Appendix G

Preliminary Hazard Analysis

AECOM

Preliminary Hazard Analysis

Mayfield Site Port-Related Activities Concept Plan

Preliminary Hazard Analysis

Mayfield Site Port-Related Activities Concept Plan

Prepared for

Newcastle Port Corporation

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Abbreviations

Abbreviation	Description
NPC	Newcastle Port Corporation
PHA	Preliminary Hazard Analysis
ADG	Australian Dangerous Goods Code
DoP	Department of Planning
HIPAP	Hazardous Industry Planning Advisory Paper
Ro/Ro	Roll On / Roll Off
TEU	Twenty-foot Equivalent Units
ha	hectares
AN	Ammonium Nitrate
kW/m^2	kilo Watts per square metre
m	metres
ppm	parts per million
pmpy	per million per year
ALARP	As Low As Reasonably Practicable
CFC	Chloro-Fluoro-Carbon
DG	Dangerous Goods
L	Litres
IBC	Intermediate Bulk Container
QRA	Quantitative Risk Assessment
CBD	Central Business District
MSA	Marine Safety Act
PSOL	Port Safety Operating Licence
kg	kilograms
ML	Mega Litres
m^3	cubic metres
FHA	Final Hazard Analysis
C1	Combustible liquid with a flash point greater than 60.5^oC but less than 150^oC
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ULP	Unleaded Petrol
kph	kilometres per hour
LEL	Lower Explosive Limit
Lc50	Concentration of toxic gas which would be lethal to 50% of the population

Abbreviation	Description
mg/s	milligrams per second
PPE	Personal Protective Equipment
TEU	20 foot container equivalent unit
TNT	Tri-Nitro-Toluene
kPa	kilo Pascals
AS	Australian Standard
km	Kilometres
NDT	Non Destructive Testing

Executive Summary

Introduction

Newcastle Ports Corporation (NPC) proposes to develop the Mayfield area of the Newcastle Port, over a period of 25 years, to provide the following precincts:

- NPC Operations Precinct.
- Bulk and General Precinct.
- General Purpose Precinct.
- Container Terminal Precinct.
- Bulk Liquid Precinct.

The Bulk Liquids Precinct will store fuels and the General Purpose Precinct may include Dangerous Goods (listed in the ADG, Ref.1) that enter the port in containers or bulk products in portable tanks or Intermediate Bulk Containers (IBCs). Whilst the goods may only be stored temporarily (i.e. transit storage), there is a potential for incidents to occur that could result in impacts ad adjacent sites and between the various precincts at the site. Hence, based on the potential quantity of Dangerous Goods that would be stored at the bulk liquids terminals alone, State Environmental Planning Policy (SEPP) No.33 – Hazardous and Offensive Industries (Ref. 22) would apply to the proposed concept.

As SEPP 33 applies to the proposed concept, the NSW Department of Planning (DoP) has requested that a Preliminary Hazard Analysis (PHA) be submitted with the Environmental Assessment, the objective of which is to demonstrate that the proposed concept does not pose a risk to adjacent facilities, both as individual sites and cumulative impacts. NPC has therefore commissioned AECOM to prepare the PHA study for the proposed concept. This document reports on the results of the PHA study for the proposed concept.

Methodology

The methodology selected for the study was that prescribed in the DoP Multi-Level Risk Assessment approach, supported by Hazardous Industry Planning Advisory Paper (HIPAP) No.6 (Ref. 5). The basic approach for the study was as follows:

- **Hazard Analysis** – identifying those hazards with the potential to impact off-site;
- **Consequence Analysis** – assessment of the consequence impacts for those incidents identified to impact off-site (including comparison of impacts with acceptable impact criteria (Ref. 8)); and
- **Risk Analysis** – assessment of those incidents that exceed the acceptable consequence criteria for risk and comparison of the assessed risk with acceptable criteria (Ref. 8).

On completion of the assessment a report detailing the study outcomes, conclusions and recommendations was developed in support of the Environmental Assessment for submission to the DoP.

