Orica Australia Pty Ltd
13-Nov-2013

Kooragang Island Modification Environmental Assessment

Modification of Project Approval 08_0129

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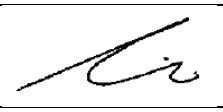
3	13-Nov-2013	Final	Simon Murphy Senior Environmental Planner	

Certification

Submission of Environmental Assessment (EA) prepared under the *Environmental Planning and Assessment Act 1979* Section 75F

EA prepared by		
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in respect of	Ammonia Flaring and Nitric Acid Tank Modification Environmental Assessment	
Project application Applicant name	AECOM Australia Pty Ltd (AECOM)	
Applicant address	PO Box 73 HRMC NSW 2310	
Land to be developed		
Proposed project	Lot 3 D.P. 234288 Proposed construction and operation of a nitric acid storage tank. Map(s) attached	
Environmental Assessment	an Environmental Assessment (EA) is attached	
Certification	I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.	
	 Signature: Name: Simon Murphy Date: 13 November 2013	 Signature: Name: Date: 13 November 2013

Table of Contents

List of Tables

List of Figures

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Executive Summary

Introduction

This Environmental Assessment (EA) has been prepared by AECOM Australia Pty Ltd (AECOM) on behalf of Orica Australia Pty Ltd (Orica), relating to proposed modifications to Major Project Approval (MP08_0129) for Orica's facility on Kooragang Island, Newcastle. The proposed modification is seeking approval for:

- A modification to the location and storage capacity of the approved site expansion nitric acid tank; and
- The construction and operation of three ammonia flaring stacks located in the ammonia storage, nitrates and ammonia plant areas.

Modification approval is being sought under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Minister for Planning and Infrastructure is the approval authority for this application under the transitional arrangements of Part 3A of the EP&A Act. AECOM has prepared an EA in accordance with the provisions of the former Part 3A of the Act and the *Environmental Planning and Assessment Regulation 2000*, The EA addresses the Director-General's Requirements previously prepared for the expansion project issued to Orica in 2009.

Project Description

The modification comprises of two different components being; the relocation and increase in storage capacity of the approved expansion project nitric acid tank; and the construction and operation of three ammonia flares.

Nitric Acid Tank

Orica proposes to build a 10,000 tonne nitric acid storage tank and associated infrastructure in the north western corner of Orica's KI facility. This tank would replace the approved 2,000 tonne Nitric Acid tank detailed in the expansion project Environmental Approval.

The tank is to be utilised for import of additional nitric acid via the existing nitric acid import line in order to fully utilise existing ammonium nitrate operations ahead of a major expansion. The nitric acid tank would utilise water from Hunter Waters recycled water project for the dilution of nitric acid prior to further use onsite.

Ammonia Flaring Stacks

Orica also proposes to install three ammonia flares on self-supported flare stacks, and including ancillary piping and infrastructure required to connect the flare stacks to the existing ammonia collection systems located in the ammonia storage, nitrates and ammonia plant areas.

The flares are to be used for the treatment of non-routine process relief-valve ammonia discharges which are currently in general vented to high-points. The existing scrubbing systems are to treat routine ammonia emissions.

Statutory Planning

The Site is located within the Newcastle Local Government Area on land governed by Newcastle Local Environmental Plan (LEP 2012). The proposed modification to a declared Major Development can be assessed through section 75W of the *Environmental Planning and Assessment Act 1979.* This was confirmed in consultation with the NSW department of Planning and Infrastructure.

The Project is consistent with the provisions of local, regional and State planning instruments which would otherwise apply to the proposal, including:

- *Newcastle LEP 2012*;
- *State Environmental Planning Policy (Major Development) 2005; and*
- *State Environmental Planning Policy 33 – Hazardous and Offensive Development*.

Environmental Assessment

A preliminary environmental risk assessment identified air quality, noise, hazard and risk and visual impacts as being a medium risk commensurate with the size and nature of the project relative to its natural and human environment.

