176**
Revision No. **A**
Date **5/03/2026**

Preliminary Hazard Assessment

FIGURE 5.2

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Print date: 05 Mar 2026 - 09:02

Data source: Railways, Roads, Waterways, Cadastre - NSW Spatial Services Nearmap WMS Server: . Created by: sgoode

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 Dangerous Good (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) storage threshold	Exceedance of SEPP (Resilience and Hazards) threshold
Lithium-Ion Batteries – Approved in Mod 3	3480	9	N/A (contained units)	55 full clusters (50 m x 50 m) and 10 part-clusters (less than 50 m x 50 m)	N/A[1]	Pass (excluded)
Lithium-Ion Batteries – Proposed in Mod 4	3480	9	N/A (contained units)	11 full clusters (50 m x 50 m) and 5 part-clusters (less than 50 m x 50 m)	N/A[2]	Pass (excluded)
Total project (cumulative)	3480	9	N/A (contained units)	66 full clusters (50 m x 50 m) and 15 part-clusters (less than 50 m x 50 m)	N/A	Pass (excluded)

The dangerous good screening indicates that the proposed additional lithium-ion battery storage does not exceed the thresholds within the SEPP (Resilience and Hazards).

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 truck movements of each dangerous good class and the truck movement thresholds according to Applying SEPP 33.

The lithium-ion battery units will be transported to Mayfield Cargo Storage Facility from the berth to the storage location. Transport from the port to their final location will occur via trucks (typically two lithium-ion battery units per truck depending on individual unit size), with potentially 300 units requiring movement off-site per month. Movement off-site will be dictated by the customer requirements.

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 (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 lithium-ion battery movements do not exceed the thresholds within the SEPP (Resilience and Hazards).

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.

[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.
[2] 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.

6.4 Summary of emissions

The nature of lithium-ion battery storage is not pre-disposed to emissions. Given they are not connected to power or undergoing charging or discharging 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 the modification is not 'potentially hazardous', due to the known fire risk associated with lithium-ion battery, a PHA has been prepared. It is considered that there is a medium potential for harm due to the localised nature of the fire risk and the predominate industrial land use surrounding the project, 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

Risk	Causes	Consequence	Potential for Offsite Impact	Identified / Recommended Safeguards
Truck interactions within the project area	Truck movements in vicinity of personnel.	Personal injury	No	Prepare traffic management plan including speed limits, standard traffic rules and signage. Driver competency.
Natural hazards	Flooding, earthquake, lightning, fire.	Personal injury Asset Damage	No	Update emergency management plan.
Mechanical damage of lithium-ion battery units	Rapid heating of individual cells (e.g. lack of venting, thermal runaway reactions). Truck impact into batteries during unloading/loading of general cargo. Unloading of batteries resulting in impacts between lithium-ion 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.
Electrical damage of lithium-ion battery units	Rapid heating of individual cells (e.g. lack of venting, thermal runaway reactions). Latent battery fault within individual cells (e.g. original equipment manufacturer design).	Personal injury / fatality Asset Damage	Yes	Ensure batteries are Quality Assured to ISO 9001, AS/NZS 5139 and prevailing battery manufacturing standards. Batteries to be stored as per supplier's specifications. Batteries not charged/discharged. Prepare emergency management procedure.

Risk	Causes	Consequence	Potential for Offsite Impact	Identified / Recommended Safeguards
Thermal damage of lithium-ion battery units	Rapid heating of individual cells (e.g. lack of venting, thermal runaway reactions). Extreme ambient temperatures during summer.	Personal injury / fatality Asset Damage	Yes	Ensure batteries are Quality Assured to ISO 9001, AS/NZS 5139 and prevailing battery manufacturing standards. Original equipment manufacturer insulation of units. Batteries to be stored as per supplier's specifications. 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

Lithium-ion batteries are regulated as Class 9 Miscellaneous dangerous goods and are the only material with the potential to cause offsite impacts from a hazardous event. An example safety data sheet (SDS) is included in Appendix C.

Lithium-ion batteries contain electrolyte and lithium in various forms, along with other metals. Lithium-ion batteries 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 lithium-ion battery cell.

There are different electrolyte chemistries that can be used in lithium-ion batteries. The main types of lithium-ion batteries currently seen are:

– Lithium Nickel Manganese Cobalt Oxide.
– Lithium Nickel Cobalt Aluminium Oxide.
– Lithium Iron Phosphate.
– Lithium Cobalt Oxide.
– Lithium Manganese Oxide.
– Lithium Titanate.

Lithium-ion batteries can fail under certain conditions of abuse, namely mechanical abuse, electrical abuse and thermal abuse (Chen, et al., 2021). Mechanical abuse refers to external forces, such as collision, extreme vibration, penetration, and extrusion, on the battery when in use. When a battery is overcharged or has a high discharge rate, it experiences electrical abuse. In thermal abuse situations, a battery experiences thermal shock, or exposure to high or extreme external temperature including fire of adjacent structures. In the absence of mechanical, electrical or thermal abuse, lithium-ion battery units can be stored without significant additional risk.

The failure of lithium-ion batteries typically result in thermal runaway. Thermal runaway begins at elevated temperatures, when the exothermic decomposition of the cell materials begins, eventually leading to the self-heating rate of the cell being greater than the rate at which heat can be dissipated to the surroundings.

The thermal runaway process can be separated into three main stages (Sino Voltaics, 2020):

1. Heat generated in a cell or multiple cells due to abuse/failure cannot be dissipated, and the temperature of the cell(s) will continue to rise, leading to degraded performance.
2. The solid electrolyte interphase is damaged (usually at 80-100 °C), leading to an exothermic reaction between the electrolyte and charged anode. It is at this stage, off gassing due to the volatilisation of the electrolyte begins. The mechanical breakdown of the separator (at 120–150 °C) leads to an internal short circuit and an exponential temperature rise.

3. Above 180 °C, the cathode begins to decompose exothermically and release oxygen. The resulting oxygen-containing atmosphere leads to a rapid, largely exothermic reaction with the electrolyte, causing further rapid temperature rise. The reaction is accompanied by enormous gas production, including the potential for hydrofluoric acid.

The thermal runaway gases build within the cell and can ultimately lead to rupture of the cell and release of the flammable gases which may immediately ignite, leading to battery fire and flaming. If the released flammable gases are not ignited, the battery could auto-ignite when the ignition point of surrounding equipment is reached, due to the exponential increase and intensity of temperatures in the battery.

Battery state of charge (SOC) is independent of thermal runaway initiation and the associated radiant heat consequences. Although, having a higher SOC, makes a lithium-ion battery unit more sensitive to reaching thermal runaway potential if a unit is damaged/abused. For example, damage/abuse due to deposition of lithium metal on the negative electrode surface (dendrite growth) during an overcharge event, the higher SOC within a battery makes it more susceptible to a thermal runaway propagation from the destruction of the separator. PON will not be undertaking any charging (or discharging) processes whilst in storage.

SOC limit for lithium-ion battery units is not currently specified for maritime transport in the IMDG Code, 2024 edition, but the code does recommend the SOC be minimised as far as possible for transportation. It is noted that the IMDG Code, 2024 edition comes into force on 1 January 2026 but may be applied voluntarily from 1 January 2025.

The Fire and Rescue NSW position statement on *Open yard storage of battery energy storage systems (BESS)* also state the SOC should be minimised as far as possible for transportation. Each manufacturer will specify the SOC for transportation.

7.3 Hazard scenarios

The key hazard identified for lithium-ion batteries is thermal runaway. Thermal runaway can occur as a result of battery fault or damage. These scenarios will be further analysed in this PHA. Due to the temperature required to damage the solid electrolyte interphase (usually at 80 to100 °C) and the associated BESS unit insulation, thermal abuse due to extreme ambient temperatures is not considered plausible and will not be discussed further.

7.4 Consequence determination

lithium-ion batteries can be variable sizes depending on the supplier. Generally, they can be grouped into container sized units or stand-alone units. From a consequence perspective, the larger container sized units pose the bigger impact, as shown in Appendix A. Table 7.2 summarises 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
Assumed average container surface temperature during thermal runaway reaction	660 °C	The individual cells may exceed 600 °C 660 °C is melting point of aluminium and conservatively assumed to be equal to the external surface temperature
Height of battery (container unit)	2.5 m	Assumed height of lithium-ion battery
Length of battery (container unit)	7.2 m	Assumed length of lithium-ion battery
Height of battery (stand-alone unit)	2.1 m	Assumed height of lithium-ion battery
Length of battery (stand-alone unit)	2.2 m	Assumed length of lithium-ion battery

7.4.1 Results

A summary of the worst-case heat radiation consequences is provided in Table 7.3. The radiated heat distances are relevant for all thermal runaway hazard scenarios. By appropriately positioning the lithium-ion battery unit storage area, these distances will not extend beyond the Mayfield Cargo Storage Facility boundary that includes the existing site and expansion area. Details of the calculations for both the container and stand-alone units are in Appendix A.

When calculating the consequence impacts, SOC does not influence the radiant heat output from a fire. The radiant heat distances will apply for a BESS unit with a SOC at 100 per cent (i.e. fully charged) as well as one with a SOC at 20 per cent (i.e. minimal charge). SOC is more relevant during the charging/discharging process. If potential deposition of lithium metal on the negative electrode surface (dendrite growth) has occurred during an overcharge or an over discharge event, a higher SOC within a battery is more susceptible to a thermal runaway propagation from the destruction of the separator. The lithium-ion batteries will not be undertaking and charging (or discharging) processes whilst in storage.

Maintaining a separation distance between stored units, as determined by the consequence assessment, will mitigate impacts of batteries being shipped with variable SOC. Additionally, lithium-ion battery units will be stored in accordance with the manufacturer's recommendations where available.

By avoiding mechanical damage, there is no limit to the storage duration of lithium-ion battery units within any of the Mayfield Cargo Storage Facility boundary.

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	6.1 m	2.9 m	1.3 m
Single stand-alone battery thermal runaway	4.5 m	2.2 m	1.0 m

Offsite health effects from smoke in the event of a battery fire, which could include very 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 density in the immediate area (e.g. Stolthaven Fuel Terminal).

As detailed in Figure 4.2 and Table 4.1, the nearest offsite facility, Stolthaven Fuel Terminal, is approximately 20 metres away from the storage of lithium-ion battery units. Even at this distance, radiation from any fire would be negligible. While not a facility, the distance from the expansion storage area to the rail siding is approximately 8 metres. Despite this distance, radiation from any lithium-ion battery fire, should it occur, would have negligible impact to the rail siding.

7.4.2 Separation distances

Adequate clearance between lithium-ion 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 electrically connected BESS design but can be considered for lithium-ion battery unit storage that is electrically disconnected as a conservative approach. 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).

Fire and Rescue NSW (2024) have developed a position statement summary for *Open yard storage of battery energy storage systems (BESS).* This is currently the only document that considers electrically disconnected BESS and is most relevant for storing lithium-ion battery units at the Mayfield Cargo Storage Facility. Table 7.4 is shown to demonstrate high level requirements from these standards.

Table 7.4 BESS separation distance guidelines

Standard/Code	BESS set up	Separation distance reference
Fire and Rescue NSW – Position statement summary for open yard storage of battery energy storage systems (BESS) 2024.	Not electrically connected	6 m from fire source feature such as buildings, structures or boundary. 1 m to adjacent unit that has access panel, door or deflagration vent(s).
NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems 2023.	Electrically connected	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).	Electrically connected	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.	Electrically connected	1.5 m (LFP)[3] or 4.0 m/2.4 m (NMC)[4] between BESS units. 2.7 m from combustible elements.

The storage layout is not expected to be filled solely by lithium-ion battery units but will include other cargo and energy generation infrastructure such as wind turbine blades. However, from a worst-case scenario, where only batteries are stored, PON can accommodate a maximum of 66 full clusters (50 m x 50 m) and 15 part-clusters (less than 50 m x 50 m). Firefighting equipment is not required, but the existing emergency response plan for the site will be updated for effective response to a fire emergency in accordance with Fire and Rescue NSW requirements.

Depending on the size, the number of lithium-ion battery units that can be stored within a cluster will vary. The storage of each unit will be separated along the side of the unit that incorporates any access panel, door, or deflagration vent(s) by 1 metre from the next unit, as outlined by the PHA consequence assessment and the Fire and Rescue NSW position statement. Furthermore, lithium-ion battery units will not be stacked (i.e. only one level of storage is allowed).

Separation distance from the site boundary is designated as 6 metres. No further setback from Stolthaven and the rail line is required. The 6 metres separation distance between clusters also allows for fire brigade vehicle access around each cluster of lithium-ion battery units.

7.5 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. The likelihood of a thermal runaway event is considered low.

[3] “on sides that contain access panels, doors or deflagration vents”
[4] Depending on fire rating of wall construction (1-hour)

Table 7.5 Thermal runaway frequency

Scenario	Frequency per year	Interval years
Latent manufacturing fault leading to thermal runaway and fire (per annum)	3.78×10^{-5}	26,455
Impact during transportation movement leading to thermal runaway and fire (per annum)	7.6×10^{-3}	132
Combined site frequency for thermal runaway events	7.6×10^{-3}	132

7.6 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)	5.00×10^{-05}	1.00×10^{-06}
Serious injury (4.7 kw/m^2 & 7 kPa)	–	5.00×10^{-05}
Property damage (23 kw/m^2 & 14 kPa)	–	5.00×10^{-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	3.2×10^{-06}	315,880	Complies

There are no expected offsite impacts given the proposed location of the lithium-ion battery unit storage and buffer distances between the site and sensitive receptors. At this distance, radiation from any fire would be negligible to other receptors, as listed in Table 4.1. 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. Cumulative risk

PON prepared a LUSS in 2017 to assist in the protection of public safety through an understanding of the Port's current and future cumulative risk profile during planning assessments and approval of development projects. The LUSS requires:

– Demonstration that proposed development will not cause any increase in the individual risk levels shown in the future case of the Port of Newcastle Land Use Safety Study Overview Report or will not increase the societal risk to exceed the future case As Low As Reasonably Practicable (ALARP) band identified in the report.

Specific to development in the Mayfield precinct, the LUSS requires the following:

– Ensure hazardous industry development in the vicinity of the fuel terminals and Mayfield 7 Berth are not large, congested facilities that may result in the creation of confined spaces within 185 m of these locations. Allowance has been made for partially congested open plant and storage areas. An increase in the congestion (concentration of equipment and piping) e.g. through the development of a chemical processing plant would need to reassess the impact in relation to confined spaces.
– Ensure hazardous industry development in the vicinity of the explosive and ammonium nitrate activities at Mayfield 4 Berth will not result in potential catastrophic accident propagation ('domino effect') from an explosion overpressure of 14 kPa at a frequency of more than 50 pmpa.
– The Intertrade site is an example of where intensification of land-use may occur within the Mayfield Precinct. Where development within the Mayfield Precinct will result in a population density of greater than 0.5 people/km^2, then the risk associated with the intensification should be assessed. The development should account for risks also associated with hazardous industries and internal transport routes within the Mayfield Precinct.

The project is not considered to be a hazardous industry, so congestion near fuel terminals and potential catastrophic accident propagation at Mayfield Berth 4 from stored lithium-ion batteries are not relevant. However, it is recommended that the proposed storage of lithium-ion battery units has a setback of at least 6 metres from the fuel storage (Stolthaven Fuel Terminal) and Mayfield Berth 4 boundary.

The proposal's individual fatality risk does not extend beyond the boundary (the risk is contained on site), so does not intersect LUSS fatality risk contours. Therefore, the introduction of the proposal will not increase the existing and future risk profiles for PON.

Societal risk is assessed using an FN curve. FN curves, where F stands for frequency and N stands for number (of fatalities), shows the relationship between how often a fatality occurs and how many people may be affected. For example, how often an accident that kills 10 people might happen compared to one that kills 100. Given a single fatality for the proposal has a frequency of less than 5 x10-5 per annum, the societal risk sits in the negligible area of the LUSS FN curve. Therefore, the proposed storage of lithium-ion battery units will not increase the existing and future societal risk profiles for PON.

For the Mayfield precinct, the LUSS shows that the driving factor for future fatality risk at the site is from the Stolthaven Fuel Terminal. The 2016 approval to increase fuel storage at Stolthaven included a quantitative risk assessment (QRA) for the terminal. This QRA shows that the individual fatality risk at the project boundary (from Stolthaven Fuel Terminal) is 1 $x10^{-21}$ per year. This means that the risk of someone working at the project site, standing at the project boundary adjacent to the Stolthaven Fuel Terminal being fatally impacted by a fire or explosion at Stolthaven Fuel Terminal is exceedingly rare.

The proposal will not result in a population density increase beyond what exists currently, so there is no risk associated with population intensification.

9. Recommendations

It is recommended that a battery storage management plan be developed and implemented to capture the following key battery safety requirements (Fire and Rescue NSW, 2024):

- LiB units will be stored as per manufacturer specifications.
- Installation of bollards/protective barriers around truck 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.

10. Conclusions

This report addressed the hazards and risks associated with the existing Mayfield Cargo Storage Facility boundary and the proposed expansion area.

The PHA involved a preliminary risk screening of the proposed modification in accordance with the requirements of SEPP (Resilience and Hazards). While the SEPP (Resilience and Hazards) screening thresholds were not exceeded, a PHA was undertaken due to the known fire risks associated with lithium-ion battery units.

The initial hazard identification process considered hazards during storage. Fire started because of thermal runaway due to transfer damage/impact or latent battery faults is considered a plausible event and may pose offsite impacts. Given the location of the site, it is considered that there is a medium potential for harm from lithium-ion battery unit 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 lithium-ion battery 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.

By including a separation distance of 6 m between adjacent lithium-ion battery clusters in conjunction with a 1 m separation distance between adjacent lithium-ion battery units within a cluster, propagation of a lithium-ion battery unit fire during storage is not expected.

There is no requirement to limit the storage duration of lithium-ion battery units, as the length of time a lithium-ion battery unit is stored when in an electrically disconnected state does not materially increase the fire risk of the facility.

The separation distance of 6 m from the boundary and associated neighbours e.g. Stolthaven Fuel Terminal and ARCT provides sufficient protection against fire escalation.

Regarding cumulative risk, the project does not increase in the individual risk level or the societal risk from the future case of the Port of Newcastle LUSS Overview Report.

It is recommended that management procedures and safeguards as listed in Section 9 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.

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Standards Australia, 2019, AS/ NZS 5139 – Electrical installations - Safety of battery systems for use with power conversion equipment.

Tesla, 2017, Lithium-Ion Battery Emergency Response Guide, Tesla Powerpack System, Powerwall, and Sub-assembly, All Sizes, Document Number TS-0004027, Revision 04.