Brief Description of the Proposed NPC Concept Plan

The NPC Concept Plan consists of 5 land-based precincts:

- NPC Operations Precinct (3 hectares) including office, storage sheds, vehicle and marine equipment, NPC dredging fleet, pilot cutters and helipad. Fuel storage facilities (underground tanks) for refuelling of vehicles and boats will be located in this area.
- Bulk and General Precinct (12 hectares) capable of handling non hazardous dry bulk products including grain, briquettes, coke cargoes and some container cargos (No Dangerous Goods will be handled through the Bulk and General Precinct). In general, no Dangerous Goods are stored in this precinct, however, methyl bromide (which is classified as a Dangerous Good) may be used as a fumigant.
- General Purpose Precinct (25 hectares) a flexible facility to handle and store cargo containers, heavy machinery, roll on and roll off (Ro/Ro) and break bulk cargo. This includes the General Cargo Facility (Mayfield No.4 Berth) approved as part of the 2001 consent. Ammonium Nitrate (AN) will be transited in this area.
- Container Terminal Precinct (35 hectares) with a trade volume of 1,000,000 TEU per annum at final development. Dangerous Goods may pass through the container terminal in transit, to and from ships.

- Bulk Liquid Precinct (15 hectares) used for storage, blending and distribution of high quality fuels and biofuels. Fuel will be stored in tanks in two terminals, including ship unloading and road tanker loading.

In There is also a berth precinct proposed along the edge of the South Arm of the Hunter River containing seven shipping berths, one berth each for the NPC Operations Precinct, Bulk and General Precinct, and the General Purpose Precinct, three berths for the Container Terminal Precinct and one berth for the Bulk Liquid Precinct.

Hazard Analysis

The hazard analysis conducted for the storage of Dangerous Goods (in transit) and fuel storages (including the handling of these goods) identified a number of potential hazards that could impact off-site (i.e. to adjacent non-port facilities and/or adjacent precincts). Those incidents identified to impact off-site, or to adjacent precincts, are listed below:

Bulk Liquids Precinct:

- Fuel release at the bulk liquids wharf, ignition and pool fire;
- Ignition of fuel in a bulk liquids terminal storage tank, tank roof fire; and
- Release of fuel into a bulk liquids terminal tank bund, ignition and pool fire in the bund.

Container Terminal Precinct

- Flammable gas leak into a container, from a gas cylinder, delayed ignition and explosion;
- Flammable liquids release, ignition and pool fire;
- Flammable Solids ignition and fire (within the container); and
- Toxic gas release and dispersion downwind towards sensitive land uses (off-site).

General Purpose Precinct

- Fire in the AN transit area leading to explosion with the potential to impact adjacent sites.

NPC Operations Precinct

- Fuel release, ignition and fires at the NPC Operations Precinct.

It is noted that fumigants would be used in the Container Terminal Precinct and Bulk and General Precinct and, although not stored at the site, could result in hazards if released after fumigation operations. Fumigant (e.g. methyl bromide) recapture equipment is available for fumigation operations. These processes should be used to minimise the impacts from releases of fumigant gases at the site. Recommendations are made in relation to fumigation operations, hence, no further analysis is made in this study.

Each incident was carried forward for detailed consequence analysis.

Consequence Analysis

A detailed consequence analysis was conducted for each of the incidents listed above. **Table 1** summarises the heat radiation impacts from the fire incidents carried forward for consequence analysis. The selected maximum permissible heat radiation impact level is 4.7 kW/m^2 (Ref. 8), heat radiation levels exceeding this level would require additional analysis (i.e. risk).

Bulk Liquids Precinct – A review of the NPC Concept layout indicates that the flammable Dangerous Goods and bulk fuels storages can all be located such that the heat radiation impacts at the adjacent site boundaries (non-port facilities) do not exceed the selected impact criteria. However, by locating the terminals so that there is no impact at adjacent non-port facilities, the terminals would be located within 10 metres of the adjacent Container Terminal Precinct. Whilst this would be permissible under the current Dangerous Goods storage and handling legislation, the 4.7 kW/m^2 heat radiation impact at the container terminal would extend 67.5 metres into the terminal area (i.e. from Table 1, total distance from a bulk liquids terminal bund fire is 77.5 metres, hence, 10 metres separation to the boundary and 67.5 metres projection into the container terminal equals 77.5 metres). A review of the available space within the Container Terminal Precinct indicates that there is adequate area within the terminal to locate the Dangerous Goods transit stores well clear of the Bulk Liquids Precinct. Hence, there would be no interaction between incidents at either site.