Air Quality and Odour

An assessment of the potential operational air quality impacts of the proposed modification were quantitatively assessed against the existing site air quality management framework and criteria as specified in the Project Approval (08_0129), EPL 828 and in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW DEC, 2005). Pollutants of interest in relation to the proposed modification are oxides of nitrogen (NO_x) (as nitrogen dioxide NO_2) associated with the nitric acid tank scrubber operation and ammonia (NH_3) associated with the proposed flares. Modelling concluded that under the operational scenarios anticipated by Orica for the ammonia flares, and with the scrubber and vent stack on the nitric acid tank, predicted emissions would meet the annual and 1 hour NSW EPA criteria for both NO_2 and NH_3 during both routine and non-routine scenarios.

Noise and Vibration

Based on the predicted construction and operational noise levels, noise management levels would not be exceeded at the nearest noise-sensitive receivers during construction phase for both the nitric acid tank and the flares. Operational assessment of the nitric acid tank pump found that it would not result in an exceedance of the project specific noise management levels during operation at any time of the day or night.

Assessment of the operation of the flare stacks found that use of the flares generally complies with the noise limits. Operation of Flare C, which operates for a short period of time, was found to cause minor exceedances (0-2 dB(A)) at receiver locations during neutral weather conditions. Receivers are predicted to exceed by 6 dB(A) during the operation of Flare C during adverse weather conditions at night. However, due to the infrequent operation of Flare C, the short duration in operation and the safety function for which the flares serve, these exceedances are deemed to be acceptable.

It was also found that, should the extremely unexpected event occur of all three flares operating simultaneously, the noise impacts would be 1-2 dB(A) higher than that of the Flare C activated by itself for both neutral and adverse weather conditions. These noise levels would only be experienced by the receivers for a period less than 15 mins – after this period of 15 mins, flares A and C would cease operation and the remaining noise contribution of the flares would be solely due to Flare B. Flare B has been shown to be generally compliant with the noise criteria.

Hazard and Risk

The Preliminary Hazard Analysis (GHD, 2008) prepared previously for the Orica site was updated to incorporate the potential hazard and risk impacts of the proposed ammonia flares. The risk assessment has shown that the site risk results for the project case did not change significantly from the results detailed in the existing facility and that risk continue to be within the requirements of the Hazardous Industry Planning Advisory Papers 4 risk criteria for “intensification of hazardous activities in an existing complex”.

A Preliminary Hazard Analysis was undertaken by Pinnacle Risk Management (2013) to examine the hazards and risks associated with the proposed nitric acid tank. This assessment also concluded that the risk associate with the nitric acid tank also comply with the requirements of the Department of Planning and Infrastructure’s Hazardous Industry Planning Advisory Papers.

Visual

An assessment of the potential visual impacts was undertaken utilising the nearest sensitive receivers located on Stockton as indicative receivers for assessment purposes. Artist’s impressions of the proposed flare stacks and nitric acid tank were prepared to allow examination of the likely visual impacts. This assessment concluded that there would be an overall low level of visual impact resulting from the proposed modification due to: the size and scale of the proposed infrastructure; its consistency with the industrial setting of KI; and the offset distances that exist between the site and sensitive receivers. Should the flares be required to operate the flame produced would have a low viability due to the flaring of ammonia and the blue colour of the flame. The flame however may be visible at night. Given the expected limited need for flaring, visual impacts due to flaring would be infrequent.

Other environmental aspects

Other environmental aspects were considered to be of low, or very low, risk including:

- Soil and water;
- Greenhouse gas;
- Transport;
- Waste;
- Flora and fauna; and
- Heritage.

In relation to the other environmental aspects assessed in the EA, no significant environmental impacts were predicted and where relevant, reasonable and feasible management measures and safeguards have been recommended to mitigate potential impacts.