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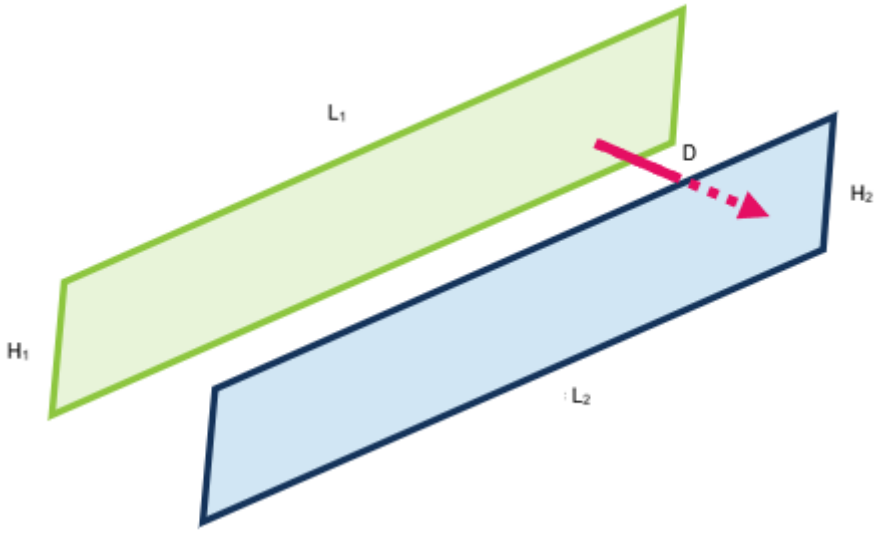
Appendix A

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 units are stationary and pose an escalation point, the radiated heat is calculated between two battery units. This calculation estimated the net radiant heat exchanged between two plates using the diagram below.



Description	Symbol	Value	Units	Reference
Height of lithium-ion battery stand-alone unit	$H_1 = H_2$	3.25	metre	ATS Projects, Typical Transport Configuration drawing, 20221103-001, s-310 Rev A
Length of lithium-ion battery stand-alone unit	$L_1 = L_2$	2.8	metre	ATS Projects, Typical Transport Configuration drawing, 20221103-001, s-310 Rev A
Height of lithium-ion battery container unit	$H_1 = H_2$	2.9	metre	Catl unit specifications
Length of lithium-ion battery container unit	$L_1 = L_2$	6.1	metre	Catl unit specifications
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

Stand-alone unit results

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	2.2	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

Container unit results

Heat flux	Units	Distance (D)	Units	Reference
4.7	kW/m^2	6.1	m	HIPAP 4 heat radiation level that can cause injury
12.6	kW/m^2	2.9	m	HIPAP 4 heat radiation level that can cause fatality
23.0	kW/m^2	1.3	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 two scenarios are summarised below.

Latent battery failure

Value	Parameter	Value	Reference
A	Total number of battery units per cluster	252	Fire & Rescue NSW position paper on 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)	0.0252	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)	3.8×10^{-05}	Calculated = C*D*(1-E)
G	Thermal runaway from latent battery failure (years)	26,455	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 per cluster	504	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)	1.512	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)	0.076	Calculated = K*L*(1-M)
O	Thermal runaway from impact (years)	132	Calculated = 1/N

Total frequency for a thermal runaway event

Value	Parameter	Value	Reference
P	Combined thermal runaway frequency (per year)	0.0076	Calculated = N+F
Q	Combined thermal runaway events (years)	132	Calculated = 1/P

Risk assessment results – onsite

		Value	Reference
R	Frequency of thermal runaway event (per annum)	0.0076	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)	3.2×10^{-06}	Calculated = R*S*T
X	Frequency of injury (per annum)	1.6×10^{-04}	Calculated = R*S*U
Y	Frequency of property damage (per annum)	3.8×10^{-03}	Calculated = R*V

Risk assessment results – offsite

		Value	Reference
Z	Frequency of thermal runaway event (per annum)	0.0076	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

END OF SDS

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→ The Power of Commitment

Appendix B

Traffic Management Plan

Prepared for
Port of Newcastle
ABN: 13 165 332 990

Mayfield Traffic Management Plan

Traffic Management Plan

07-Nov-2025
Doc No. 1
Commercial-in-Confidence

aecom.com

Delivering a better world

Mayfield Traffic Management Plan

Traffic Management Plan

Client: Port of Newcastle

ABN: 13 165 332 990

Prepared by

AECOM Australia Pty Ltd
Gadigal Country, Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 1800 868 654 www.aecom.com
ABN 20 093 846 925

07-Nov-2025

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document	Mayfield Traffic Management Plan
Ref	60764897
Date	07-Nov-2025
Originator	Sam Green
Checker/s	Joshua Brydges
Verifier/s	Martin Mallia

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
G	4-Nov-2025	Final	Martin Mallia Associate Director	
F	18-Sep-2025	Rewrite to reflect current site conditions and improve readability.	Josh Brydges Principal Transport Planner	
E	16-Nov-2015	Final	Simon Murphy Project Manager	
D	28-Aug-2015	Draft for review	Andy Yung Associate Director	
B	20-Aug-2015	Draft for review	Andy Yung Associate Director	
A	07-Aug-2015	Structure and outline for review	Simon Murphy Project Manager	

Table of Contents

1.0 Introduction

1.1 Purpose and Scope

This Traffic Management Plan (TMP) applies to the Port of Newcastle (PON) Mayfield Site as identified in Figure 1-1.

Figure 1-1 Mayfield Port area

The purpose of this TMP is to provide a framework for the coordinated management of travel to, from, and within the Site. The TMP establishes a comprehensive approach, setting out the devices and measures required to facilitate port-related traffic movements.

This document has been prepared to demonstrate how PON intends to comply with the relevant development approval conditions, including:

- **DA 293-08-00** – the original approval for PON operations.
- **Mayfield Concept Plan (MCP) approval (MP09_0096)**
- **DA 8137** – approved under the MP09_0096

The MCP approval establishes the primary conditions to be addressed by this TMP, in particular **Condition 2.5**, which states:

"The Proponent shall prepare and implement a Traffic Management Plan for the Concept Plan site in consultation with RMS, HDC, Council, adjoining land owners and the local community to provide a framework for the coordinated management of traffic to, from, and within the Concept Plan site.

The Plan shall include traffic management devices and measures to facilitate the orderly movement of port related traffic movement to/from the road network, and shall include but not necessarily be limited to:

a) measures to ensure heavy vehicle access to and from the site will be primarily along the routes shown in Attachment A to this approval;

b) measures to minimise port freight movements inside am and pm peak traffic periods;

c) measures to encourage the equal distribution of truck movements between the Industrial Drive/George Street and Industrial Drive/Ingall Street intersections;

d) measures to prevent heavy vehicles accessing residential streets and areas within the vicinity of the site and to maintain the residential amenity of the local community; and

e) Measures to encourage staff access to the site by means other than private vehicles.

Additionally, this TMP reflects requirements outlined in:

- DA 8137; which outlines the need to "*manage traffic generated by the development in accordance with the MCP's Traffic Management Plan*" (B7.g), and to "*include details of a reporting program to be provided annually to the secretary and PON that ii) is prepared in accordance with the MCP's Traffic Monitoring and Review Plan." (B7i) ii))I*
- DA293-08-00; which reiterates the requirements to provide a TMP to manage operations (S 5.44)

Accordingly, this TMP supersedes the original MCP TMP to reflect current operating conditions and ensure alignment across subsequent approvals.

Table 1-1 sets out how and where each approval condition is addressed within this TMP.

Table 1-1 Conditions of approval requirements

Approval	Conditions of approval requirements	Where addressed
MP09_0096	Measures to ensure heavy vehicle access to and from the Site will be primarily along the routes shown in Attachment A to this approval;	Section 3.3 and 3.4
	Measures to minimise port freight movements inside AM and PM peak traffic periods;	Section 3.5
	Measures to encourage the equal distribution of truck movements between the Industrial Drive/George Street and Industrial Drive/Ingall Street intersections;	Section 3.6
	Measures to prevent heavy vehicles accessing residential streets and areas within the vicinity of the Site and to maintain the residential amenity of the local community; and	Section 3.6
	Measures to encourage staff access to the Site by means other than private vehicles.	Section 3.8
	Measures to conduct necessary infrastructure upgrades as required	Section 2.3.1
DA 8137	Include details of a reporting program to be provided annually to the secretary and PON that ii) is prepared in accordance with the MCP's Traffic Monitoring and Review Plan.	Section 4.0
	Measures to conduct necessary infrastructure upgrades as required	Section 2.3.1
DA293-08-00	The applicant is to prepare the following documentation to the satisfaction of the RTA in respect to the proposed road works (g) Traffic Management Plan (TMP)	Whole of Document
	Measures to conduct necessary infrastructure upgrades as required	Section 2.3.1

2.0 Existing conditions

2.1 Site location

Figure 2-1 presents the location of the PON Mayfield Site and outlines the heavy vehicle access routes. Figure 2-1 is adapted from Attachment A in the Mayfield Concept Approval.

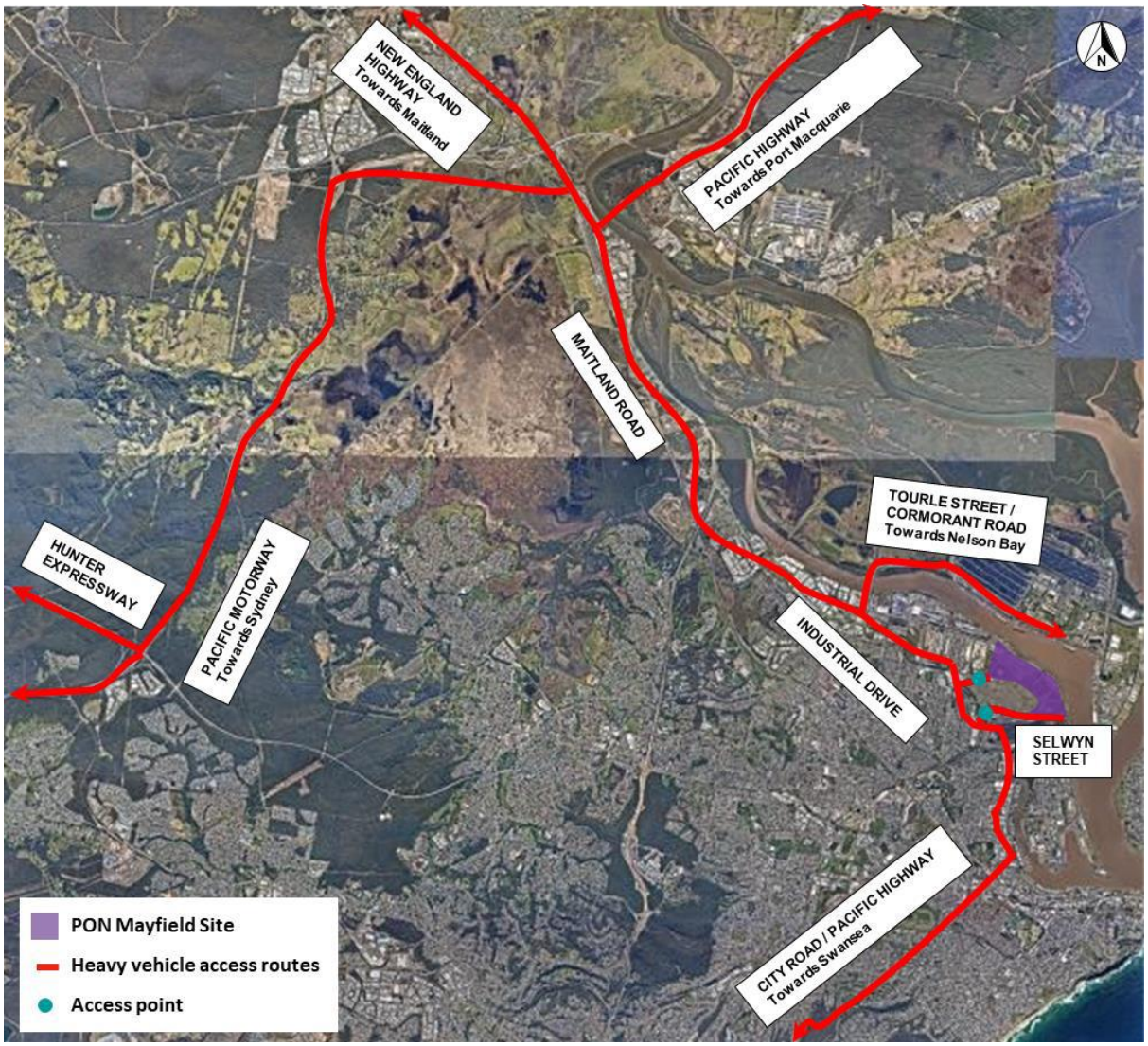


Figure 2-1 Regional context

Table 2-1 Relevant roads

Name	Classification	Description
Industrial Drive	State Road	Industrial Drive is a State Road, generally aligned in a north-south direction providing connection to Maitland Road and Hannell Street.
Selwyn Street	Local Road	Selwyn Street is a local road, generally aligned in an east-west direction providing connection between Maitland Road in the west and the Port of Newcastle access points.
Maitland Road	State Road and Regional Road	Maitland Road is both a State Road (to the west of Industrial Drive) and Regional Road (to the east of Industrial Drive), generally aligned in a northwest-southeast direction that provides connection towards Maitland and Newcastle West.
Tourle Street	State Road	Tourle Street is a State Road, generally aligned in a north-south direction that provides connection between Industrial Drive and Cormorant Road.

2.2 Site access and movement

Access to the Site is provided at two traffic-signal controlled intersections, namely:

- Industrial Drive / Ingall Street
- Industrial Drive / George Street

Figure 2-2 presents the PON Mayfield Site access and traffic movement network map. All vehicles would access the Site via the Ingall Street or George Street access points.

Figure 2-2 PON access and traffic movement network

2.3 Operational Conditions

The Port of Newcastle currently operates with a number of leaseholders and licensees, often with varying durations of usage of Port facilities. As such the Port of Newcastle will work with Lessee's and licence holders to make them aware of the traffic conditions and requirements to manage traffic and transport impacts on the local area. Final responsibility for vehicle movements, driver inductions, and other controls set out in this TMP will be the responsibility of these parties and implemented as required by their operations.

2.4 Vehicle Movement Limitations

The Concept Plan Approval (MP0 9_0096 – updated 12 December 2014) established limits on cargo and equipment being moved on/off Site. These limits are presented in

Table 2-2 and were established with the objective of the projects associated with the concept plan so as to not exceed the capacity of the transport network, including the local, regional and State Road network.

Table 2-2 Conditions of approval requirements

Stage	Total truck movements per annum	Total truck movements per day	Total hourly truck movements in peak hour
Initial Stage	462,104	1,268	95
Intermediate Stage	773,438	2,120	159
Ultimate Stage	1,017,882	2,790	209

Source: Mayfield Concept Plan Project Approval (MP0 9_0096), 12 December 2014

2.4.1 Infrastructure upgrades

To accommodate the changes to local traffic, transport infrastructure upgrades were identified for road and rail access and included in the relevant Conditions of Approval. Table 2-3 outlines each of these physical infrastructure changes under past approvals. Each of these upgrades were undertaken by PON.

Table 2-3 Infrastructure Upgrades Required under Conditions of Approval

Location	Upgrade Required	Approval	Status
Road Link (Ingall Street and Selwyn Street)	A link road between Ingall Street and Selwyn Street of suitable standard shall be provided.	MP 09_0096	Complete
Industrial Drive / Ingall Street	Intersection Upgrade as per Appendix B of approval MP 09_0096.		Complete
Industrial Drive / George Street	Intersection Upgrade as per Appendix B of approval MP 09_0096.		Complete
George Street / Selwyn Street	Intersection Upgrade as per Appendix B of approval MP 09_0096.		Complete
Selwyn Street	Provide a white line along each edge between Site access and the level crossing. Regularly maintain vegetation to ensure visibility.	DA 8137	Complete
	Provide a chevron marker board on Selwyn Street opposite side road.		Complete
One Steel Line and Bullock Island Loop Rail Line	New rail line extension to Site, and provision of two rail sidings and extended Shunt Neck at rail entry to port.	MP 09_0096	Complete
Morandoo Yard	Reconfiguration of yard to provide 4 rail sidings.		Complete
Selwyn Street	Provide localised widening and line marking along Selwyn Street to meet minimum standard.	DA293-08-00	Complete

In addition to the road network upgrades that have been undertaken as per previous approvals, Table 2-4 outlines the upgrades being undertaken at or near PON Mayfield.

These works are not being undertaken by PON.

Table 2-4 Infrastructure upgrades being undertaken at or near PON Mayfield

Location	Upgrade Required	Description	Status
Selwyn Street / Quayside Close	Road widening to enable Oversize Overmass (OSOM) traffic movements to exit the PON Mayfield Site.	The widening will increase the road width on the eastern side of the intersection.	Underway
George Street / Selwyn Street	Road widening to enable OSOM traffic movements to exit the PON Mayfield Site.	The widening will increase the road width on the west side of Selwyn Street at the intersection with George Street.	Underway
George Street / Industrial Drive	Road widening to enable OSOM traffic movements to exit the PON Mayfield Site.	The widening will increase the road width on the west side of Industrial Drive at the intersection with George Street.	Underway

3.0 Operational traffic management

3.1 Objectives

The objectives of this TMP are to establish and implement measures that:

- Ensure heavy vehicle Site access and egress occur primarily along the designated routes shown in Figure 2-1;
- Minimise port freight movements during the AM and PM peak traffic periods.
- Encourage an equal distribution of truck movements between the Industrial Drive / George Street and Industrial Drive / Ingall Street intersections where operationally feasible.
- Prevent heavy vehicles from accessing residential streets and areas within the vicinity of the Site, thereby maintaining the residential amenity of the local community.

This TMP is intended to be a living document, updated periodically in response to issues identified during monitoring of Site operations, and prior to the commencement of any subsequent project approvals.

3.2 Vehicle types

Depending on the type of port activities undertaken, several different vehicle types are expected to require access to the Site. These vehicle types are described in Table 3-1.

Table 3-1 Vehicle types

Vehicle type	Description
Cars, vans, utilities, and delivery vehicles	These will include staff vehicles, special-use vehicles, visitor vehicles, contractor vehicles and security vehicles.
Trucks	Both heavy and light commercial vehicles, primarily used to transport materials such as bulk liquids and general cargo to and from the Site.
Oversize and Overmass (OSOM) vehicles	Expected to transport large-scale cargo that require specialised arrangements and approvals.

3.3 Heavy vehicle routes

The planned heavy vehicle routes to and from the Site are shown in Figure 2-1. Depending on their origin and destination, heavy vehicles will use the New England Highway, Hunter Expressway, or the Pacific Motorway, before travelling via Industrial Drive to access the Mayfield Site. These planned routes are classified as Primary Freight Roads in the *NSW Metropolitan Road Freight Hierarchy* (State Road Network Practice Note, June 2011).

3.3.1 Driver Induction and Access Requirements

It is the responsibility of the lease/licence holders to induct drivers as necessary for their operations at the Mayfield Concept Plan area and surrounding area.

For example, truck drivers accessing a fuel terminal must:

- Complete the relevant terminal induction.
- Comply with the requirements of this TMP prior to operating On-Site.
- Provide evidence of induction and authorisation for the specific type and quantity of inbound and outbound loads for each visit as requested.