Container Terminal Precinct – The consequence, associated with the transit storage of flammable gas cylinders, was identified to be a gas release into a container and subsequent explosion. The maximum explosion overpressure, permissible at the site boundary is 7 kPa (Ref. 8), overpressures exceeding this level require further analysis. It was identified that an explosion in the gas cylinder container would result in an explosion overpressure of 7 kPa extending a distance of 78 metres from the container. It was identified that there is adequate space within the container terminal precinct to locate the flammable gas containers such that an impact distance of 78 metres does not extend beyond the site boundary or into the adjacent precincts.

It was identified that fire may occur within flammable liquids containers that are stored at the port during transit. In the event of flammable liquids release, the liquid would accumulate in the spill containment area surrounding these containers. Ignition of the leak would result in pool fire within the spill containment. In the worst case a full spill containment (bund) fire would occur. The detailed analysis conducted for this incident identified that the distance to a heat radiation level of 4.7 kW/m^2 was 26.5 metres. It was identified that there is adequate space within the container terminal precinct to locate the flammable solids containers such that an impact distance of 26.5 metres does not extend beyond the site boundary or into the adjacent precincts.

It was identified that fire may occur within flammable solids containers that are stored at the Port during transit. The fire would occur within the container itself, as these materials do not spread like liquids. Continuing fire would result in a damaged container roof and exposure of the fire externally to the container. The detailed analysis conducted for this incident identified that the distance to a heat radiation level of 4.7 kW/m^2 was 14.4 metres. It was identified that there is adequate space within the container terminal precinct to locate the flammable solids containers such that an impact distance of 14.4 metres does not extend beyond the site boundary or into the adjacent precincts.

It was identified that toxic gas (e.g. chlorine, ammonia) may be stored at/or transited through the site respectively, in cylinders or drums. Releases may occur resulting in the dispersion of gas downwind. Concentrations of gas exceeding 20 ppm may result in fatality and levels around 5 ppm could result in injury. The analysis conducted for toxic gas releases (e.g. chlorine, the worst case incident) identified that the downwind distance to a chlorine concentration of 20 ppm was 558 metres and to 5 ppm was 1558 metres. These two distances extend off-site (i.e. to adjacent industrial areas (20 ppm) and residential areas (5 ppm)). Hence, these incidents were carried forward for risk analysis.

General Purpose Precinct – It was also identified that transit of AN will occur in the General Purpose Precinct. A detailed hazard and risk analysis (Ref. 7) has been conducted for the storage of AN, in this area, as part of a previous development submission. This analysis identified that there is a potential for AN explosions to impact off-site areas, hence, this incident has been carried forward for risk analysis.

Table 1-1: Summary Heat Radiation Consequence Impacts – Flammable & Combustible Liquid Fires at the NPC Facility

Heat Radiation Level (kW/m^2)	Flexible Hose Rupture & Fire (Bulk Fuel Delivery – Berth Precinct)	Fuel Terminal Fuel Bund Fire (Bulk Liquids Precinct)	Isotainer Storage Area Bund Fire (Container Terminal Precinct)	Underground Fuel Tank Filling Incident Fire (NPC Operations Precinct)
35	9.8	30.5	10.3	6.2
23	11.8	35.8	12.4	7,6
15	14.4	43.3	15.1	9.2
12.5	15.8	47.4	16.4	10.1
8	19.5	59.0	20.5	12.5
6	22.5	68.5	23.5	14.3
4.7	25.4	77.5	26.5	16.1
2	38	120	40	24

NPC Operations Precinct – It was identified that fire may occur during the transfer of fuel from road tankers to the underground storage tanks and during the fuelling of NPC Operations cutters (boats). The fuel transferred in this operation is diesel, and the potential for ignition is low, however, in the unlikely event of diesel release, the liquid would accumulate in the spill containment area surrounding these fuel tanker delivery bay or in the wharf area surrounding the bowser. Ignition of the leak would result in pool fire within the spill containment. In the worst case a fuel spill containment (bund) fire would occur. The detailed analysis conducted for this incident identified that the distance to a heat radiation level of 4.7 kW/m^2 was 16.1 metres. It was identified that there is adequate space within the NPC Operations Precinct to locate the fuel transfer and boat fuelling areas such that an impact distance of 16.1 metres does not extend beyond the site boundary or into the adjacent precincts.

Risk Analysis

Only two incidents were identified to have the consequence potential to impact off-site, these were:

- Leak from a chlorine drum valve leading to the development of a toxic plume which is directed towards the adjacent sites and residential areas by wind; and
- Ammonium Nitrate incidents (fire, explosion, toxic plume).