Statement of Commitments

A Statement of Commitments has been prepared in respect of the construction and operation of the proposed tank and ammonia flares. Orica commits to the update/preparation and implementation of the environmental management and monitoring plans and environmental mitigation measures detailed in the Statement of Commitments for the proposed modification. This includes the preparation and implementation of a Construction Environment Management Plan during construction, and the update and implementation of operational management plans as necessary.

Justification and Conclusion

Environmental, biophysical, economic and social considerations have been addressed during the preparation of the Environmental Assessment. The assessments of each of these factors has demonstrated that the proposed modification will not have a significant impact on the surrounding environment or community provided that appropriate management and mitigation measures are implemented as identified in this Environmental Assessment.

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1.0 Introduction

1.1 Overview

This Environmental Assessment (EA) has been prepared by AECOM Australia Pty Ltd (AECOM) on behalf of Orica Australia Pty Ltd (Orica) for proposed modifications to Project Approval 08_0129.

Orica operates a manufacturing facility on Kooragang Island (KI), Newcastle, which produces ammonia, nitric acid and ammonium nitrate. An EA (AECOM, 2009) was prepared in 2009 for the expansion of the facility and was approved under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 1 December 2009 (DA 08_0129). A description of DA 08_0129 is provided in **Section 2.1**.

As a result of review of the detailed design against operational requirements, the plant and equipment layout was amended with a modification to the Project Approval sought (AECOM, 2011) and approved on 11 July 2012 (DA 08_0129 MOD 1). MOD 1 elements are described in **Section 2.1**.

Orica is proposing a further modification to 08_0129 relating to site improvement works including implementing measures designed to improve safety and reduce risk associated with the use of ammonia at the site. The modification proposed in this EA has two discrete elements being:

- A modification to the location and storage capacity of the approved site expansion nitric acid tank; and
- The construction and operation of three ammonia flaring stacks located in the ammonia storage, nitrates and ammonia plant areas.

In this EA reference to the proposed modification refers to both the nitric acid tanks and the ammonia flares. Commentary on the individual elements and characteristics of the nitric acid tank or the flare/s is provided throughout as necessary.

1.2 Approval Pathway

In accordance with Clause 3 of Schedule 6A of the EP&A Act, section 75W of the Act (as in force immediately before its repeal on 1 October 2011 and as modified by Schedule 6A) continues to apply to transitional Part 3A projects. The proposed modification can therefore be assessed under s75W of the EP&A Act, which states that:

2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.

3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.

4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.

This EA has been prepared to address the potential environmental issues associated with the proposed modification. As agreed with Department of Planning and Infrastructure (DP&I) (refer to **Section 4.1**), AECOM have used the Director General's Requirements (DGRs) previously issued for the 2009 EA, to guide the assessment of the potential impacts resulting from the proposed modification.

1.3 The Proponent

The proponent for the approved project and the modification is Orica Australia Pty Ltd (Orica). Orica is an independent, Australian-owned company with a global reach in more than 100 countries worldwide

Orica is the largest provider of commercial explosives and blasting systems to the mining and infrastructure markets, the global leader in the provision of ground support in mining and tunnelling, and the leading supplier of sodium cyanide for gold extraction.

Orica also supplies general chemicals across a diverse range of markets, including agriculture, building and construction, food and beverage, pharmaceutical and personal care, plastics, pulp and paper and water treatment industries.

Orica has a strong portfolio of manufacturing and distribution assets strategically located across Australia Pacific, Asia, Europe, Middle East, Africa, Latin America and North America which enables it to provide valuable supply chain capabilities for its customers.

The KI manufacturing site primarily supplies Orica's Mining Services division, providing ammonium nitrate which is utilised in the manufacture of commercial explosives for the mining and quarry industries.

1.4 Site Overview

The Orica manufacturing site is located on KI which lies near the mouth of the Hunter River within the Port of Newcastle, approximately 3.5 km north of Newcastle CBD in New South Wales. **Figure 1** shows the regional location of the facility.