This evidence must be made available to PON on request. Lease/licence holders should be aware of approved heavy vehicle routes outlined in this TMP, and communicate these routes to drivers as part of their induction (as required by operational activities). Failure to comply with these requirements places the relevant operator or tenant in breach of their compliance obligations under their tenure with PON.

3.3.2 Monitoring and Reporting

Compliance with approved heavy vehicle routes will be monitored by individual lease/licence holders as required by their operations. Evidence of compliance, along with details of any non-compliances, must be reported to PON either as requested by PON or as part of each operator's periodic reporting obligations depending on the nature of their engagement with PON.

3.4 Oversize over mass (OSOM) controls and approvals

At times, the PON Mayfield Site is used for the movement of large-scale goods or products that require specialised OSOM freight vehicles. These movements are outside of direct PON control and are instead strictly regulated under the Heavy Vehicle National Law (HVNL) and must be approved by the National Heavy Vehicle Regulator (NHVR).

OSOM vehicles currently access the Site via the Quayside Close Gate, connecting to Selwyn Street before travelling along Industrial Drive. Both roads are approved OSOM corridors. Figure 3-1 illustrates the existing OSOM-approved routes, which lease/licence holders are required to use when accessing the wider transport network. All routes must be nominated and approved by the relevant regulatory authorities prior to use.

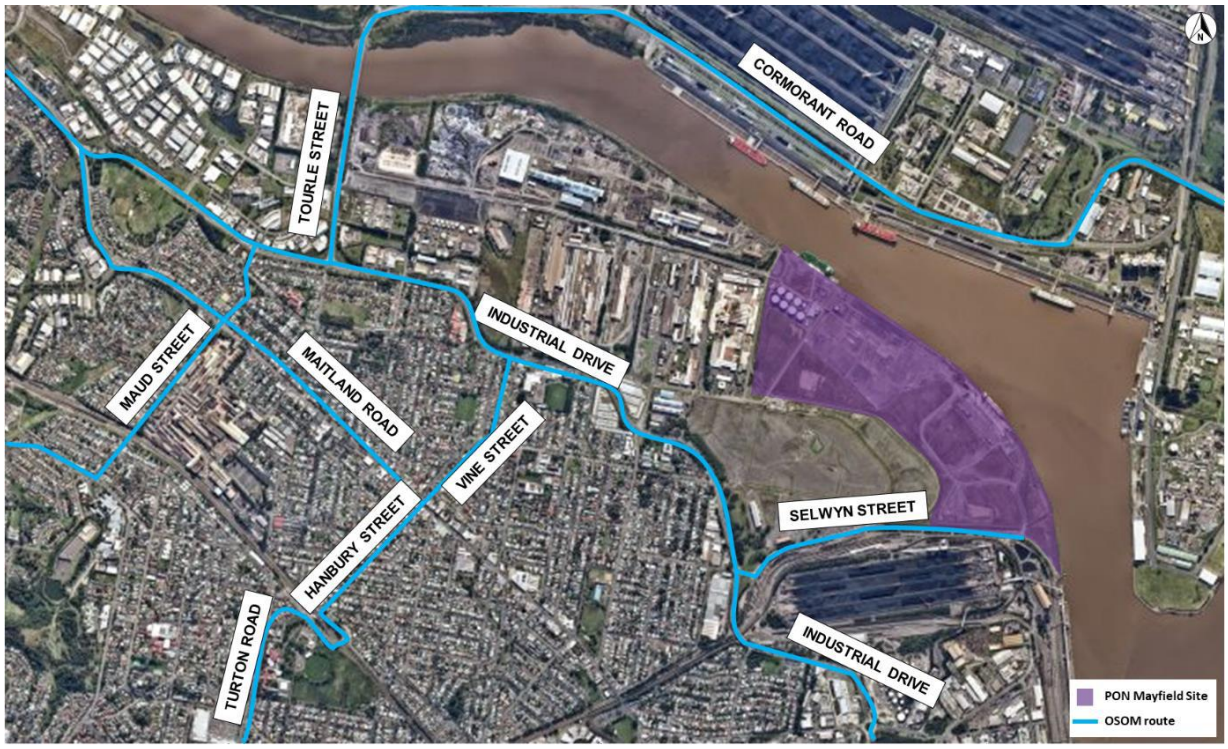


Figure 3-1 Approved OSOM routes accessing the Mayfield Site

3.5 Minimising port-related truck movements in peak hours

Given the potential for cumulative peak-hour traffic across the development area, should traffic monitoring identify significant traffic concerns during peak hours, mechanisms would be incorporated to minimise port-related truck movements during AM and PM peaks. These mechanisms may include:

- Staggered working or shift hours to reduce staff travel during peak periods.
- Driver inductions emphasising the need to avoid peak-hour truck movements, tailored to each project operator/tenant.
- Access control devices such as physical barriers, manned gates, or boom gates, with gate records maintained to include vehicle entry/exit times as needed.

Should the need arise, PON and/or project lease/licence holders may also look to adopt a pre-booking system for truck arrivals, allocating specific time slots to spread movements throughout the day and reduce entry/exit concentrations during peak hours. Lease/licence holders are responsible for determining suitable shift staggers within their operations and notifying PON accordingly.

3.5.1 Access Control Measures

PON reserves the right to implement additional access controls across the Concept Plan area. Current arrangements include:

- Ingall Street/Steelworks Road: Gatehouse operated by Infrabuild (formerly Arrium (OneSteel)) – PON does not control
- Selwyn Street: No existing access controls.
- Stolthaven Terminals (via Steelworks Road): Automated gate operated by Stolthaven.
- Mayfield Berth No. 4 (via Selwyn Street): Automated gate and manned security checkpoint.

Typically, lease/licence holders determine their access controls. Should PON determine that further access controls are required, lease/licence holders must comply in accordance with their lease or licence obligations. Future Site-specific access control measures may also be installed by individual lease/licence holders, subject to consultation with PON and tailored to their operational requirements.

3.6 Access allocation at Industrial Drive intersections

Allocation of heavy vehicle movements between the two Site access points is based on intended destination/departure location within the Mayfield Concept Area. Heavy vehicle movements are required to access the Mayfield Berth area via the George Street / Industrial Drive intersection to limit internal vehicle movements. Heavy vehicles accessing Stolthaven can access the terminals via the Ingall Street / Industrial Drive intersection. All OSOM movements will also be required to use the George Street / Industrial Drive intersection.

Licence/lease holders must:

- Nominate indicative traffic loadings per intersection in consultation with PON.
- Incorporate driver induction processes to clearly communicate the designated gate entry point for each operation.
- Consider the use of vehicle identification systems at access points to enable monitoring and compliance with gate allocations as per their operational requirements or as per PON requirements.
- Where appropriate, consider implementing pre-booking systems for truck arrivals during high traffic periods, specifying gate allocation and arrival times. If needed, this may include the potential expansion of the existing container booking system pending operational growth and alignment.

The strategic location of the PON Mayfield Site ensures that both access intersections connect directly to Industrial Drive. As a result, heavy vehicles accessing the Site will not be required to travel along residential streets in the vicinity of the site, maintaining the amenity of the local community.

3.7 Residential streets

The two sections of residential streets potentially used by trucks are Ingall Street and George Street, located opposite the Site entry points west of Industrial Drive. These roads are only to be used for direct Site access, in compliance with the requirement to avoid heavy vehicle movements on residential streets in the vicinity of the Site.

Driver induction programs must explicitly communicate the requirement to prevent heavy vehicles from accessing or egressing via local residential streets. Any deviation from this requirement must be justified by the tenant to PON and Council. Drivers must also ensure that movements remain within the dedicated heavy vehicle network identified by Transport for NSW.

It is the responsibility of individual lease/licence holders to secure any relevant RMS approvals prior to accessing or egressing the Site with heavy vehicles. As noted in Section 3.3, access and egress routes must be a mandatory component of driver induction. Non-compliance by drivers constitutes a breach of the operator/tenant tenure obligations with PON.

Council has previously identified a number of Local Area Traffic Management (LATM) measures to minimise impacts on neighbouring local roads and residential areas. These measures should be considered by lease/licence holders in planning and managing vehicle movements.

Driver compliance with approved routes will be monitored as part of the Traffic Monitoring and Review Plan (see separate document), in accordance with the Concept Plan Conditions of Approval.

3.8 Reducing reliance on single-occupancy car use

Staff are encouraged to share trips to and from work and between sites wherever possible, to reduce the total number of vehicle movements generated by PON operations throughout the day. PON provides dedicated pool vehicles for staff use, enabling travel between sites without reliance on private vehicles. This initiative is intended to minimise the number of vehicle trips associated with work-related travel across PON Site.

4.0 Proposed measures

The following strategies are proposed to manage traffic and ensure compliance with this TMP, application of which will be dependent on the specific operational requirements and impacts of relevant lease/licence holders:

- Driver Induction provided by individual lease/licence holders, covering:
    - Hours of operation.
    - Approved heavy vehicle access routes, including avoidance of residential streets.
    - Peak hour restrictions.
    - Allocation of gate entry to balance traffic between the two access points.
    - Site-specific requirements, such as security arrangements, wheel washing protocols, access road constraints, safety considerations, speed limits, and restrictions on compression braking in sensitive areas.
    - Compliance with relevant aspects of this TMP.
    - Driver induction programs must be implemented regularly to maintain ongoing compliance.
- Pre-booking of Truck Arrivals to allocate time slots as required to reduce peak hour congestion.
- Lease/licence holders to provide designated On-Site Resources to manage traffic and deliveries.
- OSOM movements must be approved by the relevant regulatory authorities and utilise designated access points and approved routes.
- Staff Travel Initiatives, including the provision and promotion of pool vehicles, to reduce reliance on single-occupancy car use.

5.0 Compliance and monitoring

To ensure compliance with this TMP and effectively manage any complaints, measures to be implemented by each lease/licence holder and PON within the Site are presented in Table 5-1.

Table 5-1 Compliance and monitoring measures

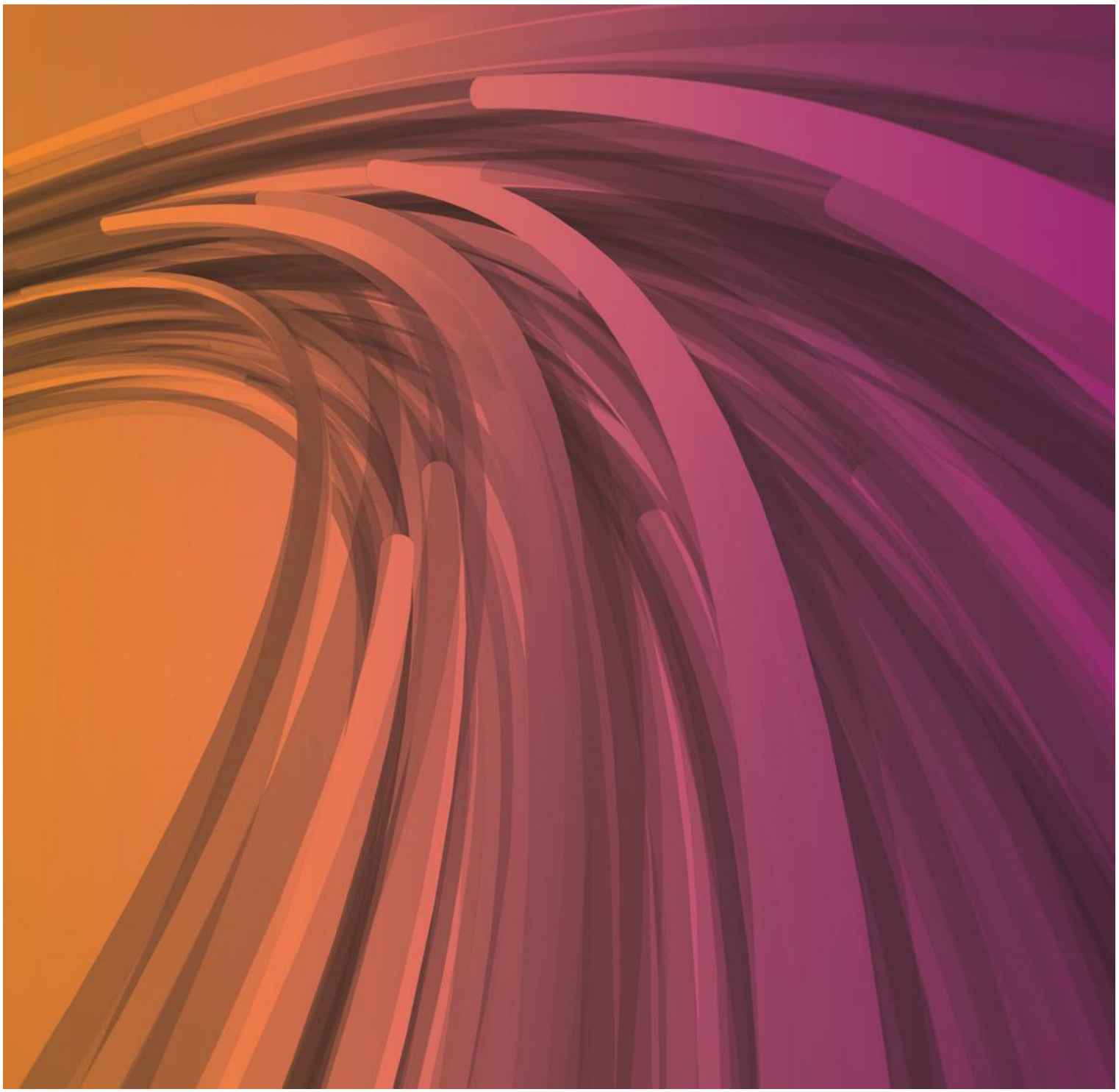
Measure	Responsibility	Reporting	Frequency
Monitoring for non-compliance	Lease/licence holder	Bi-monthly Traffic Management Report	Bi-Monthly
Maintenance of complaints / non-compliance register	Lease/licence holder	Register available to PON; included in periodic compliance reports	Ongoing; provided on request and in periodic reports
Incident notification	Lease/licence holder	Immediate notification to PON and relevant agencies/stakeholders as required based on nature of the incident	Immediately upon occurrence
Incident reporting and corrective actions	Lease/licence holder	Formal incident report to PON detailing corrective actions	Within 1 month of incident

Appendix C

Stormwater Management System

Concept Stormwater Management Strategy

Mayfield Concept Plan



Concept Stormwater Management Strategy

Mayfield Concept Plan

Client: Port of Newcastle

ABN: 13 165 332 990

Prepared by

AECOM Australia Pty Ltd
17 Warabrook Boulevard, Warabrook NSW 2304, PO Box 73, Hunter Region MC NSW 2310, Australia
T +61 2 4911 4900 F +61 2 4911 4999 www.aecom.com
ABN 20 093 846 925

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Job No.: 60301147

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Reviewed by Melanie Collett

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	16-May-2014	Draft for Client Review	Simon Murphy – Senior Environmental Planner	
B	30-May-2014	Revised Draft	Simon Murphy Senior Environmental Planner	
C	27-Feb-2015	Response to Dept. Planning Review	Simon Murphy Senior Environmental Planner	
D	9-Jul-2015	Final Report	Simon Murphy Senior Environmental Planner	

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Abbreviations

AEP	Annual Exceedance Probability
AHD	Australian height datum
CEMP	Construction Environmental Management Plan
CSMP	Contaminated Site Management Plan (Hunter Development Corporation 2014)
DCP 2012	Newcastle Development Control Plan 2012
DECCW*	Department of Environment Climate Change and Water (*now renamed*)
DIPNR*	Department of Infrastructure, Planning and Natural Resources
DP&E	Department of Planning and Environment
EA	Environmental Assessment (AECOM 2010)
EPA	Environment Protection Authority
EPL	Environment Protection Licence
GPT	Gross Pollutant Trap
HDC	Hunter Development Corporation
IIP	Intertrade Industrial Park
km	kilometres
LGA	Local Government Area
m	metres
mm	millimetres
NSW	New South Wales
NTU	Nephelometric Turbidity Units
OEMP	Operational Environmental Management Plan
PAH	Polycyclic Aromatic Hydrocarbons
PMF	Probable Maximum Flood
PON	Port of Newcastle
PWCS	Port Waratah Coal Services
SWMP	Soil And Water Management Plan
TPH	Total Petroleum Hydrocarbons
HDPE	High Density Polyethylene

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1.0 Introduction

1.1 Purpose

This Concept Stormwater Management Strategy has been prepared to provide a framework for the coordinated management of stormwater and flooding across for the future development of the Mayfield port-side lands (formerly known as the Mayfield Closure Area). The site is the subject of a Concept Plan Approval (09_0096) granted by the Minister for Planning in 2012 under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Subsequent to the approval of the Concept Plan, Newcastle Ports Corporation (PON) sought a modification of the Concept Plan approval under Section 75W of the EP&A Act. The modification sought to:

- Remove reference to prescriptive precinct or cargo-based road and rail traffic limits and replace these with reference to overall road and rail traffic limits for the site.
- Replace reference to developing maximum sound power levels for each precinct with development of an overall Site Noise Model which is a more sophisticated and robust method of assessing cumulative noise impacts.
- Ensure the approval appropriately reflects the original intent of the Concept Plan, which was to allow flexibility for future development of the site provided that the overall environmental limits established by the Concept Plan were not exceeded.

The modification reflected changing circumstances including: a shift in NSW government policy regarding the strategic role of the Newcastle Port; significant changes in market drivers relating to the NSW fuel supply chain; and growth in global export demand for bulk commodities such as grain and cement products.

The modification was approved by the Minister for Planning and Infrastructure in March 2014.

This Concept Stormwater Management Strategy has been prepared to meet the requirements of the Concept Plan Approval, specifically Condition 2.1(n) and 2.21.

Patterson Britton & Partners Pty Ltd prepared a Preliminary Design Stormwater Strategy (2006) for the preliminary design of the site earthworks and drainage that was implemented for the remediation works of the Closure Area. The strategy was based on conceptual layout of road and stormwater networks to prove the earthworks design was compatible with technically viable solutions for the future roads and drains, and consistent with Newcastle City Council (now known as The City of Newcastle) design criteria.

This Concept Stormwater Management Plan has been prepared to consolidate the principles developed in the Preliminary Strategy (Patterson Britton 2006) and Environmental Assessment (AECOM 2010), as well as the requirements of the Concept Plan Approval.

Being a Concept Plan Approval, it is noted that the proposed site layout and uses are indicative and may change over time in response to market demand and government policy. Individual developments will be required to obtain Project Approval from the Department of Planning and Environment (DP&E) prior to commencement of construction and operation. However, these developments will need to be consistent with the principles in this Concept Stormwater Management Strategy, The City of Newcastle design criteria and principles outlined in the Contaminated Site Management Plan (CSMP).

1.2 Background

The site is located within an existing industrial area of the Port of Newcastle, adjoining the South Arm of the Hunter River. The land comprises 90 hectares and is located on the former BHP Steelworks site. Following closure of the steelworks in 1999, the site has been progressively demolished and remediated, with the remediation works being completed in 2012.