A conservative drum leak frequency analysis was conducted and combined with the wind direction, weather conditions and the probability of fatality (at the adjacent industrial site) and/or injury at the closest residential area. The analysis identified that the closest residential area may be subjected to chlorine concentrations not exceeding 5ppm (see details above). At this level, injury to sensitive members of the community may occur. Incident release frequency for chlorine was estimated to be 30 chances in a million per year (pmpy). Hence, the risk of injury at the closest residential area is 30pmpy. The acceptable injury risk at residential areas is 50 pmpy, hence this criteria is not exceeded. It is noted that the concentration of chlorine at the closest residential area is not sufficient to result in fatality. Hence, the risk of fatality at the closest residential area does not exceed the acceptable fatality risk criteria of 1 pmpy.

The concentration of chlorine at the adjacent precincts or industrial facilities has the potential to exceed 20 ppm. Hence, at this level of chlorine concentration fatalities may occur. The analysis identified that the release of chlorine could occur with a frequency of 30 chances in a million per year. Hence, the fatality risk at the adjacent sites would be 30 pmpy. The acceptable fatality risk criteria for industrial facilities is 50 pmpy.

Hence, in summary, the assessed risk does not exceed the acceptable risk criteria and therefore the storage of the toxic gases would only constitute a potential hazard.

The risks associated with the transit of AN was assessed as part of the AN storage submission, the subject of a separate approved development application. This analysis (Ref. 7) indicated that a fatality risk of 0.5 pmpy extended about 40 metres (maximum) from AN transit operations. This risk was contained well within the General Purpose Precinct and therefore the risk criterion of 50 pmpy (at the adjacent industrial site) was not exceeded.

Cumulative Hazards & Risk

A review of the consequence impacts, detailed in this study, at each of the potentially hazardous facilities within each precinct indicates that there is adequate space within the precincts such that the potentially hazardous facilities (e.g. terminals, Dangerous Goods transit storages, fuel tanks, AN transit storages, etc,) do not result in an accumulation of risk. The analysis conducted in this study identified that the potentially hazardous facilities can be located within the specific precincts such that the impacts do not overlap causing accumulation of risks.

Conclusions and Recommendations

Based on the analysis conducted in this study it was identified that the potentially hazardous areas within the site can be located such that they do not impact adjacent surrounding land uses (e.g. Onesteel, Koppers, residential areas, etc.) exceeding permissible impact levels published in HIPAPs No.4 and No.10. Hence it is concluded that the proposed concept can be classified as only potentially hazardous and not actually hazardous and therefore would be permitted at the proposed location under the provisions of SEPP 33.

Notwithstanding this conclusion, a number of recommendations are made to ensure the hazards and risks assessed in this are maintained in the As Low As Reasonably Practicable Range (ALARP):

1. It was identified that detailed designs were not available for the Concept Plan, hence, it is recommended that a detailed Preliminary Hazard Analysis be conducted for each of the facilities proposed at the site to confirm the results of the concept assessment conducted in this study and to ensure that the detailed site layouts

and Dangerous Goods storage quantities and operations do not result in exceeding the acceptable risk criteria (Ref. 8).

2. It was identified that methyl bromide would be used for fumigation of certain containers that may contain contamination (e.g. wildlife, insects, etc.). Methyl bromide is a CFC gas and has a detrimental effect on the environment if released. Hence, it is recommended that the Bulk and General Precinct and Container Terminal Precinct be designed and operated with methyl bromide dosing and capture systems to minimise the risk of harmful gas release to the atmosphere.
3. The analysis identified that liquid Dangerous Goods (LDG) could be held in transit storage at the site. These goods may be held in packages, drums, intermediate bulk containers and Isotainers (20,000 litre tanks). It was identified that a leak from a LDG container could spill to the ground and, if ignited, result in pool fire and impact to the environment. It is therefore recommended that spill containment areas be constructed at the site for the storage of Isotainers. Spill retention area for flammable liquids (Class 3), toxic liquids (Class 6), corrosive liquids (Class 8) and environmentally hazardous liquids (Class 9) should be constructed to retain a minimum of 20,000 litres.
4. It was identified that in the event of a fire in the flammable solids container storage area, the fire would impact at a heat radiation level of 4.7 kW/m^2 up to a distance of 14.4 metres from the storage area. Hence, the flammable solids storage area should be separated from other Dangerous Goods storages and the site/precinct boundary by a minimum of 14.4 metres.
5. It was identified that in the event of a fire in the flammable liquids container storage area, the fire would impact at a heat radiation level of 4.7 kW/m^2 up to a distance of 26.5 metres from the storage area. Hence, the flammable liquids storage area should be separated from other Dangerous Goods storages and the site/precinct boundary by a minimum of 30 metres.
6. It was identified that in the event of a flammable gas release in a cylinder storage container within the container storage precinct, a gas ignition could result in explosion. The explosion overpressure impact to a level of 7 kPa (the maximum permissible at the precinct boundary without further analysis) was estimated to occur at a distance 78 metres from the storage area. Hence, the storage of flammable gases in cylinders should be separated from other Dangerous Goods storages and the site/precinct boundary by a minimum of 78 metres.
7. It was identified that in the event of an incident at the site, the implementation of emergency response would result in the reduction of incident impacts. Whilst it is recognised that NPC currently operates an emergency response plan, it will be necessary to ensure that this plan is regularly updated to include additional facilities as they are developed within the various precincts at the site. Hence, it is recommended that a methodology be developed for the regular update of the existing NPC emergency plan, for the Port of Newcastle, to incorporate additional operational facilities as they are developed.