Neighbouring land uses to the Orica site consist of:

- **North** - The Incitec Pivot Fertiliser distribution centre is located to the north and adjoins the AN Plant at the northern boundary;
- **North West** – Kooragang Berth No.2, used for the unloading of cement, vegetable oil, woodchip and bulk products (fertiliser, ammonia, and ammonium nitrate);
- **West** – Saw-millers exports Pty. Ltd. Operates a major export point for woodchips directly to the west of the AN Plant, across Heron Road;
- **South West** – an agri-terminal is located to the south west, which is used for the storage and loading of cotton seed, other seed grains woodchips and sand;
- **South** – Patricks Warehousing and Despatch Facility operates a warehouse adjacent to the southern boundary of the AN Plant;
- **South** – Walsh Point is located across Heron Road (i.e. the southern end of KI); and
- **East** – the thin strip of land between Greenleaf Road and the AN Plant is currently vacant, apart from two disused bulk storage tanks.

The nearest residential areas are located at Stockton, approximately 760 m to the south east and Fern Bay, approximately 1.5 km to the north east. There are also residential properties 2 km to the south at Carrington and 2.2 km to the south west at Mayfield.

The site is topographically flat and includes a range of existing buildings, plant and machinery and supporting infrastructure associated with the production of ammonia, nitric acid and ammonium nitrate at the site.

Orica's KI facility consists of:

- An Ammonia Plant;
- Three Nitric Acid Plants, NAP1, NAP2 and NAP3 (nitric acid is used in the production of ammonium nitrate);
- Two Ammonium Nitrate (AN) Plants, namely AN1 which manufactures Nitropril (a porous prilled ammonium nitrate product) and AN2 which manufactures Opal (a granulated ammonium nitrate product) and 88% ammonium nitrate solution;
- Bagging and bulk dispatch facilities for anhydrous ammonia, solid ammonium nitrate, AN solution, nitric acid and granulated material; and
- Offices and amenities located adjacent to Greenleaf road on the eastern side of the plant.

The main elements of the facility are detailed on **Figure 2**.

The land to which the proposed modification relates is identified as Lot 3 DP DP234288. The land is owned by Orica.

G:\ENVGIS\Projects\60306451 Orica Kooragang Island Flare Modification\Figures\AQIA\60306451 F1 Site Location 17 10 2013 TO

AECOM

SITE LOCATION

Proposed Modification, Greenleaf Road, Kooragang Island

FIGURE 1

2.0 Proposed Modification

2.1 Approved Project

In 2009, approval was gained for the expansion to the ammonium nitrate facility located on KI. The expansion included:

- An additional Nitric Acid Plant (NAP4);
- An additional Ammonium Nitrate Plant (ANP3);
- Modification of the existing Ammonia Plant;
- Additional storages for nitric acid (including a 2,000 tonne nitric acid storage tank), solid ammonium nitrate and ammonium nitrate solution; and
- Upgrades to existing infrastructure such as cooling towers, air compressors, loading facilities, electrical systems, effluent treatment systems and the steam system.

The project was approved with the following production limits:

- 360 kilotonnes per annum (ktpa) of ammonia product;
- 605 ktpa of nitric acid product; and
- 750 ktpa of ammonium nitrate product.

In July 2012 the plant and equipment layout for the site was amended. No changes to the productions limits were made as part of the modification. The layout of the project as approved, and modified (DA 08_0129 MOD 1) is shown in **Figure 2**.

2.2 Modification Description

As described in **Section 1.1** this modification includes two discreet elements:

- A modification to the location and storage capacity of the approved site expansion nitric acid tank; and
- The construction and operation of three ammonia flaring stacks located in the ammonia storage, nitrates and ammonia plant areas.

The approval does not seek to alter the approval production limits. Each modification is described in detail in **Sections 2.2.1** and **2.2.2** and details on **Figure 2**.