The initial Concept Plan Approval (09_0096) for the redevelopment of the site included a conceptual layout of anticipated port-related activities, with five key land-use precincts. The concept plan also includes supporting road and rail infrastructure to service the above precincts. A full description of the concept site development is provided in the Environmental Assessment (AECOM, July 2010).

1.3 Strategy Overview

The Concept Plan Approval outlines the requirements for the preparation of this Stormwater Management Strategy (condition 2.21), and that future applications for Project Approval be supported by a hydrological assessment in accordance with Condition 2.1(h), namely:

*A **Hydrological Assessment** that assesses the potential on and off site hydrological impacts of the project and the projects interaction with the site hydrological objectives. The assessment shall:*

i. Consider flooding coastal risk impacts on the project and adjoining land uses within, adjoining and within the locality of the site, including the consideration of climate change risks, and the NSW sea level rise planning benchmarks;

ii. Consider surface and storm water impacts, including the need to isolate stormwater from land contamination and the local groundwater table;

iii. Consider impacts to groundwater, including the need to isolate stormwater from land contamination and the local groundwater table;

iv. Detail flooding, surface and storm water, groundwater and water quality management and monitoring measures, including the maintenance of measures and the application of first flush collection systems and Water Sensitive Urban Design measures;

v. Consideration of the Stormwater Management Strategy required under this approval; [this document] and

vi. Relevant documents including the Floodplain Development Manual (DIPNR, 2005), Flood Risk Management Guide (DECCW, 2010) and Newcastle Development Control Plan 2005.

This Concept Stormwater Strategy has been prepared in response to Condition 2.21 of the Concept Plan Approval, the requirements of which are detailed in **Table 1** in addition to the relevant sections of this report where the necessary information is provided.

Table 1 Requirements of Condition 2.21

DP&E Comment	Addressed in report
2.21 The Proponent shall prepare a Stormwater Management Strategy for the Concept Plan site to provide a framework for the coordinated management of storm water and flood risks across the site and within precincts and to facilitate the continual improvement in the quality of stormwater discharge to the South Arm of the Hunter River and a reduction in flooding impacts to land uses within and surrounding the site. The Strategy shall include:	The Stormwater Management Strategy has been prepared to provide an overarching framework for the management of stormwater across the Concept Plan area. The Stormwater Management Strategy seeks to provide a coordinated and centralised approach to stormwater management so that no a balance can be achieved between all site uses that maintained stormwater quality, and limits the impacts of flooding.
a) The identification of water management risks, including flood risk, water quality and stormwater impacts, the isolation of stormwater from contaminated land and the local groundwater table, and the consideration of climate change and coastal risk;	- Flood risk is discussed in Sections 2.5 and 4.2. - Water quality risks are discussed in Sections 4.3 and 4.4 - Stormwater impacts are discussed in Sections 4.3 and 4.4. - Aspects relating to the isolation of stormwater from the groundwater table and local ground water are discussed in Sections 4.3 and 5.2 (Table 1). - PONs Environmental Management System (EMS) Procedure No. 033 for Groundwater Monitoring at the Mayfield Site, and 034 Annual Review for the CSMP and attached at Appendix A and B respectively. This Strategy has been prepared to be consistent with those procedures. - Climate change and coastal risk is discussed in Sections 4.5 and 5.2.3.

DP&E Comment	Addressed in report
b) *design principles, objectives and environmental performance criteria for flooding, ground water and storm water management, including the consideration of the following matters:*	Refer to Section 5.1 – Principles and Objectives
i. *the design and adoption of stormwater management measures that reflect site constraints, land use and catchment conditions;*	Refer to Section 5.2 for the nominated detailed design criteria and commitments.
ii. *the minimisation of runoff and the reduction of peak flows;*	Refer to Section 3.2.2 and the requirement for above-ground rainwater collection systems in Section 5.2.
iii. *minimising coastal risks and flooding impacts for land uses within, adjoining and in proximity of the site, including the establishment of site design criteria for site levels and drainage capacity, and in consideration of NSW seal level rise planning benchmarks;*	Site specific design criteria are discussed in Section 5.2 (Table 2). Designing for sea level rise is discussed in Section 5.2.3.
iv. *integrating stormwater capture, treatment and reuse into the operating environment;*	Refer to Sections 5.1, 5.2 and 6.2.
v. *improving surface and groundwater quality within the site and at discharge points;*	Section 5.1 and Section 5.2
c) *conceptual site based flooding, storm water, surface water and water quality management measures, including standards for the protection and maintenance of these measures;*	Refer to Sections 5 and 6
d) *a monitoring program for surface and groundwater which identifies parameters to be monitored, sampling locations, monitoring methods and sampling methodology, including frequency and duration of monitoring and sampling, responsibilities and reporting;*	Refer to surface water monitoring program in Section 7
e) *corrective action and contingency measures in the event of exceedances of the relevant environmental performance criteria;*	Refer to Section 8.3
f) *process for regularly reviewing an updating the Strategy to identify continual improvement procedures and to reflect ongoing development of the site;*	Refer to Section 8.4
g) *reporting procedures and protocols for evaluating performance; and*	Refer to Section 8.4
h) *taking into account the NSW Coastal Planning Guidelines: Adapting to Sea Level Rise (DoP, 2010), the Preliminary Stormwater Strategy (contained in Appendix H of the Environmental Assessment), Managing Urban Stormwater: Soils and Construction (Landcom 2004), Council design*	Throughout the Strategy document.

DP&E Comment	Addressed in report
criteria and the existing Hunter Development Corporation groundwater monitoring program.	
The Strategy shall be prepared in consultation with Council, HDC, and EPA and shall be submitted to the Director-General prior to the lodgement or consideration of any project application associated with this Concept Plan approval, or as otherwise agreed by the Director-General. The Proponent shall update the Strategy, a required, following subsequent project approvals associated with this Concept Plan Approval.	A copy of this document is to be provided to the relevant agencies for comment with updates incorporated accordingly.

2.0 Site Description

2.1 Site Background

The site is located at Mayfield approximately 7 kilometres (km) north west of the Newcastle central business district. The site adjoins the South Arm of the Hunter River and has a total area of approximately 90 hectares. The site is owned by the Government Property NSW and managed by Port of Newcastle (PON).

The site was formerly occupied by the long-running BHP Steelworks operation which commenced in 1915 and closed in 1999. Following closure, works including the demolition of structures and remediation of the site soils and groundwater, were completed to minimise the transport of contaminants within groundwater to the river by provision of a 'barrier wall' and low permeability capping.

The Concept Plan Approval for the redevelopment of the site included a conceptual layout of anticipated port-related activities, with five key land-use precincts, as follows:

- **PON Operational Precinct:** for managing operations by PON within the Port of Newcastle. Will include various administrative buildings and small-scale facilities, including vehicle and marine equipment areas.
- **Bulk and General Precinct:** for handling and storing bulk cargoes, such as non-hazardous dry bulk products, and containing various buildings and infrastructure, including covered storage areas, storage silos, conveyors systems, and office buildings.
- **General Purpose Precinct:** for handling and storing cargo containers, heavy machinery, break-bulk and Roll-on Roll-off cargoes. Will include various buildings and infrastructure, including covered storage areas and areas of hardstand.
- **Container Terminal Precinct**: for the storage and transfer of containers, containing various buildings and infrastructure such as quayside and mobile cranes, rail mounted gantries, hardstand areas.
- **Bulk Liquid Precinct:** for the receipt, storage, blending and distribution of fuels and biofuels. To include buildings and structures such as tank farms with steel storage tanks, fuel distribution pipelines and administration buildings.

As described in Section 1.1, subsequent modification to the Concept Plan Approval removed the prescriptive precinct and cargo based limits on the development of the Concept Plan area and instead provided a whole of site cumulative approach. Parts of the site either have been developed, or are in the process of being developed, for a range of port related activities including:

- Existing general purpose cargo handling facility known as Mayfield Berth 4;
- Existing facility run by Koppers for the unloading of coal, tar and pitch products via BHP Berth 6; and
- Bulk liquids facility, run by Stolthaven, in the northern part of the site.

Following closure of the BHP Steelworks operation in 1999, development approval was issued in April 2001 (DA No.293-09-00) which allowed for remediation of soil and groundwater contamination and development of the site as a multi-purpose terminal including container terminal and general cargo handling facility. The general cargo handling facility at Mayfield Berth 4 has been developed and operates in accordance with this approval.

Remediation works on site and in adjacent areas of the South Arm of the Hunter River have now been completed. Remediation works are now managed in accordance with the site CSMP. Refer As part of these remediation works a subterranean barrier wall and sheet pile walls along the river edge were installed. In addition, most of the site was also sealed with asphalt and trunk drainage infrastructure was installed. Further description of the existing site stormwater management system is provided in Section 2.3.

2.1.1 Contaminated Site Management Plan

The former BHP Steelworks Site Contaminated Site Management Plan (CSMP) provides a common framework for the ongoing management of the remediated land which falls within the Mayfield Concept Plan Approval Area. The CSMP is designed to provide the guidance for the ongoing management of the contaminated land such that the integrity of the remediation works is maintained to prevent the release of, or environmental impacts occurring from, liberated contamination.

The CSMP includes requirement for the monitoring of groundwater to determine changes in contamination levels and hydrology. Where appropriate consideration of the CSMP is provides in this document noting that this document focuses on stormwater management.

PON groundwater management documents and procedures have also been prepared to be consistent to the CSMP, including PON EMS procedures 33 and 34 as references in this document and attached at **Appendix A** and **B** respectively.

2.2 Site Context

The project is located within the Hunter River Estuary, which is the second largest estuary in NSW, comprising of over 100 kilometres of waterways, including the South Arm of the Hunter River which flows to the south of Kooragang Island. Kooragang Island was originally a series of smaller islands which formed part of the Hunter River delta, and the area was reclaimed and raised to a level of approximately 3 m Australian Height Datum (AHD) using sand dredged from the Hunter River.

The estuary has been substantially modified as a result of demand for industrial land and the major changes of land use which have taken place upstream. In addition to port-related activities, a range of other commercial activities exist within the estuary, impacting on water quality and habitat integrity (Hunter Valley Research Foundation, 2008).

The site is located in an area of Newcastle that is dominated by industrial and port related land uses.

To the west of the site is vacant land under the control of Hunter Development Corporation (HDC), known as the Intertrade Industrial Park (IIP). Previously there was a proposal to develop this site for a mix of industrial and commercial land uses, however, the status of this proposed development is currently unclear.

To the north of the site is the South Arm of the Hunter River and across the river on Kooragang Island are a number of significant industrial facilities and coal loading facilities run by Port Waratah Coal Services (PWCS) and Newcastle Coal Infrastructure Group.

Although the site does not directly adjoin any residential properties, there are three main residential areas in reasonable proximity to the site:

- To the west beyond the IIP site and across Industrial Drive is the Mayfield residential area.
- To the south beyond the PWCS coal terminal facility is the Carrington residential area.
- To the east across the Hunter River and Walsh Point (the south eastern extent of Kooragang Island) is the Stockton residential area.

The closest residential area to the site is at Mayfield which is approximately 900 metres from the site boundary.

A locality plan showing the site and surrounding areas is provided in **Figure 1**.

Figure 1 Mayfield Precinct (source: Strategic Development Plan for the Port of Newcastle 2013 – 2043)

2.3 Existing Stormwater Management System

The detailed design of the existing stormwater infrastructure was based on a preliminary stormwater design (Patterson Britton 2006) for the ultimate redevelopment of the entire site. A stormwater trunk drainage network was established in association with the remediation carried out across the site. This drainage network includes two trunk drains (an eastern and a western drain) which receive run-off from the hard stand areas, open drains and pipes across the site before discharging via nominated points to the Hunter River. The location of the drains and post-remediation site contours are shown in **Figure 2**.

The trunk drains are intended to provide a permanent trunk drainage solution for the site. Additionally, a number of smaller, temporary, lined shallow ponds and drains have been provided across the remediation area. These ponds contain weirs to control water levels, and drain off-site via lined channels or existing underground drainage. The site has been partly contoured to direct stormwater runoff into the stormwater drains. These ponds and drains serve as an interim drainage system until the final use of the site is determined and a permanent drainage system is implemented.

The stormwater management system, in conjunction with the capping of the site, provide a barrier minimising groundwater and surface water interaction and have been designed to work together to reduce the amount of rainwater infiltrating the site and the movement of groundwater through contaminated soil and into the South Arm of the Hunter River. Following completion of the contamination works the impervious capping was placed across the site to direct runoff to the truck drainage network. Final levels generally range between 3.5m and 7m AHD as shown on **Figure 2**.

Trunk Drainage – Eastern and Western Drains

The Western Drain is located along the western boundary and extends from the southern end of the Closure Area, north to the Hunter River. The drain consists of 475 m of lined open channel draining into a 220 metre (m) long concrete precast box culvert (2.40 m width x 2.05 m height) to the Hunter River.

The Eastern Drain consists of 675 m lined open channel and 248 m of concrete precast box culvert (2.40 m width x 2.05 m height) beneath Selwyn Street to the Hunter River. A box culvert structure was also constructed at the Selwyn Street Inlet Structure which extends approximately 50 m southwest and connects to the upstream end of the open channel.

The open channels are lined with a 2 millimetre (mm) thick high-density polyethylene (HDPE) geomembrane liner, crushed concrete, soil and mangrove vegetation. At the major headwalls, at the upstream and downstream ends, as well as smaller headwalls along the drain, the liner has been connected (and sealed) to the headwalls using a product called Elock to provide an impermeable barrier between the open channel and the surrounding soil and groundwater. The joints between the pre-cast concrete box culverts were also treated to prevent ingress by dirt or water from surrounding soil or groundwater (Coffey Environments, 2008).

It is noted that disused stormwater drains in Area 1A and 2D were backfilled with sand imported to site (classified as inert waste) and left in-situ. Four new concrete stormwater pits were poured as complete units and installed in the low-lying area of Area 1A without joints. Coffey Environments (June 2008) concluded that, following the site remediation, the stormwater drains are isolated from the groundwater by suitable barriers.

The open sections of the main drains have grassed sloping edges which meet benches (2.5 m to 3 m wide) located in the intertidal zone. The benches of the Eastern drain are vegetation with mangroves to provide a water quality improvement function and visual amenity. Incorporated into each main drain is a weir at the downstream end to maintain a permanent water zone (RL 0.1 m AHD) at low tide. Permanent pools created by the weirs and deep water zones located within the channel provide stormwater attenuation and reduce flow velocities within the channels and promote settlement of sediments. Both drains (including the culvert sections) were designed for a storm event with a 1% Annual Exceedance Probability (AEP).

The main drains receive runoff from across the site via a series of open drains and trunk stormwater pipes. Runoff from the adjacent IIP site also flows into the Eastern and Western Drains. Stormwater from the main drains is discharged into the South Arm of the Hunter River at the north west and south west boundaries of the site. There is also a culvert that discharges stormwater from a low point in Area 1 to the South Arm of the Hunter River. This culvert was required to drain a low point in the remediated Area 1 landform. It is understood that this is a temporary arrangement, with future developers of any immediately adjoining wharfs or structures to construct an alternative drainage arrangement (i.e. altered site grading, or larger culvert or other) as required (Patterson Britton 2006).

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AECOM

EXISTING SITE DRAINAGE

Concept Stormwater Management Strategy
Mayfield Concept Plan

FIGURE 2

Eastern Basin

The Eastern Basin was constructed as part of the Stage1 remediation works for water quality treatment purposes. The basin was intended to act as a sediment basin prior to further development of the site, when it will serve a water quality treatment function (Patterson Britton 2006). This basin was designed to have a permanent water level equal to the permanent 'low-tide' level in the Eastern Drain (Selwyn Street).

One Steel Wet Basin

An existing basin is located on the southern side of Steel Works Drive.

Existing Developments

A bulk liquids development, operated by Stolthaven, has been constructed in the north-west corner of the site (completed in 2012). Construction for this development included the provision of an access road and associated stormwater infrastructure. The road connects from Steel Works Road and ends in a cul-de-sac head near the South Arm of the Hunter River.

Construction of this road includes the provision of conventional concrete kerb inlet pits and concrete pipes, collecting stormwater from the road way and limited areas of adjoining land. Stormwater captured and conveyed by this system is discharged via a gross pollutant trap (GPT) to the South Arm. Provision for transverse drainage was also provided in the form of 1.2 m x 1.2 m box culverts parallel to the rail line near Steel Works Road to allow trunk drainage to the Western Drain.

Mayfield No. 4 Berth is a two hectare berth and hardstand within the port-side lands that was constructed as part of the refurbishment of the former BHP Wharf 5. The site has a stand-alone stormwater management system and is subject to its own Environmental Protection Licence (EPL) and Operational Environmental Management Plan (OEMP).

2.4 Existing Surface Water Quality

The estuary of the Hunter River undergone significant environmental and physical changes associated with port and industrial development over the last 200 years. The South Arm of the Hunter River is highly disturbed as a result of historical and ongoing industrial activity in and around the Port of Newcastle. Heavy industry, manufacturing and shipping have contributed to poor water quality within the lower reaches of the Hunter River, including the South Arm.

Sampling and analysis of surface water across the site was undertaken by Coffey Environment (2008) during the remediation works (June 2007 and March 2008). As summarised in the EA (AECOM 2010), in general the following observations were made:

- Exceedances of Australian and New Zealand Environment Conservation Council (ANZECC) marine trigger values (95 percent level of protection) were common for heavy metals across all monitoring locations, particularly copper, lead and zinc. Chromium and cadmium exceedances were also observed. Elevated heavy metal concentrations were attributed in part to suspended particles in the water samples (which were not filtered prior to laboratory testing);
- Turbidity exceedances of the ANZECC guideline value (0.5 to 10 Nephelometric Turbidity Units (NTU)) were attributed to increased suspended sediments resulting from earthworks, including construction of the cap, and erosion of uncapped areas;
- In general, Total Petroleum Hydrocarbons (TPH) concentrations were below the intervention/investigation level of 325 micrograms per litre (µg/L). Elevated TPH concentrations in one sampling location were attributed to the high use of trucks, cars and other heavy equipment at that location; and
- Elevated concentrations of polycyclic aromatic hydrocarbons (PAH) were recorded. Higher concentrations in Area 1 were partly attributed to runoff from the bitumen seal used to coat the cap constructed in that area.

Sampling was also undertaken by GHD between November 2008 and October 2009. The results demonstrated:

- In general, turbidity exceedances were observed at all locations, with the highest and most frequent exceedances occurring in the south east of the site (in Area 2). These areas are currently uncapped and turbidity exceedances are likely the result of disturbance of sediments from earthworks and erosion of uncapped areas draining to the sampling locations;

- Heavy metal exceedances, particularly copper, lead and zinc occurred for all sampling events and in all locations, including the Eastern and Western Drains;
- TPH concentrations were generally below detection limits for all sites except SW9, located in the south east of the site, which recorded elevated levels of TPH since May 2009, with an exceedance of the guideline value on one sampling event (September 2009); and
- PAH concentrations were generally below limits of recording for all sites except SW9.