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1.0 Introduction

1.1 Background

Newcastle Port Corporation (NPC) proposes to develop the Mayfield area of the Port of Newcastle to provide berths for containers handling, bulk cargo (including flammable and combustible liquids) and general cargo. General cargo may include dangerous goods that enter the Port in containers or bulk products in portable tanks or Intermediate Bulk Containers (IBCs).

As part of the development, it may be necessary to temporarily store Dangerous Goods that are listed in the Australian Dangerous Goods Code (Ref. 1), that enter the Port and are stored until these goods can be transported to the owner's premises. Whilst the goods may only be stored temporarily, there is a potential for incident at the Port whilst the goods are stored. Ammonia nitrate (AN) would transit through the Port.

Based on the above hazards and the Director Generals requirements for this project, the NSW Department of Planning (DoP) has requested that a Preliminary Hazard Analysis (PHA) be conducted for the proposed concept.

NPC has commissioned AECOM to prepare the PHA study for the proposed concept. This document reports on the results of the PHA study for the proposed concept.

1.2 Objectives

The objectives of the study are to:

- Conduct a PHA study of the Mayfield site Port-Related Activities Concept Plan in accordance with the requirements of the DoP Hazardous Industry Planning Advisory Paper (HIPAP) No.6, Hazard Analysis Guidelines (Ref. 2); and
- Prepare a report on the results of the PHA study for inclusion in the environmental assessment conducted for the proposed concept.

1.3 Scope of Work

The scope of work is for a PHA of the proposed concept. At this stage of the development it is difficult to determine the exact quantity and type of Dangerous Goods that may enter the Port and, hence, be stored at the site. Whilst it may be possible to determine the quantity of some of the Dangerous Goods (i.e. in the bulk liquids and AN transit areas), estimating the quantity of Dangerous Goods in containerised cargoes may be more problematic.

The scope of the PHA is therefore difficult to fully define as the exact quantity of Dangerous Goods is not available for assessment (particularly in the containerised cargoes). The scope of the study is therefore to review the general principles of storage at the proposed facility and to identify any issues that may arise as a result of the proposed concept.

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2.0 Methodology

2.1 Multi Level Risk Assessment

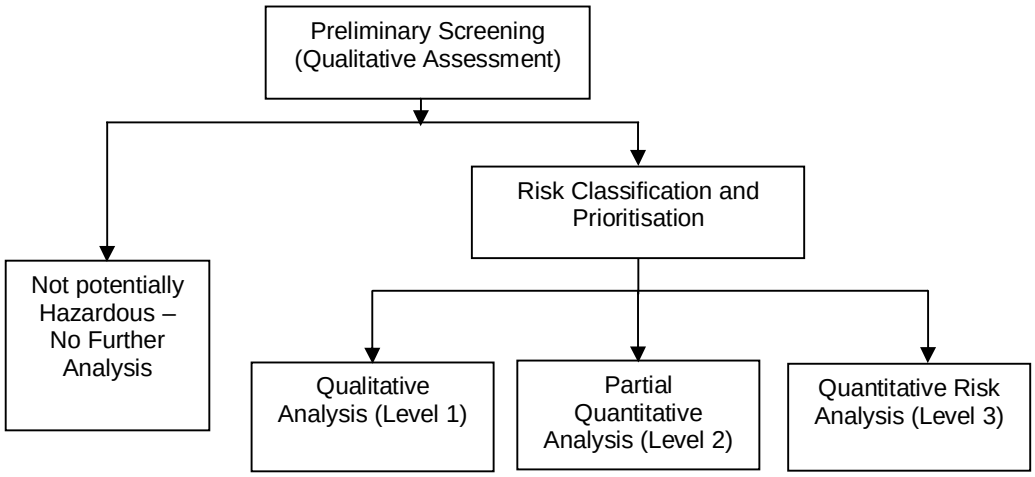
The Multi Level Risk Assessment (Ref. 3) approach was used to assist in developing a methodology that may be used for the proposed concept, considering the stage of the project and the difficulty in identifying the exact quantity of DGs that may enter the Port and in any given cargo.