2.2.1 Nitric Acid Tank

Orica proposes to build a 10,000 tonne nitric acid storage tank and associated infrastructure which includes the following elements:

- 10,000 tonne nitric acid tank;
- Overhead pipe gantry to connect the proposed tank to existing import pipeline;
- Tank secondary containment;
- Venting systems and scrubber; and
- Associated lighting and security.

The proposed tank would be constructed in place of the 2,000 tonne storage tank previously approved as part of Project Approval 08_0129. The proposed tank would be used to store imported nitric acid, or provide additional storage capacity for nitric acid produced on site. The proposed location for the 10,000 tonne storage tank is on the western property boundary (as shown on **Figure 2**).

The additional nitric acid storage and import capacity would allow the site to realise additional production of ammonium nitrate within approved production capacities prior to constructing the additional nitric acid and ammonium nitrate plants as approved under Project Approval 08_0129.

The tank would be used for the importation of 68% w/w nitric acid via the existing nitric acid import/export line. Following dilution to 60%, it is expected that the imported nitric acid combined with available on-site ammonia

could raise production within the existing ammonium nitrate plants from a current average of 430ktpa to approximately 505 ktpa. As noted in **Section 2.1**, the Project Approval for the KI site currently allows for production of up to 750 ktpa of ammonium nitrate. This modification therefore does not seek to increase existing production capacity limits, but would increase production through increase of existing plant utilisation, to within existing approved limits.

Nitric acid would be unloaded from a ship to the new tank utilising the ship's pump via the existing approved nitric acid import/export pipeline. It is expected that there would be approximately 14 ship deliveries of nitric acid per year. It would then be transferred from the new tank to the existing Nitric Acid Tank 1 (refer **Figure 2**) using the eastern section of the existing nitric acid import/export pipeline. The nitric acid import infrastructure would be modified to incorporate the new storage tank. This would include connections for nitric acid, demineralised water, and other services which already exist at Orica's site. These connections would primarily involve the extension of piping systems which are already in close proximity to the tanks. All connections would be fully contained within the Orica site.

A system to dilute the nitric acid from 68% w/w to 60% w/w would be included, and would be located between the new tank and Tank 1. This dilution system would utilise process condensate which would be supplemented by demineralised water.

The new nitric acid storage tank area would include secondary containment measures, scrubber and venting systems.

General arrangement plans detailing the proposed tank and associated infrastructure are attached at **Appendix A**.

2.2.2 Ammonia Flares

Central to the approval of the expansion project were a series of design improvements to the site's existing ammonia management infrastructure. These improvements were aimed at reducing the risk associated with the use of ammonia on site, to both the community and site personnel.

Following a non-routine ammonia release at the site on the 9 November 2011, Orica made several changes to the site's ammonia management systems and committed to undertaking a programme of work, in consultation with the EPA and WorkCover, aimed at further improving the site's ammonia handling systems, to further reduce the risk associated with the use of ammonia onsite. The focus of the Ammonia Management Improvement (AMI) programme is to:

a. Simplify the ammonia distribution network;

b. Improve the integrity of ammonia feed tanks;

c. Improve the site's ammonia collection and scrubbing capability;

d. Ensuring that ammonia treatment systems are capable of adequately managing larger ammonia release scenarios through the construction and operation of three ammonia flares located in the ammonia.

The design improvements associated with (a), (b) and (c) are considered by Orica as consistent with the commitments previously detailed in the existing Project Approval (DA 08_0129) and as such do not require modification to the Project Approval. The design improvements associated in achieving (d) is considered beyond the scope of the existing Project Approval, and therefore require further assessment and modification to the Project Approval.

To date the site's existing ammonia management system has been designed to prevent a fatality or serious injury to either onsite personnel or in the community by non-routine ammonia releases discharged at height and routine ammonia emissions directed to ammonia scrubbers where practicable. Orica has undertaken a review of alternative ammonia treatment options for large non-routine release scenario's at the site.