Existing ground and surface water quality is monitored in accordance with the requirements of the CSMP as per the procedures attached at **Appendix A** and **B**.

2.5 Flooding

The 'Newcastle City-wide Floodplain Risk Management Study and Plan' (BMT WBM, 2012) has been developed and adopted by The City of Newcastle to direct and coordinate the future management of flood prone lands within the Newcastle Local Government Area (LGA).

There are two flood events

- 1% Annual Exceedance Probability (AEP); and
- The Probable Maximum Flood (PMF)

These flood events could occur as a result of two flooding two scenarios

- An Ocean Flood, driven by ocean levels; and
- A River Flood, driven by flooding of the Hunter River

For the 1% AEP the site is not affected by flooding under either scenario. For the PMF the site is not affected under the River Flood scenario but is affected by the ocean flood scenario. In the ocean flood event the site is in an area described as Flood Fringe

Maps presented in the 'Newcastle City-Wide Floodplain Risk Management Study and Plan' (BMT WBM, 2012) indicates that site is defined as 'flood prone land' as it is subject to flooding during the Probable Maximum Flood (PMF) ocean flood event. However, the study and plan indicate that the site, with the exception of the immediate waterfront area (Hunter River bank), is not affected by Hunter River flooding (including up to the PMF Hunter River flood) or the 1% AEP ocean flood event.

During a PMF ocean flood event, the site is located in an area assessed as being "Flood Fringe", with a Life Hazard 'L1'. Life Hazard L1 is defined as "*flooding where there is sufficient time to remove people from the risk to their lives by means of formal community evacuation plans".*

A summary of key flood levels at the site is discussed in Section 4.2.

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3.0 Statutory Requirements and Guidelines

3.1 Concept Plan Approval

The Concept Plan Approval outlines the requirements for the preparation of this Stormwater Management Strategy (Condition 2.21).

Proponents for developments within each precinct will be required to prepare a development application and submission. The Concept Plan Approval requires that these applications be supported by a hydrological assessment in accordance with Condition 2.1(h) (see Section 1.3) and be prepared in accordance with this strategy and requirements of The City of Newcastle.

The following Sections 3.1.1 to 3.1.3 discuss the documents referenced by the Concept Plan Approval as requiring consideration by this Strategy and future developments of the site. Key relevant points from these policies are summarised below, however development proponents are required to review these policies to confirm any further applicable information to their developments.

3.1.1 NSW Coastal Planning Guidelines: Adapting to Sea Level Rise

The 'NSW Coastal Planning Guideline: Adapting to Sea Level Rise' (Department of Planning, 2010) was prepared to provide guidance on how sea level rise is to be considered in land use planning and development assessment in coastal NSW. It presents six coastal planning principles for sea level rise adaptation for application to decision making processes for land-use planning and development assessment. Of these Principal 5 and 6 are relevant to the development and use of the site:

Principal 5 *– Minimise the exposure of development to coastal risks.*

Principal 6 *– Implement appropriate management responses and adaptation strategies, with consideration for the environmental, social and economic impacts of each option.*

The guideline outlines the NSW sea level rise planning benchmarks as being an increase above 1990 mean sea levels of 40cm by 2050 and 90cm by 2100. These sea level rise benchmarks are intended to be used in coastal hazard and coastal flood studies and have been considered in the 'Newcastle City-wide Floodplain Risk Management Study and Plan' (BMT WBM, 2012) for the purposes of assessing flood risk and establishing Flood Planning Levels (refer to Section 4.2).

3.1.2 Floodplain Development Manual and Flood Risk Management Guide

The 'Floodplain Development Manual' (DIPNR, 2005) was prepared in accordance with the NSW Government's Flood Prone Land Policy to guide councils in the development and implementation of detailed local floodplain risk management plans to produce robust and effective risk management outcomes.

In accordance with the framework outline in this policy, The City of Newcastle has implemented a floodplain risk management process, culminating in the 'Newcastle Floodplain Risk Management Study and Plan' (BMT WBM, 2012). It is also noted that this study incorporates the NSW sea level rise benchmarks, consistent with the 'Flood Risk Management Guide' (DECCW, 2010).

3.2 Newcastle Development Control Plan 2012

The 'Newcastle Development Control Plan 2012' (DCP 2012) outlines the requirements of The City of Newcastle for the development and use of land within the LGA. The following sections provide the sections outline the relevant development provisions for the management of water in the future development of the site:

- Section 4.01 Flood Management
- Section 7.06 Stormwater Management
- Section 7.07 Water Efficiency.

These provisions outlined in the above are supported with further detail in the 'Stormwater and Water Efficiency for Development Technical Manual' (The City of Newcastle, 2013).

Whilst development applications to The City of Newcastle would not be required for future development (being a state significant site, DP&E is the consent authority), it is expected that future developments will need to demonstrate consistency with DCP 2012 where practicable. As such, it is likely that future applications for

development will require the assessment consistent with this Concept Stormwater Management Strategy, DCP 2012, and the 'Stormwater and Water Efficiency for Development Technical Manual' (The City of Newcastle, 2013). A summary of the key provisions potentially relevant to the future development of the Mayfield port-related land is provided below.

3.2.1 Flood Management

The site is considered to be flood prone under the definitions under the 'NSW Government Floodplain Development Manual' (Department of Infrastructure, Planning & Natural Resources, 2005), in that it is susceptible to inundation by the PMF ocean flood event. In this case, the site is susceptible to the PMF Ocean Flood event, but not the PMF Hunter River flood event, and is considered to be a flood fringe area.

DCP 2012 (4.01 Flood Management) notes that:-

> *Flood fringe areas can usually be developed without reference to how that development will affect the flood behaviour either upstream or downstream.*

With the exception of the waterfront bank of the Hunter River, the site is not inundated by the 1% AEP river or ocean events and therefore no hydraulic behaviour thresholds or property hazard categories have been applied to the majority of the site under the 'Floodplain Risk Management Study and Plan' (BMT WBM 2012). Whilst the site is defined as flood prone land, inundation of the broader site through either riverine or ocean flooding is likely to be very infrequent, of moderate depth, and low velocity, and therefore the associated potential hazard to life or property is considered low.

Where developments do not include works directly adjacent to the river, minimal controls under DCP 2012 apply, other than Clause 4.01.04 'Management of potential risk to life'. The objective of this clause is to:-

> *Only permit new development or redevelopment where the full potential risk to life from flooding can be managed for all floods up to and including the PMF.*

The immediate water frontage to the South Arm of the Hunter River is at greater risk of flood inundation and subject to higher velocity flood flows. Development of the waterfront or river bank would potentially affect flood flows in the Hunter River and be defined as works within the Floodway. The objective of DCP 2012 is to retain floodways in a condition capable for the conveyance of essential flood flow. Controls include:-

> *No building or structure erected and no land filled by way of the deposition of any material within any area identified as a floodway except for minor alterations to ground levels which do not significantly alter the fundamental flow patterns.*

Wharf structures along the waterfront may require hydraulic modelling and assessment, in accordance with DCP 2012, to demonstrate they do not adversely affect flows within the floodway.

3.2.2 Stormwater Management

Section 7.06 of DCP 2012 outlines Council's requirements for stormwater management for development. Council's aims include:

- *To adopt a whole of water cycle approach to development; and*
- *To ensure an appropriate quality and quantity of water enters waterways.*

Section 7.06 outlines a number of controls relating to the following:

- stormwater collection
- flooding and runoff regimes
- storage and storage drawdown
- site discharge controls
- pollutants
- overflow
- existing drainage systems.

The Concept Plan was developed to be generally consistent with DCP 2012 (formerly known as DCP50), with site-specific design criteria advised by The City of Newcastle adopted by Patterson Britton (2006).

The Preliminary Design and measures outlined in this Strategy are generally consistent with the provisions of DCP 2012, with the exception of site storage and site discharge controls. The intentions of the DCP for the capture of site runoff will be applied for roof catchments only (using above ground tanks) due to the capping of the site. Breaching of the capping for the installation of hardstand runoff poses potential issues relating to the integrity of the capping and reduced effectiveness in isolating and containing underlying pollutants.

Where the trunk drainage network can safely convey the 1% AEP event, without adversely affecting adjoining property, on-site detention is not proposed for the mitigation of peak flows, due to the proximity to the harbour (refer to Patterson Britton 2006).

The remainder of the stormwater network will be designed with regard to DCP 2012 and the 'Stormwater and Water Efficiency for Development – Technical Manual' (The City of Newcastle, 2012) and relevant industry guides where appropriate.

3.2.3 Water Efficiency

The objectives of DCP 2012 – Section 7.04 are to:

1) Improve the efficiency of water use and reduce the long term water consumption for residential, business and industrial uses through best practice water use;

2) Encourage the innovation of water efficient technologies and processes.; and

3) Incorporation of water sensitive urban design elements into the urban landscape.

As noted in the Preliminary Stormwater Strategy (Patterson Britton 2006) and EA (AECOM 2010), future development should seek to implement measures in line with the above objectives including:

- Capture of roof runoff in rainwater tanks, fitted with first flush devices, for reuse on site (i.e. washdown, landscape irrigation).
- Provision of water efficient plumbing fixtures and appliances where fitted.
- Reuse or recycling of water on site where practicable.

3.3 Contaminated Site Management Plan

The Concept Plan Approval envisages that development of the site will be staged across five precincts and individual proponents would prepare Project Applications to develop areas within each precinct.

The EA (AECOM, 2010) noted that the individual developments would be developed in accordance with the 'Contaminated Site Management Plan' (HDC, 2014) (CSMP). The CSMP provides the common framework for the design, implementation, use and maintenance works across the whole Closure Area. The CSMP provides controls to both the remediation works as well as future project works to ensure they are properly designed and implemented having regard to relevant risks presented by contamination of the site

The Eastern and Western Drains were constructed as part of the Stage 1 Remediation works. HDC has also constructed interim environmental drainage works in Area 2 to reduce infiltration and provide stormwater detention for sediment removal, to operate in the period prior to development.

Future development of the site will require regulatory approval for the design of permanent stormwater quality improvement devices to service the development, including provisions of DCP 2012 for individual lots, grassed swales and sand filters, stormwater detention basins and gross pollutant traps.

The CSMP requires that:

- Interim environmental drains and basins may not be decommissioned until written authority has been obtained from the EPA on the design of permanent water quality improvement facilities.
- The drainage system is to accommodate the drainage pathways identified in the Preliminary Design, or those superseded by the Final Design, and are to provide a similar pattern of drainage, and be compatible with the stormwater strategy for the site.
- Stormwater systems and sewer systems (including subsoil drains, pumping stations, sumps and other infrastructure or equipment) are to be isolated from ingress of groundwater.
- Designs should limit exposure to contamination during site regrading earthworks.

- Any plan of subdivision or lease is to create a drainage easement over the areas denoted Area K on the CSMP, and have suitable terms for access to maintain the drains which are acceptable to the State.

It is noted that a plan of subdivision has been registered for the site. The subdivision includes drainage easements which provides access rights to the relevant authorities for the inspection and maintenance of assets. I copy of the plan of subdivision is attached at **Appendix C**.

In order to manage the area to which the CSMP applies, PON has established EMS Procedure No. 034 a copy of which is attached at **Appendix B**. Any changes to the management of stormwater would be undertaken in accordance with the requirements of that procedure to protect the integrity of the remediation works.

4.0 Water Management Issues and Risks

This section has been prepared to satisfy Condition 2.21(a) of the Concept Plan Approval by providing an "identification of water management risks, including flood risk, water quality and stormwater impacts, the isolation of stormwater from contaminated land and the local groundwater table, and the consideration of climate change and coastal risk".

The following information is reproduced from the Environmental Assessment (AECOM 2010) based on the conceptual land use precincts.

Individual projects will be required to undertake a detailed hydrological assessment that identifies aspect of these water management issues and risks that are specifically relevant to their activities.

4.1 Issues Overview

The original environmental assessment (AECOM 2010) identified that stormwater run-off from the Concept Plan could potentially impact the receiving environment of the Hunter River in the following ways:

- Mobilisation of sediments from land based construction works;
- Run-off generated from extensive hard stand areas and buildings/structures;
- Spills and leaks of potentially contaminated materials and fuels; and
- Run-off generated from various road, rail and ship transport related activities.

The environmental assessment identified the following to have the greatest potential for adverse impacts to the water environment based on the proposed uses of the site:

- General land-based construction work (earthworks, excavations, road and rail infrastructure and stormwater drainage works;
- Mobilisation of existing soil contamination through percolation of surface water and groundwater flows;
- Drainage runoff generated from hardstand areas and buildings, and various road, rail and ship transport related activities;
- Discharge of contaminated stormwater during construction and operation; and
- Spill and leaks of potentially contaminated materials during construction and operation.

During operation, potential impacts on hydrology and water quality would occur from stormwater management from buildings and hardstand areas and transport and portside operations. A range of potential pollutants from the built development and operational activities from the precincts (e.g. heavy metals, sediments and other contaminants) could be generated and mobilised in surface runoff from the site.

For particular land use types (formerly referred to as 'precincts', the EA identified the activities and associated types and sources of pollutants that could be generated at each precinct based on the nature of its designated uses:

- **Administration areas and roads/carparks** – runoff from hardstand areas that receive vehicle traffic could contain elevated levels of pollutants such as heavy metals and PAH;
- **Bulk cargo handling and storage** – potential for spills from plant and machinery, ship loaders/unloaders and malfunction of conveyor systems and pipelines. Also potential contaminated runoff from uncovered stockpiles in wet weather or blown contaminants in windy conditions;
- **General purpose cargo handling and storage** – activities (e.g. heavy weight of cranes and machinery) could damage the subterranean barrier wall (part of which is located within this precinct) and result in groundwater or surface water infiltration into the highly contaminated sediments of Area1. Also the potential for uncontrolled spills and leaks resulting in degradation of water quality;
- **Container terminal** – potential risks to the barrier wall are similar to those for general purpose cargo areas. In addition, pollutants generated from the increased volumes of road and rail movements would potentially contaminate surface water runoff; and

- **Bulk liquid handling and storage**– potential for spills and leaks during transfer of liquids from ships to facilities, from damaged hoses and pipelines, corrosion and damage to tanks, and overfilling of storage tanks.

4.2 Flood Risk

The 'Newcastle City-wide Floodplain Risk Management Study and Plan' (BMT WBM, 2012) has been developed and adopted by The City of Newcastle to direct and coordinate the future management of flood prone lands within the Newcastle Local Government Area (LGA).

Maps presented by BMT WBM (2012) indicate that the site is only inundated during a PMF Ocean Flood event. The site, with the exception of the immediate bank of the Hunter River, is not affected by Hunter River flooding (including up to the PMF Hunter River flood) or the 1% AEP Ocean Flood event.

During a PMF Ocean Flood event, the majority of the site is located in an area assessed as being Flood Fringe, with a Life Hazard 'L1'. Life Hazard L1 is defined as "*flooding where there is sufficient time to remove people from the risk to their lives by means of formal community evacuation plans".*

A summary of key flood levels at the site include:

Frequent Ocean Flood level

The adopted frequent ocean flood level for Newcastle Harbour is 1.35m (refers to levels published in NSW Government 2010) and which was approximated as the current 10% AEP ocean water level. This value does not include an allowance for future sea level rise or coincident catchment flooding.

1% Annual Exceedance Probability (AEP) Ocean Flood level

The 1% AEP Ocean Flood level has been estimated at RL 2.3m AHD. This level has been calculated as the current peak recorded ocean level within Newcastle Harbour (RL 1.4m AHD) plus an allowance for sea level rise of 0.9m by year 2100. The average level of the Concept Plan area ranges between 3.5m and 7m.

Extreme (PMF) Ocean Flood level

An Extreme Ocean Flooding level of 3.4m AHD within Newcastle Harbour was estimated by numerical modelling by (DHI 2008, in BMT WBM 2012). This value includes a sea level rise of 0.9metres expected by 2100 and assumes coincidence of several extreme meteorological conditions (approximately equivalent to a PMF event). With site levels generally between 3.5m and 7m the majority of the site is safety from the PMF.

It is noted that the immediate waterfront (Hunter River bank) is at greater risk during a Hunter River or ocean flood event of inundation and high velocity flood flows due to its proximity to the South Arm of the Hunter River. Structures along the waterfront will therefore be subject to the provisions of DC P2012 (Section 4.01).

4.3 Construction Phase Risks

The capping and contouring of the site remediation works has been carried out to minimise surface ponding and direct runoff to either the Eastern or Western Drains. Construction works will alter the existing drainage regime of the site, with potential impacts to local drainage and water quality, such as:

- The alteration of surface gradients within the precincts during construction may result in areas of ponding and lead to infiltration and interaction with contaminated soil and groundwater.
- The potential for impacts arising from erosion and sedimentation from stockpiles, and exposed work areas within the construction site – mobilising fine soil particles and associated heavy metal and organic contaminants.
- Excavation for the installation of stormwater infrastructure and other services or structures has the potential to disturb and interact with contaminated soil material beneath the site capping layer or reduce the integrity of the capping.
- Spills and leaks from plant and machinery reaching site drains or the Hunter River if not prevented or controlled.
- Pollutants generated by construction vehicles and machinery and deposited on roads, or waste materials not appropriately stored could contribute to increased load of pollutants such as litter, hydrocarbons, heavy metals and particulates.

4.4 Operational Risks

The industrial use of the site and change in hydrological regime poses various risks to discharge water quality, with specific issues being dependent on individual developments. However the following generic water quality risks are possible.

4.4.1 General

The greatest potential for impacts on hydrology and water quality during operation of the proposed concept would be from stormwater management from buildings and hardstand areas, and transport and portside operation activities.

As part of the remediation works the site was sealed with an inert capping layer to prevent surface water infiltration. The capped surfaces across the site would be further covered by impervious hardstand. Surface water runoff from the impervious surface has the potential to mobilise sediments and contaminants (such as litter and hydrocarbons from oil and fuel spills and leaks) and organic matter which would degrade receiving water quality.

Road and rail infrastructure constructed to service the site could be the source of a range of potential pollutants in surface runoff from the site. Large volumes of trucks would use access roads and internal road networks to import and export bulk goods, liquids and general cargo. The potential pollutant loads in road runoff, including hydrocarbons, fuels, heavy metals and particulates, would increase and result in impacts on water quality in the stormwater drainage system and potentially the Hunter River. First flush stormwater containment would be designed into the SMS, to capture and separate the most contaminated portion of stormwater runoff.

Road and rail infrastructure has the potential to divide catchments and provide a barrier to surface water flow from one part of the site to another. This would in turn potentially increase flood risk within the site. Flood risk impacts would be addressed by ensuring that appropriately designed culverts are installed and maintained.

The construction of a new access road off Selwyn Street and the internal road network could form barriers across the local catchment area during operation, potentially altering flood risk within the site and to the adjacent site areas and IIP. Appropriately sized culverts would be designed and constructed under roads to convey flows across the site to main drains and retention basins.