The methodology used in this study was based on estimated quantities that may be stored at the site in context of the location of the site to the surrounding land uses and the nature of the Dangerous Goods that may be stored. The Multi Level Risk Assessment Guidelines are intended to assist industry, consultants and the consent authorities to carry out and evaluate risk assessments at an appropriate level for the facility being studied, in this case a concept plan.

The Multi Level Risk Assessment approach is summarised in **Figure 1-1**. There are three levels of assessment, depending on the outcome of preliminary screening. These are:

- **Level 1** – **Qualitative Analysis**, primarily based on the hazard identification techniques and qualitative risk assessment of consequences, frequency and risk;
- **Level 2** – **Partially Quantitative Analysis**, using hazard identification and the focused quantification of key potential off-site risks; and
- **Level 3** – **Quantitative Risk Analysis (QRA)**, based on the full detailed quantification of risks, consistent with HIPAP No.6.

Figure 2-1: The Multi Level Risk Assessment Approach



The *Applying SEPP 33* (Ref. 4) guideline may also be used to assist in the selection of the appropriate level of assessment. This guideline states the following:

"It is considered that a qualitative PHA may be sufficient in the following circumstances:

- *where materials are relatively non-hazardous (for example corrosive substances and some classes of flammables);*
- *where the quantity of materials used are relatively small;*
- *where the technical and management safeguards are self-evident and readily implemented; and*
- *where the surrounding land uses are relatively non-sensitive.*

In these cases, it may be appropriate for a PHA to be relatively simple. Such a PHA should:

- *identify the types and quantities of all dangerous goods to be stored and used;*
- *describe the storage/processing activities that will involve these materials;*
- *identify accident scenarios and hazardous incidents that could occur (in some cases, it would also be appropriate to include consequence distances for hazardous events);*
- *consider surrounding land uses (identify any nearby uses of particular sensitivity); and*
- *identify safeguards that can be adopted (including technical, operational and organisational), and assess their adequacy (having regards to the above matters)."*

"A sound qualitative PHA which addresses the above matters could, for some proposals, provide the consent authority with sufficient information to form a judgement about the level of risk involved in a particular proposal" (Ref. 4).

It is noted that the site is currently in the concept stage and therefore details of the development are not finalised. Whilst general information regarding the types of materials that would be expected to pass through the site are available, exact quantities and deliveries (both by vehicle and ships) is not available, hence, under these circumstances, qualitative assessment with some quantitative analysis has been used, following the general principles detailed in HIPAP No.6 (Ref. 2).

Hence, based on the nature of the approval being sort for the proposed concept and the fact that the nature and quantity of the Dangerous Goods is uncertain, a Level 1 assessment has been selected for this PHA, supported by selected quantitative studies (Level 2). This analysis will permit a qualitative assessment of the general Dangerous Goods storage area with a more detailed assessment of higher potential hazard materials (e.g. toxic gases, flammable liquids, etc.). It is noted that subsequent Project applications will be prepared for all precincts (including individual terminals), each requiring preliminary hazard analyses of the Dangerous Goods storages. At this stage of the development, more detailed information regarding Dangerous Goods storage quantities and storage designs will be available.

The analysis generally followed the approach below:

- **Hazard Analysis** – Hazard identification was conducted for the range of Dangerous Goods that could be stored at the site. Where an incident was identified to have potential off site impact, it was included in the recorded hazard identification word diagram (**Appendix A**). The hazard identification word diagram lists incident type, causes, consequences and safeguards. This was performed using the word diagram format suggested in HIPAP No.6 (Ref. 2). Each postulated hazardous incident was assessed qualitatively in light of proposed safeguards (technical and management controls). Where a potential off-site impact was identified, the incident was carried into the main report for further analysis. Where the qualitative review in the main report determined that the safeguards were adequate to control the hazard, or that the consequence would obviously have no off-site impact, no further analysis was performed.
- **Consequence Analysis** – For those incidents qualitatively identified in the hazard analysis to have a potential off-site impact, a detailed consequence analysis was conducted. The analysis modelled the various postulated hazardous incidents and determined impact distances from the incident source. The results were compared to the criteria listed in HIPAP No.4 (Ref. 8). Where an incident was identified to have an off-site effect, and a simple solution was evident (i.e. move the proposed equipment further away from the site boundary), the solution was recommended and no further analysis was performed. Where an incident was identified to result in off-site effect, and no immediate solution was evident, it was reviewed qualitatively and recommendations made for risk reduction.
- **Risk Analysis** – The quantitative assessment of risk is difficult to perform at this stage of the development as detailed storage quantities and delivery frequencies are unavailable. In some cases, preliminary work has been performed for bulk liquids storages and for port bulk liquids handling, however in general, the site is very much in the concept stage. Hence, assessment of risk performed for the overall concept impacts were reviewed in light of the potential location of Dangerous Goods and the site boundaries.

On completion of the assessment a report detailing the study outcomes, conclusions and recommendations was developed in support of the Environmental Assessment for submission to the DoP.

3.0 Brief Description of the Proposed Port Concept

3.1 Overview and Purpose of the Concept Plan

The proposed concept would allow reasonable flexibility for future Project approvals relating to the development of the five key land based precincts and the Berth Precinct thereby allowing the detailed plans to evolve over the long-term timeframe of the project. The proposed concept would provide a level of certainty for future users, regulators and the local community, and establish defined parameters for the assessment of future development as part of subsequent Project applications.

Figure 3-1 shows the site layout. The proposed concept identifies five key land based precincts, these are:

- NPC Operations Precinct (3 hectares) including office, storage sheds, vehicle and marine equipment, NPC dredging fleet, pilot cutters and helipad.
- Bulk and General Precinct (12 hectares) capable of handling non hazardous dry bulk products including grain, briquettes, and coke cargoes.
- General Purpose Precinct (25 hectares) a flexible facility to handle and store cargo containers, heavy machinery, roll on and roll off (Ro/Ro) and break bulk cargo. This includes the General Cargo Facility (Mayfield No.4 Berth) approved as part of the 2001 consent. Ammonium Nitrate will transit through this area.
- Container Terminal Precinct (35 ha) with a trade volume of 1,000,000 TEU per annum at final development. Dangerous Goods may pass through the container terminal in transit, to and from ships.
- Bulk Liquid Precinct (15 hectares) used for storage, blending and distribution of high quality fuels and biofuels. Fuel will be stored in tanks in two terminals, including ship unloading and road tanker loading.
- There is also a Berth Precinct along the edge of the South Arm of the Hunter River containing seven shipping berths, one berth each for the NPC Operations, Bulk and General Precinct, and the General Purpose Precinct, three berths for the Container Terminal Precinct and one berth for the Bulk Liquid Precinct.

3.2 Site Location and Surrounding Land Uses

The proposed site is located on the former BHP Steelworks site (known as the Closure Area), in Mayfield, approximately 7 killometres north west of the Newcastle CBD. The site comprises an area of approximately 90 hectares, as shown in **Figure 3-1**.

The site is located in an existing industrial port area. The following land uses surround the site (refer to **Figure 3-2** for location of surrounding land uses):

- North and East – the South Arm of the Hunter River (Coal Terminals and ship berths located across the river),
- South – Intertrade Industrial Park (IIP) and the Port Waratah Carrington coal loading terminal;
- West – adjoining industry (Onesteel Market Mills)

Surrounding land use comprises predominantly industrial development with residential development located further to the south across Industrial Drive. The closest residential area to the proposed concept site boundary is about 400 metres to the south west of the bulk liquids storage. Boundaries associated with the general cargo areas are about 500 metres to the closest residential areas.

The main road access to the site is from Selwyn Street and Ingall Street both via Industrial Drive, which joins to the Pacific Highway to the north west. The site is also accessible to cargo ships via the shipping channel in the South Arm of the Hunter River. Rail infrastructure is also available to service the site.