Failure of part of the surface water management system, for example drain/pipe blockages, could result in uncontrolled discharge of contaminated surface water runoff within the site or to the South Arm of the Hunter River. Malfunction or poor maintenance of the surface water management system could also result in increased localised flooding, with the potential to impact on the site and on neighbouring land.

4.4.2 Barrier Wall Integrity

A subterranean barrier wall installed as part of the remediation activities to contain contaminated groundwater onsite. Construction activities have the potential to impact the integrity of the barrier wall, which could in turn result in groundwater or surface water infiltration into the highly contaminated sediments of Area 1. The likelihood of this impact occurring is low as there is a 15-metre easement in place around the barrier wall and the CSMP places restrictions on construction activities within the vicinity of the barrier wall. These measures would minimise the potential for the barrier wall to be damaged, in turn reducing the likelihood of infiltration and contamination.

The large weight of mobile cranes and heavy machinery moving across (or in the vicinity of) the barrier wall could result in damage to the barrier wall at the land surface. This could result in infiltration of surface water and a potential increase in the volume of water in contact with contaminated sediments and groundwater. The likelihood of this impact occurring is low as the barrier wall has been designed to withstand sustained heavy loads associated with port operations.

4.4.3 Bulk Cargo Handling and Storage

Activities relating to storage and handling of bulk cargo is likely to require facilities such as covered and uncovered storage areas, storage silos, conveyor systems. Bulk goods to be handled and stored include grain, dry-bulk cement, fertiliser, coke, soda ash, meals and sand. All goods would be stored in covered storage areas, except boutique coal and sand which would be stored uncovered.

During operation, there is the potential for spills from ship loaders/unloaders during transfer of bulk goods from ships to land and vice versa. Malfunction of conveyor systems and pipelines could result in uncontrolled spills and leaks and lead to degradation of stormwater quality. Fuel and oil leaks and spills from machinery and plant could also result in water quality impacts in this precinct.

There is the potential for contaminated runoff to be produced by uncovered sand and boutique coal stockpiles during rainfall. In addition, materials and particles blown from uncovered stockpiles during windy conditions, could result in deposition and contamination of waterways within and adjacent to the site. Measures such as bunding to capture runoff, as well as dust and sediment control measures would be implemented to reduce the potential for stockpiles being the source of contaminated runoff.

4.4.4 Containers and General Purpose Cargo

General purpose activities would include handling and storage of cargo containers, heavy machinery, break bulk and Ro/Ro cargo, for example, farm and road construction machinery and excavators would be imported while ammonia nitrate, scrap metal and pine logs would be exported. Cargo including large industrial components, luxury boats, transformers, machinery, and steel and timber products would be imported and exported.

Development for the import / export of a container terminal(s) or for general purpose cargo would include buildings, quayside infrastructure such as mobile cranes, hardstand areas, workshop, quarantine facilities and road and rail infrastructure.

During operation, there is the potential for spills during transfer of cargo and machinery from ships to land and vice versa. Malfunction of cranes and conveyors could result in uncontrolled spills and leaks and lead to degradation of stormwater quality. Fuel and oil leaks and spills from machinery and plant could also result in water quality impacts. Strict procedures for cargo transfer and regular maintenance of cranes, conveyors and machinery would be implemented to manage the potential for spills during operation.

4.4.5 Bulk Liquid Operations

Bulk liquid operations may include the receipt, storage, blending and distribution of fuels and biofuels. Fuel types handled would include unleaded petrol, diesel, biodiesel, fuel oil and ethanol. Unleaded petrol, diesel and fuel oil would be delivered to the site by ship and biodiesel would be delivered by road. Infrastructure would include tank farms with steel storage tanks, fuel distribution pipelines, loading / unloading facilities for trucks, bunded areas, workshops and administration buildings.

Ships at berth would transfer unleaded petrol, diesel and fuel oil through flexible hoses to an aboveground pipeline and into the bulk liquid facilities. There is the potential for spills and leaks to occur during transfer of the liquids from ships to facilities, from damaged hoses and pipelines. There is also the potential for overfilling of storage tanks during receival of fuels from both ships and road tankers which could result in large spills into the drainage system of the precinct or directly to the South Arm of the Hunter River. Large spills are unlikely to occur as there would be strict procedures set out in environmental management plans, incorporating visual inspections, supervision of transfers and regular maintenance of hoses and pipes.

Bulk fuel storage tanks would have the capacity to store significant volumes of fuel on the site. Damage to tanks, corrosion, malfunction of valves and level gauges and failure of bunding, although highly unlikely, could result serious leaks, spills and overflows of potentially large volumes of fuels and oils to the receiving environment. The resultant impacts of uncontrolled fuel spills on the Hunter River would be significant and potentially cause long-term damage to water quality, habitats and sediments within the river. Bunding would be placed around storage tanks to contain spills and overflows and emergency response plans would be implemented to ensure the risk and impact of spills and overflows is minimised.

Bunded areas would create micro-catchments within the precinct, potentially impacting flood risk potential. Stormwater drainage infrastructure would be designed to ensure bunded areas are incorporated into the stormwater system, thereby managing the potential for flood risk impacts within or downstream of the precinct.

4.4.6 Berth Operations

During operation, runoff from the hardstand areas of the berths could become contaminated with sediment and pollutants associated with machinery and vehicles and result in impacts on water quality if allowed to drain directly to the Hunter River. The first flush containment system that would form part of the SMS (refer to Section 9.6.4) would capture rainfall runoff containing accumulated pollutants, reducing their release to the South Arm of the Hunter River.

4.5 Coastal Risk & Climate Change

Given the site's proximity to the Hunter River, the area is potentially at risk of coastal hazards and increases in mean sea level predicted as a result of climate change.

The Coastal Risk Management Guide (DECCW, 2010) notes that:-

> *higher inundation levels, saltwater intrusion and landward advance of tidal limits within estuaries will have significant implications for freshwater and saltwater ecosystems and development margins, particularly buildings structures and foundation systems within close proximity to the shoreline.*

Increased sea levels will also affect the integrity and function of stormwater drainage and sewerage infrastructure as the rise in mean sea level increases the frequency and depth of seawater ingress into these systems.

Increasing sea levels and changing rainfall patterns may also change the vulnerability of areas to flood inundation as the effects of climate change take place. It is noted that the recent Newcastle City-wide Floodplain Risk Management Study and Plan (BMT WBM 2012), prepared flood risk maps for Newcastle that includes allowances for the NSW sea level rise planning benchmarks which is a 0.9m rise in sea levels by 2100.

As noted in Section 4.2, the site is not generally vulnerable to flooding, except in rare events, including allowances for climate change. However increased frequency and depth of tidal inundation has the potential to affect site infrastructure, and as such should be considered in the detailed design of site stormwater infrastructure, and the design of site services and structures.

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5.0 Concept Stormwater Design

5.1 Stormwater Management Principles and Objectives

Future development of the site is to include the design and construction of a permanent stormwater drainage system, generally consistent with The City of Newcastle guidelines, standards and requirements.

The EA (AECOM 2010) presented six overarching stormwater principles to guide stormwater, flooding, and water quality management across the site. Integrated water cycle management and water sensitive urban design approaches form the basis of these principles.

Principal 1: *Design and adopt stormwater management measures that are appropriate for the site constraints, land use, and catchment condition.*

Principle 2: *Minimise runoff and reduce peak flows.*

Principal 3: *Minimise flooding impacts within and downstream of the site.*

Principle 4: *Integrate stormwater capture, treatment, and reuse into the operating environment.*

Principle 5: *Maintain or improve surface and groundwater quality within the site.*

Principle 6: *Maintain or improve quality of surface and groundwater discharges to the South Arm of the Hunter River.*

The Preliminary Design Stormwater Strategy (Patterson Britton 2006) was prepared for the Stage 1 remediation works and was also submitted in support of the Environmental Assessment. The strategy outlines design objectives for the future design and management of stormwater on the site. Whilst some of these objectives overlap with the above principles or are more relevant as drainage standards, these are reiterated below:

Detailed drainage designs for the future development of the site will aim to meet the following objectives:

- *Stormwater system is to be coordinated across the site, whilst reflecting specific requirements of each precinct;*
- *Stormwater generated on-site to be conveyed to the South Arm of the Hunter River;*
- *Stormwater to be isolated from the local groundwater table;*
- *Major drains and detention basins are to have sufficient capacity to convey/retain the 1% AEP catchment runoff;*
- *Maintain water quality and provide aquatic habitats where possible;*
- *Promote recycling and reuse of drainage runoff where possible;*
- *Provide maintenance access where necessary;*
- *Provide an aesthetically pleasing drainage solution;*
- *Utilise existing infrastructure where possible; and*
- *Minimise construction costs and spatial requirements.*

Drainage networks for individual project may need to be designed and constructed progressively and would incorporate some or all of the Principles listed above, depending on the location of each project within the site, the size of the drainage sub-catchment, and existing drainage features in place at the time of the project development. Each individual development will be designed and developed such that no adverse impacts to future development is incurred by ensuring appropriate site grading and maintaining sufficient capacity in the site trunk drainage networks.

5.2 Detailed Design Commitments and Criteria

The detailed design of stormwater systems for individual projects is required to comply with this Concept Stormwater Management Strategy, The City of Newcastle design criteria, principles set out in the Contaminated Site Management Plan and in consultation with applicable regulatory agencies.

As documented by Patterson Britton (2006), it is intended that stormwater management and water quality improvement for general catchment runoff will be achieved using the following treatment train:

- above-ground rainwater collection systems (roof water only)
- water quality controls for the remainder of the lots (site-specific, depending on nature of activities)
- grassed swales for conveyance and as a treatment measure of road runoff
- discharge into the detention basins (e.g. East Basin and One-Steel Basin) to pass through GPTs
- detention basins to serve a dual quality improvement function (i.e. additional sedimentation)
- tidal-lined mangrove 'wetlands' (the open channels – eastern and western drain).

Site-specific design criteria or measures that are to be incorporated into the development of the site are listed in Table 2. These have been compiled based on commitments or mitigation measures presented in the EA and Preliminary Strategy. As such they form part of the Concept Plan Approval.

Table 2 Design and Construction of Stormwater Infrastructure

Feature	Requirements
Site grading	Site is to be graded to be free-draining and free of ponded areas Site grading to be designed to maintain separation of potentially contaminated runoff (i.e. from stockpiles, tank farms, washdown areas, etc.) from clean stormwater runoff.
General	- Open channels to be adopted as a 'green' solution. - All open drains are to be lined to isolate drainage flows from the local groundwater. - Where inverts are below the estimated groundwater table, will be sufficiently weighted to counter buoyancy forces. - Appropriately sized culverts and/or drains will be constructed under road and rail infrastructure to maintain connectivity between catchments and reduce the likelihood of localised flooding.
Roads	- Water sensitive urban design features (e.g. vegetated swales) or similar treatment will be provided to remove potential contaminants prior to discharge to the Hunter River (e.g. sediments, contaminants deposited on roadways).
Minor open drains and swales	- Designed to convey the 5% AEP event. - Use of swales for treating stormwater is acceptable. - Grassed batters – no minimum slope (maintained by boom-style mowers) and may undulate if required. Low flow drainage will be provided to drain flat sections. - Acceptable to run overflows along swales as well as roads and footways during larger events (i.e. safe overland major flow paths). - Velocity x Depth product to be less than 1.0 (in a 1% AEP event) (or as otherwise recommended in updated revisions of Australian Rainfall and Runoff).
Major open drains	- Designed to convey the 1% AEP event. - 0% longitudinal grade is permitted (where intent is to create a water quality function or intertidal zone, similar to the Eastern or Western Drains).
Tidal drains	- Use of mangroves is preferable for vegetation treatment (use Manning's n of 0.1 for mangroves). - Flap valves to prevent tidal inundation of the stormwater system

Feature	Requirements
	should be located at the upstream end of open channels.
Tailwater conditions	- A tailwater of 0.8m AHD (spring high tide) for the 1% AEP flood event (across the site) is considered appropriate, and this should be compared to a flood event based on a storm surge tailwater (1.35m AHD) with a 10% AEP rainfall event.
Stormwater pipes	- Minimum pipe slopes of 0.3% are to be adopted. - Consideration to be given to pipe blockage, including risk of blockage, design features to minimise risk of blockage and storage effects (with referenced made to updated revisions of Australian Rainfall and Runoff). - Pits, pipes, culverts and headwalls shall be constructed so that drainage flows are isolated from groundwater. Therefore conduits are to be sealed and open drains lined with HDPE.
Roof water	- Roof water will be captured and stored on site and reused for wash down facilities, irrigation of landscaping, or other non-potable reuse purposes where practicable.
Basins	- To perform either a water quality or flood attenuation function. - To be connected to the main drains. - Designed with sufficient capacity to contain up to the 1% AEP event. - Wet basins to have side slopes of no steeper than 1V:3H, lined with HDPE to prevent groundwater interaction.
Bunds	- Catchments with a high risk of accumulation of contaminants, or spills and leaks are to be bunded to contain potentially contaminated stormwater, and separated from clean stormwater runoff in adjacent sub-catchments. - Stormwater captured in bunded areas will be retained on site until tested as suitable for discharge. - Bulk liquid storage tanks to be located in sealed bunded area, with capacity to hold 120% of the tank storage volume. Tank farm areas to be encompassed by a second bund in the unlikely event of an individual bund failure.
Interaction with groundwater	- Design and construction of all drains must consider the potential to interact with the groundwater table and implement measures to reduce infiltration and prevent leaching of groundwater into the stormwater system.
Construction materials	- If slag is used in the construction of major stormwater channels, testing is to be undertaken to demonstrate no leachate into the water.
All excavation works	- All works are to be carried out in accordance with the CSMP. - Use of geotextile liners or temporary capping would reduce infiltration of surface water runoff where capping is disturbed during construction (to be reinstated and maintained during operation). - Designs and all disturbance works are to maintain the integrity of the site capping (as per the CSMP).
Bulk liquids storage tanks	- Each tank to be fitted with auto-level gauging, high/high and high/low level alarms, multi-level temperature measurement, multi-level sampling equipment, water draining and low-level product drains for maintenance. - Filling of storage tanks to be controlled by a computer-controlled system that would monitor storage tank levels and reduce the risk of overfilling. - Design of tanks to meet or exceed the applicable standards. Storage tanks to be placed on a reinforced concrete foundation and include a tell-tale drain installed under each tank to assist with leak detection.

5.2.1 Water Quality Improvement

The EA and Preliminary Design Stormwater Strategy both discuss the use of first flush systems as a water quality treatment measure for site catchments. The intent of these systems would be to capture and treat runoff from hardstand areas, which can accumulate deposited sediments and pollutants from daily activities. The general principles for the first flush systems being:

> *First flush collection systems, consisting of pits, trenches or retention tanks, would capture the initial pollutant-laden stormwater flows created by the first 10 millimetres of rainfall. Oil/grit separators would be installed to separate oils, greases and other hydrocarbons from the first flush stormwater. The stormwater would then be transferred to holding tanks for testing, prior to discharge to main drains or storage tanks for reuse on-site.*
>
> *Sediment and pollutants removed from first flush stormwater (i.e., at the bottom of settling tanks and retention pits and from separators) would be discharged to the sewerage system or transported off-site for disposal at an approved waste facility.*

Individual developments will be required to demonstrate that adequate water quality treatment is being provided as part of the site operations. The design of these systems will be specifically tailored to suit the site configuration and anticipated pollutant load and hydraulic analysis provided with the Project Application to demonstrate that the proposed treatment train can meet the desired environmental performance criteria (refer to Section 7.2).

5.2.2 Flooding

Project applications for individual developments will provide a detailed description of waterfront structures and construction and operation methodology which will allow a detailed and robust assessment of potential environmental impacts at the land and water interface (AECOM, December 2010).

5.2.3 Designing for Sea Level Rise

The predicted flood levels for extreme events currently developed for The City of Newcastle (BMT WBM 2012) have considered the NSW seal level rise planning benchmarks i.e. 0.9m by 2100.

Whilst the site will be generally flood free in most events (with the exception of the PMF ocean flood event and the bank of the Hunter River), flood levels in the South Arm of the Hunter River should be considered when establishing floor levels for development (to ensure adequate freeboard), and in particularly in the design of infrastructure, services, and utilities to ensure they can maintain their function and achieve their intended design performance in the event that predicted sea level rises are realised.

With respect to stormwater infrastructure, designs should demonstrate that they will continue to provide their intended function, or can be readily adapted, as tailwater conditions increase over time. This may include providing adaptations to outlets, such as valves or tide flaps, adjustable weir heights and so on to allow for increasing tailwater levels and increasing frequency of inundation over the life of the development.

5.3 Coordination of Development

As the development of the site progresses, there will be a need to review the performance of the site stormwater system as a whole to confirm that each development fits within the overall stormwater strategy and does not adversely limit the ability of future sites to be developed.

Each individual Project Application will be required to develop a detailed Hydraulic Assessment demonstrating that:

- The proposed individual site configuration and activities conform with the requirements of the Concept Plan Approval, Council requirements and this Concept Stormwater Strategy;
- Demonstrating that the Mayfield port-related lands as a whole, will still perform as approved with respect to stormwater runoff and water quality; and
- That remaining lands yet to be developed are not adversely affected and can be developed within the approved limits of the Concept Plan Approval.

6.0 Construction and Operational Stormwater Management Framework

6.1 Construction Environmental Management

Construction works would be undertaken in accordance with Construction Environmental Management Plans (CEMPs), the CSMP and appropriate environmental controls and work method statements would be prepared for construction activities carried out across the site.

Water quality impacts during construction would be managed according to the CEMPs that would be prepared for each Project application. The CEMPs would set out appropriate controls to manage and mitigate potential impacts on water quality and would outline appropriate response procedures for dealing with emergencies such as spills and leaks during construction activities. These controls would be detailed in a series of sub-plans including:

- Soil and Water Management Plan (SWMP); and
- Emergency Response Plan.

The CEMP is to be prepared in accordance with the industry guideline 'Managing Urban Stormwater: soils and construction, Volume 1.' (Landcom, 2004).

The EA made some specific recommendation measures that would be implemented to mitigate the anticipated risks to runoff and water quality during construction. These are summarised in Table 2 and should be incorporated into the CEMP.

Table 3 Construction Environmental Mitigation Measures

Feature	Criteria
Construction	
General	- Construction works to be undertaken in accordance with a CEMP.
Interim drains	- Existing temporary drainage network would continue to be utilised during construction works. Prior to decommissioning interim environmental drains, regulatory approval for the permanent stormwater management system is required.
Erosion and sediment controls	- To be documented in a Soil and Water Management Plan.
Barrier Wall	- The integrity of the barrier wall will be maintained through the application of development restrictions set in the CSMP.
Plant and machinery	- To be operated in a responsible manner by experienced drivers to reduce the risk of spills. Equipment to be well maintained.
Spills and leaks	- Spill kits to be appropriately located on site to ensure emergency containment measures can be implemented if required to prevent impacts to surface or groundwater quality.

6.2 Operational Environmental Management

Individual projects will develop and implement Project-specific Operational Environmental Management Plans, OEMPs) outlining the relevant monitoring, maintenance, mitigation and emergency response procedures for the site activities.

These measures will be documented in a series of sub-plans, including:

- Soil and Water Management Plan;
- Spill Management Plan; and
- Emergency Response Plan.

The OEMP and sub-plans will include details on the following:

- Implementation / maintenance of the stormwater management system infrastructure;
- Document controls for the management of bulk material stockpiles and materials within handling areas, through the use of containment walls, bunding, stormwater and dust controls;
- Measures to minimise excess materials being deposited off site during loading and transportation of bulk materials from the material handling area. Controls such as vehicle brush shaker pads, use of vacuum road sweepers, covering loads during transport and dust suppression to reduce impacts on water quality; and
- Emergency spill response procedures.

Site-specific measures will be required to be developed to suit the final arrangement and activities on each site to ensure compliance with the environmental performance criteria and statutory conditions, however generic and precinct-specific measures were provided in the EA.

General Stormwater Infrastructure

- Maintenance requirements for culverts and stormwater systems, including regular inspections for damage and blockages; and
- Inspection, maintenance and cleaning regimes for site water quality treatment devices (i.e. first flush devices, GPTs, rainwater tanks).

Bulk Materials Handling and Stockpiles

- Sites are to include controls systems for the management of bulk materials stockpiles and materials handling areas, for example: containment walls, bunding, stormwater controls and dust suppression;
- Measures will be provided to minimise risk of materials being deposited off-site during loading and transportation of bulk materials, for example: vehicle brush shaker pads, use of vacuum road sweepers, covering loads during transport, and dust suppression;
- Stockpiles will be managed to minimise airborne particulates (i.e. wetting down – dust suppression systems); and
- Stockpile sizes and configurations will be managed to stay within the original footprint to avoid spills into adjoining catchments or drains.

Shipping Vessels and Loading/Unloading Systems

- Site protocols will be developed that require operational vessels to have a Ship Board Oil Pollution Emergency Plan in place and maintain on-board spill kits;
- Disposal of solids and liquids from vessels to be in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL);
- Ballast water to be managed in accordance with requirements outlined in the *National Ballast Water Management Requirements* (Department of Agriculture, 2011);
- Operation of ships/unloaders to be carried out by experienced personnel;
- Ship loaders/unloaders: computer-aided systems, alarms and warning systems to be used to reduce the risk of spills and cargo as a result of transfer machinery failure, pipeline damage, or conveyor malfunction; and

- Regular inspection and maintenance of pipelines, machinery and plant to be undertaken to reduce potential for spills and leaks.

Spills and Emergency Responses

- Site-wide emergency spill response procedures will be developed and documented in the OEMP; and
- Appropriate training and resources will be provided to ensure adequate implementation if required.

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7.0 Water Quality Monitoring Program

7.1 Overview

The requirements of the water quality monitoring program are outline in the Concept Plan Approval, namely

d) a monitoring program for surface and groundwater which identifies parameters to be monitored, sampling locations, monitoring methods and sampling methodology, including frequency and duration of monitoring and sampling, responsibilities and reporting.

It is noted that the ongoing monitoring of groundwater is carried out by PON in accordance with the requirements of the Maintenance of Remediation Notice (under S28 of the *Contaminated Land Management Act 1997*), and has not been addressed by this strategy.

It is the responsibility of individual developments to implement appropriate measures for the protection of water quality and to undertake water quality monitoring demonstrating their sites are operating within the limits of their development consent and Environmental Protection Licence. Each of these programs will need to be tailored to suit the activity and site stormwater layout and will be documented in the site environmental management systems, such as within the Operational Environmental Management Plan (OEMP).

The following sections outline the framework for the development of the water quality monitoring programs for each site.

7.2 Environmental Performance Criteria

Unless otherwise approved under an EPL, discharge from individual sites are to be within the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) marine trigger values for highly disturbed systems, with the values for 95% species protection in a marine ecosystem used to assess the contaminant levels.

Where the above trigger values are exceeded, contingency actions nominated in Section 7.6 will be initiated.

7.3 Site-Wide Monitoring Program

PON will conduct an ongoing monitoring program of the site drainage network to confirm the site continues to meet the commitments and requirements of the Concept Plan Approval. This includes ongoing monitoring required by the EPA to monitor contaminated land groundwater movement.

Sampling will be undertaken quarterly at the downstream extent of site drainage infrastructure prior to discharge to the Eastern and Western Drains (i.e. at pipe outlet into the drain, or within final stormwater pit prior to discharge, subject to access and safety considerations). This program only applies to stormwater infrastructure within the control of PON (i.e. road drainage and minor culverts). Sampling would be undertaken by the relevant PON Environmental Office or delegate.

Monitoring of the Eastern and Western Drain was considered and it is noted that these drains serve the Mayfield port-related lands, as well as adjoining sites, including the IIP. Works on these adjoining sites, including remediation works by HDC on IIP has the potential to adversely affect water quality in the Eastern and Western Drain. Such external quality effects are outside the control of PON and would be subject to their own water quality monitoring and controls.

Analytes for water quality monitoring are provided in Table 4. This monitoring is independent to any such programs that may be required by individual developments – which would be specified under existing and future EPLs for activities the limits of the Mayfield port-related lands.

Table 4 Analytes for Stormwater

Pollutant	Unit of Measure	Frequency	Sampling Method
Total suspended solids	mg/L	Quarterly	Grab sample during rainfall event
pH	pH units	Quarterly	Grab sample during rainfall event
Nitrogen (total)	ug/L	Quarterly	Grab sample during rainfall event
Oil and grease	mg/L	Quarterly	Grab sample during rainfall event
Phosphate	ug/L	Quarterly	Grab sample during rainfall event
BOD	mg/L	Quarterly	Grab sample during rainfall event
Dissolved oxygen	mg/L	Quarterly	Grab sample during rainfall event
Heavy metals (comprehensive suite)	ug/L	Annually	Grab sample during rainfall event

In addition to the water sampling program, routine quarterly inspections shall by undertaken by PON's property inspector of all open trunk drainage networks, open swales and road kerb inlets. The purpose of these inspections will be to ensure that the stormwater drainage network is free of blockages and well-maintained.

7.4 Construction Activities

A water quality monitoring program is to be developed by individual site developments and implemented by the proponent (or delegated to the Contractor) throughout construction. This program is to be documented in the CEMP and approved prior to commencement of construction. The objective of these programs will be to ensure that the water quality objectives in the Hunter River are not compromised.

The water quality monitoring program will be developed to suit the proposed construction activities and timeframes, and shall include the same program elements listed in Section 7.3.

- Establish existing baseline conditions.
- Identify monitoring parameters – to include parameters (environmental performance criteria) identified in Section 7.1.
- Identify representative sampling locations and frequency of sampling - as a minimum; sampling locations are to include the site discharge points (e.g. in-pit samples) and the downstream points of the Eastern and Western Drains during an ebb tide, or during stormwater discharge. Samples are not to be taken at the downstream points of the Drains on an incoming tide.
- Depending on the location of the construction activities upstream sampling points may also be required to obtain baseline or comparative data to monitor for potential impacts.
- Identify testing procedures - ensuring analysis is undertaken by a NATA registered laboratory.
- Provide a reporting framework that is consistent with this Strategy or as otherwise approved by regulatory bodies.

Discharge water quality is to be consistent with the Environmental Performance Criteria nominated in Section 7.2.

7.5 Project Requirements

Individual projects will be required to undertake site-specific water quality monitoring as specified under a development consent or Environmental Protection Licence (if applicable).

Proponents are not to discharge waters off-site without demonstrating the water meets the relevant conditions of an EPL or environmental performance criteria outlined in Section 6.1.

The proponent is to detail within the OEMP the water quality monitoring program, inclusive:

- Monitoring methodology and frequency;
- Monitoring locations;
- Sampling and analysis methods;
- Project-specific performance criteria;
- Contingency and emergency response plans;
- Procedure for reporting results; and
- Reporting procedures.

As a minimum, the monitoring programs are to include:

- Design of the sampling program to be in accordance with :
    - AS/NZS 5667.1-1998 Water quality sampling: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples, and
    - AS/NZS 5667.10-1998 Water quality sampling: Guidance on sampling waste waters.
- Sampling locations to be individually determined to suit the development, and as specified by an EPL, but will as a minimum include all off-site discharge points for the site;
- Sampling will be undertaken at least monthly (during discharge);
- Analysis of all samples is to be undertaken by a National Associate of Testing Authorities (NATA) accredited laboratory; and
- Routine recording and reporting of results shall be provided to PON on a monthly basis, with a consolidated summary document provided to PON annually.

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8.0 Implementation

8.1 Coordination of Development

As the development of the site progresses, there will be a need to review the performance of the site stormwater system as a whole to confirm that each development fits within the overall stormwater strategy and does not adversely limit the ability of future sites to be developed.

Each individual Project Application will be required to develop a detailed Hydraulic Assessment demonstrating that:

- The proposed individual site configuration and activities conform with the requirements of the Concept Plan Approval, Council requirements and this Concept Stormwater Strategy;
- The Mayfield port-related lands as a whole, will still perform as approved with respect to stormwater runoff and water quality; and
- Remaining lands yet to be developed are not adversely affected and can be developed within the approved limits of the Concept Plan Approval.

8.2 Monitoring and Maintenance

Individual operators will be responsible for inspecting and monitoring the performance of the site stormwater management systems and maintaining the infrastructure to ensure it continues to perform as designed. Regular and timely maintenance of drainage infrastructure will be the responsibility of individual operators.

Responsibility of maintaining road drainage and trunk infrastructure will remain the responsibility of PON.

8.3 Contingency Response

8.3.1 Port of Newcastle

In the event that PON receive an exceedance in the water quality sampling program, the following actions and contingency measures will be undertaken.

- For pollution events – initiate spill and emergency response actions as soon as possible and notify the Environmental Protection Agency (EPA) within the required statutory timeframes;
- Conduct site investigation and additional stormwater sampling (if possible) to identify the offending source;
- For exceedance of trigger values notify DP&E of the results and the initial plan of action within 24hours;
- Limit or stop activities contributing to the exceedance to reduce levels satisfactorily; and
- Develop and implement solutions, as appropriate, and in consultation with EPA and The City of Newcastle.

8.3.2 Individual Projects

The OEMP is to also detail actions and contingency measures in the event that an exceedance of the performance criteria occurs. The contingency plan will include the following generic measures, as a minimum, and will document any relevant site-specific procedures as appropriate to ensure the exceedance is contained and addressed as soon as practicable:

- Reporting obligations and responsibilities under the EPL, consent conditions and *Protection of the Environment Operations Act 1997*;
- Reporting to PON within 24 hours;
- Restrict further off-site stormwater flows, if practicable, from entering the surrounding environment until such time as the offending source has been identified and remediated;
- Investigation to identify the source and potential mitigation measures; and
- Develop and implement solutions, as appropriate, (in consultation with regulatory agencies as required).

8.4 Reporting and Review

8.4.1 Port of Newcastle

PON will provide the detailed results from the water quality monitoring program and stormwater management performance in accordance the Compliance Tracking Program (to be developed as per condition 4.1(c) of the Concept Plan Approval).

8.4.2 Individual Projects

Individual operations will be responsible for reporting environmental performance to regulatory agencies in line with the specific requirements of their Project Approvals and EPLs. Copies of all reports and water quality monitoring results are also to be provided to PON.

All site environmental management plans, including the CEMP, OEMP and associated sub-plans, will include mechanisms for reporting environmental performance, contingency response, and regular reviews to ensure continual improvement of site management processes and to reflect ongoing development of the site.

9.0 References

AECOM (December 2010) **Submissions Report, Mayfield Site Port-Related Activities Concept Plan**. Prepared for Newcastle Ports Corporation, AECOM Australia Pty Ltd, Sydney NSW.

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Landcom (2004) **Managing Urban Stormwater: Soils and Construction, Volume 1**. 4th Edition. NSW Government. ISBN 0 9752030 3 7.

Patterson Britton & Partners Pty Ltd (15 December 2006) **Remediation Civil Design Works – Former BHP Site Mayfield. Stormwater Strategy Report – Addendum.** Letter report to Regional Land Management Corporation. Patterson Britton & Partners Pty Ltd, Newcastle, NSW.

Patterson Britton & Partners Pty Ltd (August 2006) **Preliminary Design Stormwater Strategy** (Issue No. 2). Prepared for Regional Land Management Corporation, Patterson Britton & Partners Pty Ltd, Newcastle.

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Appendix A

Port of Newcastle EMS 033 Groundwater Monitoring Procedure

Appendix A Port of Newcastle EMS 033 Groundwater Monitoring Procedure

1.0 PURPOSE

The purpose of this procedure is to detail requirements for monitoring groundwater at the Mayfield site and reporting the results.

2.0 SCOPE

This procedure applies to the annual monitoring of groundwater at the Mayfield site. Section 4 i) of the EPA Section 28 Notice states that the annual groundwater monitoring at the site must be undertaken in accordance with the report titles *Ongoing Monitoring Requirements Former Steelworks Mayfield NSW* prepared by JBS&G dated 7 March 2014.

This procedure summarises the requirements of the JBS&G Report.

3.0 DEFINITIONS

Aquifer – any geological formation containing or conducting ground water, especially one that supplies the water for wells, springs etc.

Groundwater – the water beneath the surface of the ground, consisting largely of surface water that has seeped down: the source of water in springs and wells

Preservative – A solution used in water sampling programs to preserve environmental water samples for analysis.

4.0 REFERENCES

JBS&G *Ongoing Monitoring Requirements Former Steelworks Mayfield NSW*

EPA Remediation Site Declaration (Declaration no. 21022)

EPA Voluntary Remediation Agreement (VRA no. 26025)

EPA Notice to End Significantly Contaminated Land Declaration (Declaration no. 20144405)

EPA Notice of Maintenance of Remediation (Notice no. 20142802) under Section 28 of the *Contaminated Land Management Act 1997* (CLM Act)

HDC *Contaminated Site Management Plan, Closure Area Former BHP Steelworks Mayfield Newcastle* (CSMP)

NSW Contaminated Land Management Act 1997

Department of Environment and Conservation *Guidelines for the Assessment and Management of Groundwater Contamination* 2007

AS/NZS 5667.11: 1998 *Water Quality* ***– Sampling – Part 11 Guidance on sampling of groundwaters***

5.0 THE SITE

The site is known as the Mayfield Portside Lands Site. The site contains the following lots:

- Lots 1, 2, 39 & 40 DP 1177466
- Lots 36, 37 & 38 DP 1191723
- Lots 41, 42, 43, 44 & 45 DP 1191982

Some of these were created since the site was declared significantly contaminated. The original EPA declaration related to the same site, but with the following lots listed:

- Lots 1 & 2 DP 1177466
- Part Lot 35 DP 1191723
- Lots 36, 37 and 38 DP 1191723

6.0 BACKGROUND

The Site was declared as a Remediation Site (declaration no. 21022) by the EPA. Remediation at the Site was completed by the Hunter Development Corporation (HDC) in 2012 under a Voluntary Remediation Agreement (no. 26025). The remediation was certified complete by the appointed environmental auditor (ENVIRON Australia Pty Ltd) in December 2013.

The EPA accepted the findings of the ENVIRON Site Audit Report and determined that the contamination at the site is no longer significant enough to warrant regulation. The EPA issued a notice to end the significantly contaminated land declaration under notice no. 20144405. The EPA's declaration that the site no longer poses a risk to human health and the environment is on the basis that the *Contaminated Site Management Plan, Closure Area Former BHP Steelworks Mayfield Newcastle* (CSMP) prepared by HDC is implemented.

The EPA has issued a Maintenance of Remediation Notice (notice no. 20142802) under Section 28 of the CLM Act. The Maintenance Notice details the ongoing environmental management measures, including monitoring, required under the CSMP to confirm that the remediation is performing effectively, and that no defects are evident.

This Procedure details the requirements contained within the Maintenance of Remediation Notice and CSMP related to monitoring groundwater at the Mayfield site.

7.0 PROCEDURE

Groundwater monitoring is required in both the fill and estuarine aquifers. This is due to the influence of variations on water levels in the estuarine aquifer caused by the Hunter River. As tidal influences affect water levels, monitoring is required at higher frequency using data loggers.

The data loggers measure depth to groundwater. The chemical composition or temperature of the groundwater are not recorded. The following table demonstrates the data required from the field loggers:

Bore ID	Time sampled	Depth to aquifer (m)	Monument height (m)	Depth from aquifer surface (m)	Logger download file name	Battery %	Temperature calibration check
Comments:							

Groundwater monitoring is to be undertaken at the following monitoring well locations (refer to the figure contained in Appendix A):

- Hourly water level monitoring at fill aquifer monitoring wells MWG05FA, M13/12F, M14/21F; and
- Hourly water level monitoring at estuarine aquifer monitoring wells MWF05SA, M13/12S and M14/21S.

The data is to be compared to historic measurements to assess the ongoing performance of the cap and barrier wall.

If monitoring at the nominated sites is not possible due to site development, changes in site operations or other reasons, the replacement wells will need to be installed in similarly indicative locations. Replacement wells should be installed and levels monitored concurrently with existing wells for a minimum of

three months to allow a relationship between existing and replacement wells to be developed.

Data is to be collected twice yearly.

6.0 REVIEW

A review of this procedure will be conducted in accordance with the internal audit schedule or more regularly as required.

Appendix B

Port of Newcastle EMS 034 Mayfield CSMP Annual Review

Appendix B Port of Newcastle EMS 034 Mayfield CSMP Annual Review

1.0 PURPOSE

The purpose of the annual review is to verify compliance with the Mayfield Contaminated Site Management Plan (CSMP). The review is to confirm that remediation measures at the Mayfield site are being adequately maintained.

2.0 SCOPE

The key requirements of the CSMP that are to be reviewed are:

- Maintenance of low permeability capping
- Maintenance of drainage
- Prevention of any activities that could damage the barrier wall
- Documentation of measures taken to prevent damage to the barrier wall
- Documentation to confirm that developments on the site have accounted for specific issues noted in the CSMP, specifically:
    - areas of containment cells
    - volatiles
    - friable asbestos
    - unremediated areas
- For any proposed works that may disturb the cap, demonstration that a Work Management Plan (WMP) has been prepared and implemented. The WMP needs to demonstrate how the CSMP will be complied with.

Information to be collected is to include:

- Has the area been operating since the last annual review?
- Have any modifications occurred?
- Has any development occurred in the area since the last annual review?
- Does the area remain undeveloped?
- Has a specific Work Management Plan (WMP) been prepared?
- Are additional WMPs required for a particular area?
- Are there any obvious breaches of the CSMP?