In a regional context, the site is located within the Port of Newcastle, which is a major distribution point for a number of industries. Whilst coal is the predominant commodity which is transferred through the Port, other cargoes such as fertilisers, vegetable oils, grains, woodchips and aluminium also have a significant contribution.

The Port of Newcastle supports other industries such as ship building and repairs in the Marina precinct at Honeysuckle. The Port is also becoming an increasingly popular location for pleasure craft, particularly with the establishment of the Newcastle Cruising Yacht Club in Wickham.

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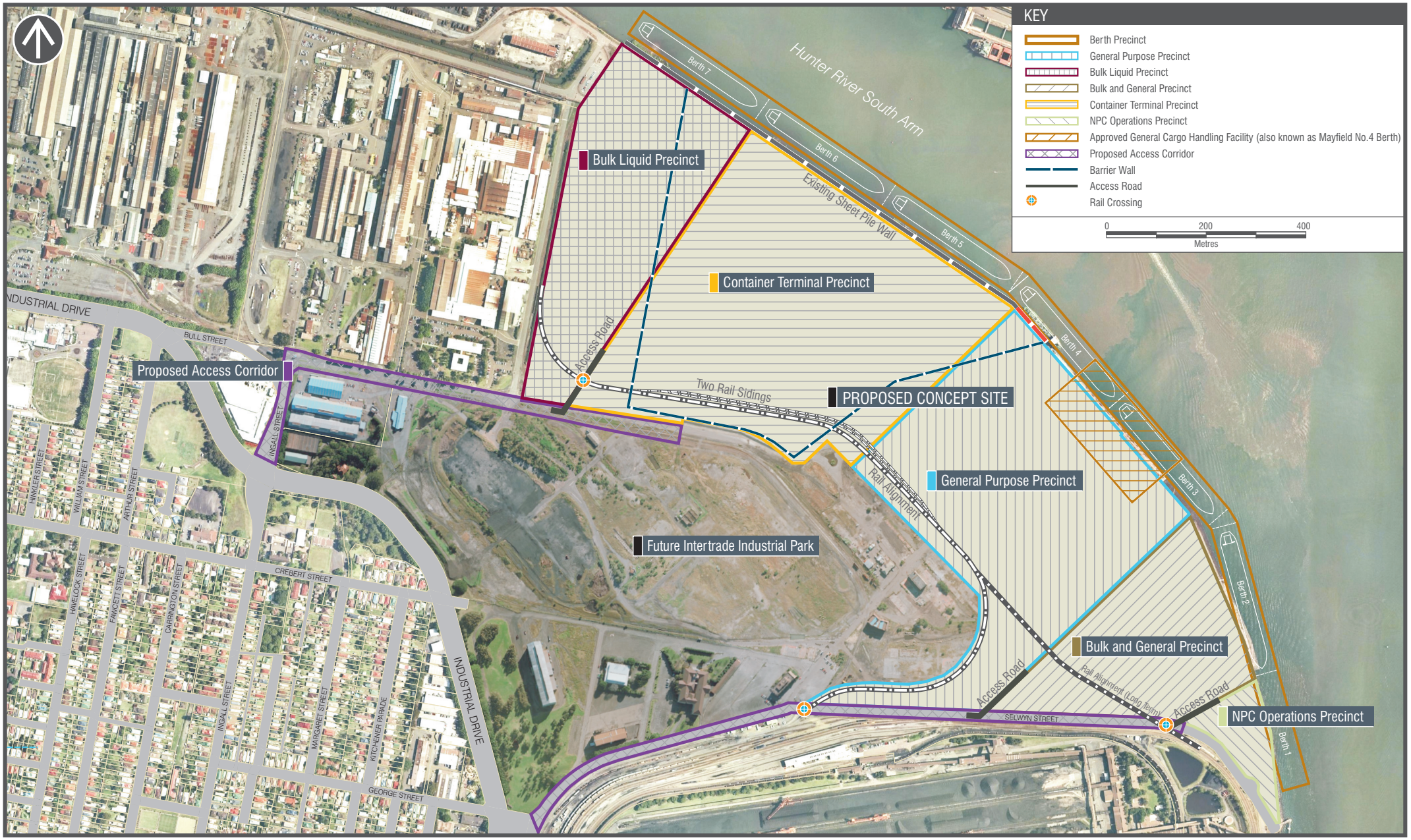

AECOM

CONCEPT PLAN

Preliminary Hazard Analysis

Mayfield Site Port-Related Activities Concept Plan

Figure 3-1

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