3.0 THE SITE

The site is known as the Mayfield Portside Lands Site, located on Industrial Drive Mayfield. The site contains the following lots:

- Lots 1, 2, 39 & 40 DP 1177466
- Lots 36, 37 & 38 DP 1191723
- Lots 41, 42, 43, 44 & 45 DP 1191982

Some of these lots were created since the original declaration of contamination, and the subsequent issue of the Section 28 Notice. The original EPA declaration related to the same site, but with the following lots listed:

- Lots 1 & 2 DP 1177466
- Part Lot 35 and lots 36, 37 and 38 DP 1191723

Site Areas

For ease of description and for managing the annual review, the site can be divided into the following areas:

- Undeveloped or unused areas that have been remediated
- Unremediated areas
- Operational areas subject to specific EMPs prepared under the CSMP
  - Berth 4
  - Stolthaven Stage 1
- Developed areas that do not have a specific EMP:
  - Access Road
  - Railway
- Areas in the process of development or modification, subject to Work Management Plans

4.0 DEFINITIONS

Contaminated Site Management Plan (CSMP):

Means the "*Contaminated Site Management Plan, Closure Area, Former BHP Steelworks, Mayfield Newcastle*" prepared by Hunter Development Corporation February 2014 (ref: 203188053).

Contamination:

Means *"the presence in, on or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment"* as defined by the NSW *Contaminated Land Management Act* 1997.

Site Auditor

The State has appointed Mr Graham Nyland of Environ as the Site Auditor. The Site Auditor issues Site Audit Statements in accordance with Site Auditor Guidelines under the CLM Act 1997.

5.0 REFERENCES

- EPA Declaration of a Contaminated Site – Declaration no. 21022
- Voluntary Remediation Agreement no. 26025
- EPA Completion Notice no. 201444044
- Notice to end significant contamination declaration no. 20144405
- Contaminated Site Management Plan (CSMP) (Objective ID A529055)

6.0 BACKGROUND

The CSMP covers the land that was subject to the declared remediation site by the EPA under Declaration no.21022. The land was subject of a Voluntary Remediation Agreement (VRA no. 26025). The EPA is satisfied that where remediation has been completed it was done do in accordance with the requirements of the CRA and therefore issued a notice of completion (notice no. 20144404). The EPA is also satisfied that the contaminated at the site is no longer serious enough to warrant regulation. Accordingly the EPA issued a notice to end significantly contaminated land declaration (notice no. 20144405).

7.0 PROCEDURE

Operational Areas

For each operational area (those that have been developed and are operating under a specific EMP), the review for compliance with the CSMP would include:

- A site visit to confirm conditions are as documented and expected
- A meeting with the Site Manager, with minutes taken as a record
- Review any Work Management Plans
- Review the implementation of any Work Management Plans (WMP)
- Review of documentation required under the specific EMP such as records of inspections
- Verification that the EMP is being implemented via documentation review and staff interviews
- Identification of any proposed changes to operations or site modifications that would trigger the requirement for a WMP.

Non-Operational Areas

For non-operational areas (areas that are not leased for operations, areas currently under development, or common infrastructure areas such as access roads) the review for compliance with the CSMP would include:

- Site inspection of capping and drainage to verify consistency with anticipated conditions to note any degradation or damage
- Review of the Site EMP
- Verification that the Work Management Plan (WMP) process is being followed for areas being developed. The adequacy of the WMP and the conformance with the WMP are subject to separate audit processes
- Review of documentation for any areas modified since the previous review.

Statement of Compliance

The annual review would determine whether or not the CSMP has been complied with. It would note corrective measures required to remedy any non-conformances

8.0 REVIEW

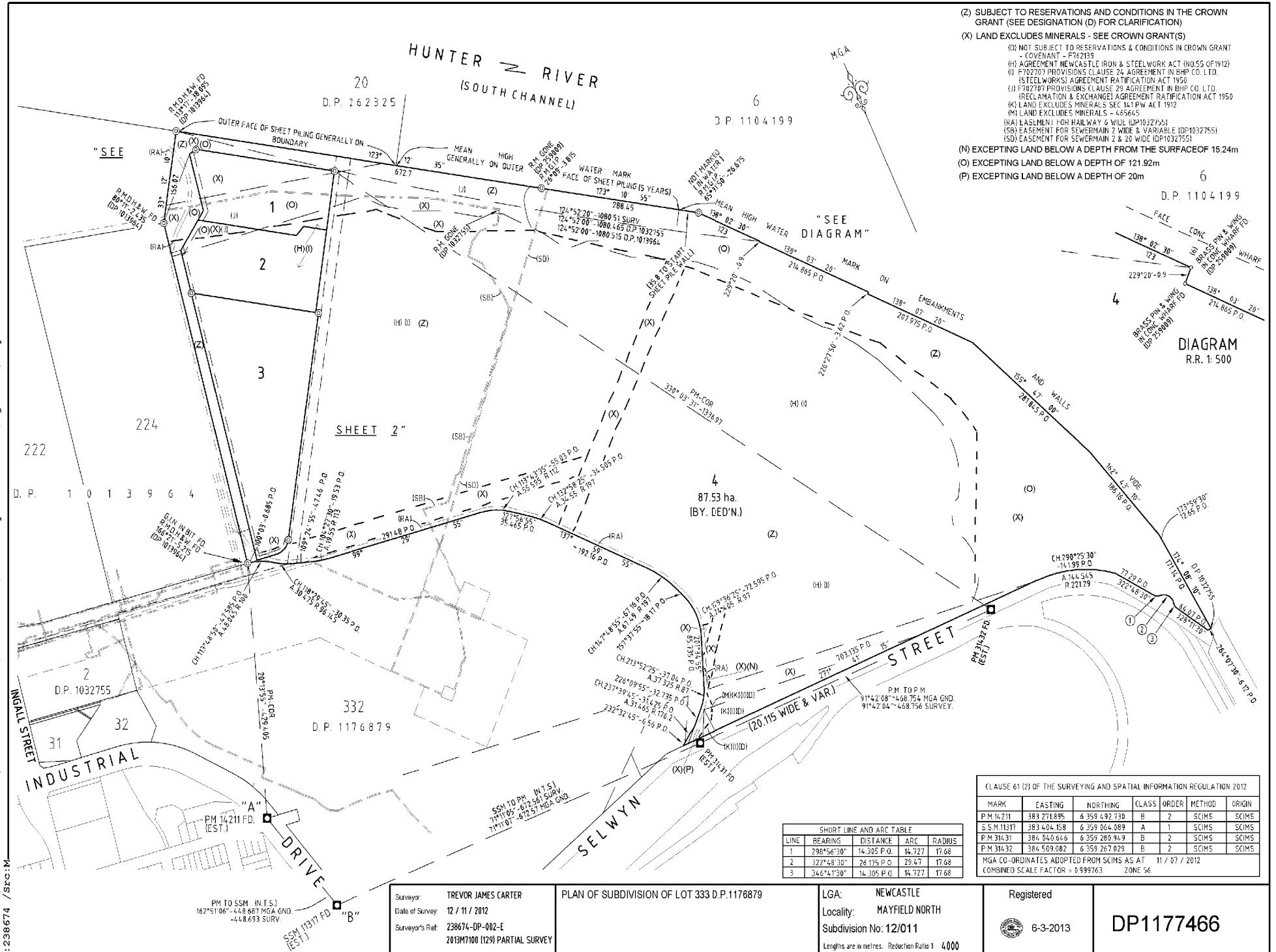
A review of this procedure will be conducted in accordance with the internal audit schedule or more regularly as required.

The review will make recommendations for any changes in the review process or how the site is managed so that remediation measures are maintained.

Appendix C

Subdivision Plan

Appendix C Subdivision Plan



SHORT LINE AND ARC TABLE				
LINE	BEARING	DISTANCE	ARC	RADIUS
1	298°56'30"	14.305 P.O.	14.727	17.68
2	322°48'30"	26.175 P.O.	29.47	17.68
3	346°41'30"	14.305 P.O.	14.727	17.68

CLAUSE 61 (2) OF THE SURVEYING AND SPATIAL INFORMATION REGULATION 2012

MARK	EASTING	NORTHING	CLASS	ORDER	METHOD	ORIGIN
P.M.14211	383 271.895	6 359 492.730	B	2	SCIMS	SCIMS
S.S.M.11317	383 404.158	6 359 064.089	A	1	SCIMS	SCIMS
P.M.31431	384 040.646	6 359 280.949	B	2	SCIMS	SCIMS
P.M.31432	384 509.082	6 359 267.029	B	2	SCIMS	SCIMS

MGA CO-ORDINATES ADOPTED FROM SCIMS AS AT 11 / 07 / 2012
COMBINED SCALE FACTOR = 0.999763 ZONE 56.

Surveyor:	TREVOR JAMES CARTER
Date of Survey:	12 / 11 / 2012
Surveyor's Ref:	238674-DP-002-E
	2013M7100 (129) PARTIAL SURVEY

PLAN OF SUBDIVISION OF LOT 333 D.P.1176879

LGA: NEWCASTLE
Locality: MAYFIELD NORTH
Subdivision No: 12/011
Lengths are in metres. Reduction Ratio 1: 4000

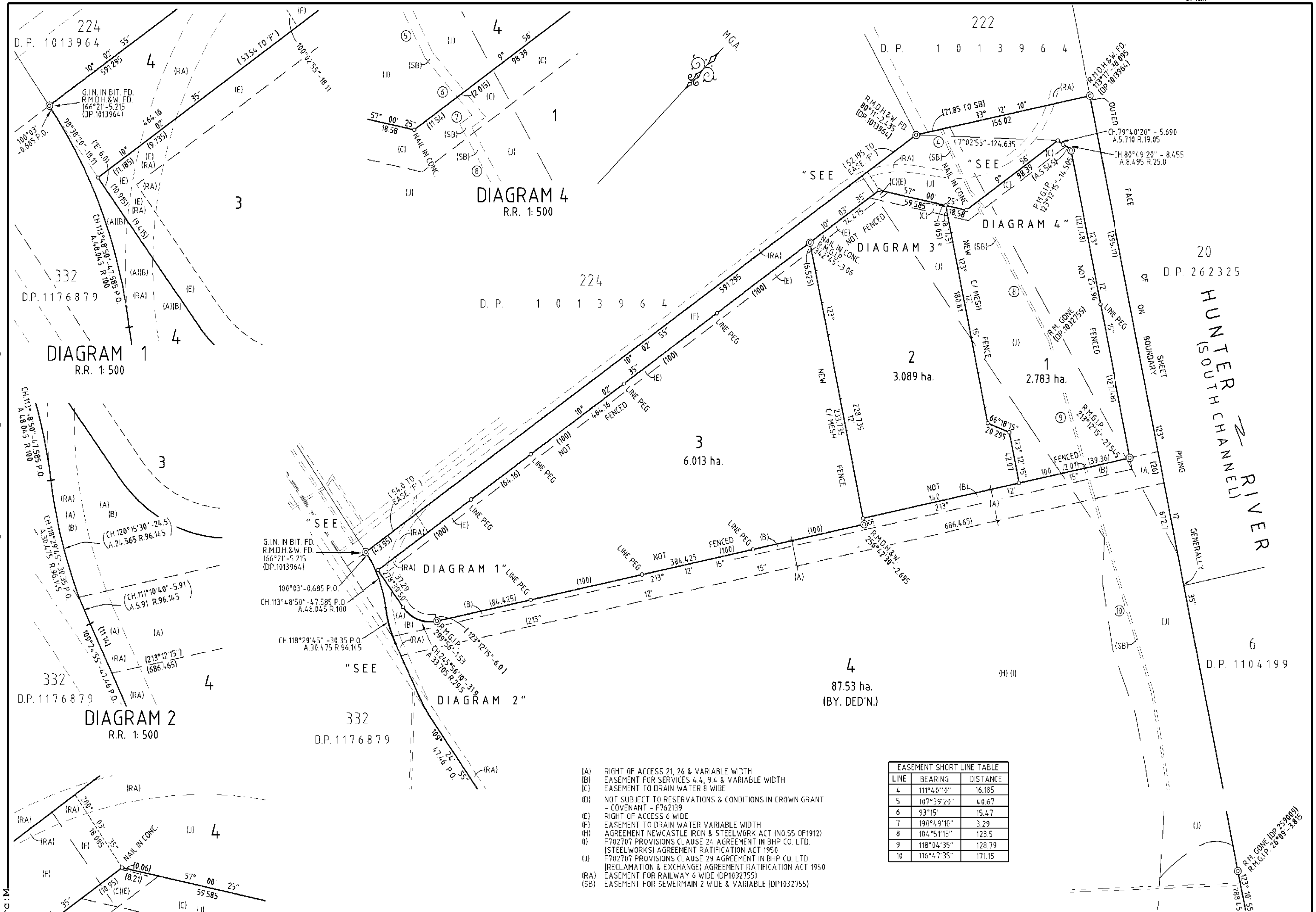
Registered 6-3-2013

DP1177466

REVIEW 1-110213

10 20 30 40 50 Table of mm 90 100 110 120 130 140

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION



(A) RIGHT OF ACCESS 21, 26 & VARIABLE WIDTH
(B) EASEMENT FOR SERVICES 4.4, 9.4 & VARIABLE WIDTH
(C) EASEMENT TO DRAIN WATER 8 WIDE
(D) NOT SUBJECT TO RESERVATIONS & CONDITIONS IN CROWN GRANT – COVENANT - F762139
(E) RIGHT OF ACCESS 6 WIDE
(F) EASEMENT TO DRAIN WATER VARIABLE WIDTH
(H) AGREEMENT NEWCASTLE IRON & STEELWORK ACT (NO.55 OF1912)
(I) F702707 PROVISIONS CLAUSE 24 AGREEMENT IN BHP CO. LTD. (STEELWORKS) AGREEMENT RATIFICATION ACT 1950
(J) F702707 PROVISIONS CLAUSE 29 AGREEMENT IN BHP CO. LTD. (RECLAMATION & EXCHANGE) AGREEMENT RATIFICATION ACT 1950
(RA) EASEMENT FOR RAILWAY 6 WIDE (DP1032755)
(SB) EASEMENT FOR SEWERMAIN 2 WIDE & VARIABLE (DP1032755)

EASEMENT SHORT LINE TABLE

LINE	BEARING	DISTANCE
4	111°40'10"	16.185
5	107°39'20"	40.67
6	93°15'	15.47
7	190°49'10"	3.29
8	104°51'15"	123.5
9	118°04'35"	128.79
10	116°47'35"	171.15

Surveyor:	TREVOR JAMES CARTER
Date of Survey:	12 / 11 / 2012
Surveyor's Ref:	238674-DP-002-E 2013M7100 (129) PARTIAL SURVEY

PLAN OF SUBDIVISION OF LOT 333 D.P.1176879

LGA: NEWCASTLE
Locality: MAYFIELD NORTH
Subdivision No: 12/011
Lengths are in metres. Reduction Ratio 1: 2000

Registered 6-3-2013

DP1177466

DEPOSITED PLAN ADMINISTRATION SHEET

Office Use Only

Registered: 6-3-2013

Title System: TORRENS

Purpose: SUBDIVISION

Office Use Only

DP1177466

PLAN OF SUBDIVISION OF LOT 333 D.P.1176879

LGA: NEWCASTLE
Locality: MAYFIELD NORTH
Parish: NEWCASTLE
County: NORTHUMBERLAND

Crown Lands NSW/Western Lands Office Approval

I ..... (Authorised Officer) in approving this plan certify that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature:.....

Date:.....

File Number:.....

Office:.....

Subdivision Certificate

I, GARY WEBB, CHIEF EXECUTIVE OFFICER

Authorised Person/~~General Manager/*Accredited Certifier~~, certify that the provisions of s.109J of the *Environmental Planning and Assessment Act 1979* have been satisfied in relation to the proposed subdivision, new road or reserve set out herein.

Signature: Gary Webb

Accreditation number: —

Consent Authority: Newcastle Port Corporation

Date of endorsement: 29/01/2013

Subdivision Certificate number: 12/011

File number: A382663

*Strike through if inapplicable.

Survey Certificate

I, TREVOR JAMES CARTER
of ADW JOHNSON PTY LIMITED
7/335 HILLSBOROUGH ROAD, WARNERS BAY, NSW 2282
a surveyor registered under the *Surveying and Spatial Information Act 2002*, certify that:

*(a) ~~The land shown in the plan was surveyed in accordance with the Surveying and Spatial Information Regulation 2012, is accurate and the survey was completed on .....~~

*(b) The part of the land shown in the plan (*being/*excluding ^ .... BEING LOTS 1, 2 & 3 EXCLUDING LINES SHOWN AS P.O. .) was surveyed in accordance with the *Surveying and Spatial Information Regulation 2012*, is accurate and the survey was completed on, 12 / 11 / 2012 . the part not surveyed was compiled in accordance with that Regulation.

*(c) The land shown in this plan was compiled in accordance with the *Surveying and Spatial Information Regulation 2012*.

Signature: T. ..... Dated: 29/01/13

Surveyor ID: 749

Datum Line: 'A' - 'B'

Type: *Urban/*~~Rural~~

The terrain is *Level-Undulating / *~~Steep Mountainous.~~

*Strike through if inapplicable.

^Specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey.

Statements of intention to dedicate public roads, public reserves and drainage reserves.

Plans used in the preparation of this survey / compilation

DP.1116571
DP.1013964
DP.1032755
DP.259009
DP.1176879

If space insufficient continue on PLAN FORM 6A

Signatures, Seals and Section 88B Statements should appear on PLAN FORM 6A

Surveyor's Reference: 238674-DP-002-E
2013M7100(129) PARTIAL SURVEY

DEPOSITED PLAN ADMINISTRATION SHEET

SHEET 2 OF 2 SHEET(S)

Registered: 6-3-2013

Office Use Only

Office Use Only

DP1177466

PLAN OF SUBDIVISION OF LOT 333
D.P.1176879

Subdivision Certificate No: 12/011

Date of Endorsement: 29/01/2013

This sheet is for the provision of the following information as required:

- A schedule of lots and addresses - See 60(c) *SSI Regulation 2012*
- Statements of intention to create and release affecting interests in accordance with section 88B *Conveyancing Act 1919*
- Signatures and seals- see 195D *Conveyancing Act 1919*
- Any information which cannot fit in the appropriate panel of sheet 1 of the administration sheets.

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, AS AMENDED, IT IS INTENDED TO:

(A) CREATE:-

1. RIGHT OF ACCESS 21, 26 & VARIABLE WIDTH
2. EASEMENT FOR SERVICES 4.4, 9.4 & VARIABLE WIDTH
3. EASEMENT TO DRAIN WATER 8 WIDE
4. RIGHT OF ACCESS 6 WIDE
5. EASEMENT TO DRAIN WATER VARIABLE WIDTH

STREET ADDRESSES OF ALL LOTS ARE NOT AVAILABLE

Signed by: SIMON FURNESS

(formerly State Property Authority)

As delegate on behalf of the Government Property NSW but not so as to incur any personal liability in the presence of:

Signature of Witness

YASEMIN AKCA
Name of Witness

4-6 BLIGH ST, SYDNEY NSW 2000
Address of Witness

If space insufficient use additional annexure sheet

Surveyor's Reference: 238674-DP-002-E

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The Power of Commitment