This review included the evaluation of the two ammonia treatment options being:

- New larger ammonia wet scrubber/s to absorb ammonia from process streams forming a weak aqueous ammonia solution; or

- The use of ammonia flares to thermally oxidise released ammonia prior to being discharged to the atmosphere.

The feasibility review identified that a flaring system is the preferred option due to the reduced reliance on existing site systems, greater reliability, increased operational simplicity (which can improve effectiveness during emergency events), reduced aqueous ammonia formation and lower capital cost. Orica is therefore proposing to use flares to treat non-routine process relief valve discharges from the ammonia, nitrates and the ammonia storage area.

The three proposed flares are to be used to treat non-routine process relief valve discharges, while the existing scrubbing system would continue to treat routine planned ammonia emissions.

The feasibility study also assessed the most appropriate configuration of flares (e.g. one flare servicing a large pipe interconnecting all plant areas or several smaller flares for each central process area). The study considered issues such as flare radiation and impact on adjacent plant, dispersion modelling for flare combustion products, potential visual amenity impacts, and aesthetics to minimise potential community impact. The size of the three flares was dependant on the potential ammonia volume that could be managed in each ammonia collection system as detailed in **Table 1**.

Table 1 Proposed Flares

Flare	Approximate Design Throughout (tph)*	Approximate Stack Height (m)	Approximate Flame Height (m)
Ammonia Plant Flare	60	20	36
Ammonia Storage Tank Flare	5	5	10
Nitrates Plants Flare	12	8	18

**tph = tonnes per hour.*

The location of the three proposed flares is shown in **Figure 2**.

The flares would be installed on self-supported flare stacks including ancillary piping and infrastructure required to connect the flare stacks to existing plant and machinery.

2.3 Modification to Project Approval 08_0129

A review of the existing Project Approval was undertaken to examine which conditions would require amendment as a result of the proposed modification.

Condition 2, Schedule 2, would need the following modification. Proposed additions to conditions are shown in **bold** and deletions shown as ~~strikethrough~~:

2. The proponent shall carry out the project generally in accordance with the:

a) EA;

b) Statement of commitments;

c) Submissions Report;

d) Modification Application (08_0129 MOD 1) with supporting documentation titled Kooragang Island Facility Uprate Modification Request, prepared by AECOM for Orica Australia Pty Ltd and dated 2A April 2011;

e) Report titled Orica Mining Services Report for Kooragang Island Uprate PHA MOD1 Report, prepared by GHD for Orica Australia Pty Ltd and dated March 2012; ~~and~~

f) Modification Application (08_0129 MOD 2)with supporting documentation titled, Kooragang Island Modification Request Environmental Assessment, prepared by AECOM for Orica Australia and dated 13 November 2013;

g) Report titled Orica Mining Services Report for Kooragang Island Uprate PHA MOD Report, prepared by GHD for Orica Australia Pty Ltd and dated October 2013; and

h) *Conditions of this approval.*

2.4 Project Benefits

2.4.1 Nitric Acid Tank

The proposed nitric acid tank would allow Orica to meet the short term ammonium nitrate market demand during the transition period, prior to constructing the additional approved Nitric Acid and Ammonium Nitrate plants. This will reduce the quantity of ammonium nitrate required to be imported into the Port of Newcastle during this transition period.

In addition, the 10,000 tonne capacity of the tank will provide a buffer storage capacity for the existing Nitric Acid Plants on site. This would have a secondary benefit of allowing excess production from the site's existing nitric acid plants to be stored in the proposed tank for later use, when not immediately required. This will have the advantage of maintaining more stable plant operations, with potential reduction in the number of market-driven plant start-ups and shutdowns and the associated environmental benefits.

2.4.2 Ammonia Flares

The AMI programme of work, of which the proposed flares is one of several components, is aimed at reducing the risk associated with the use of ammonia at the KI facility. A key objective of the programme is that the community is not adversely impacted by ammonia operations, including potential safety and operational related ammonia releases to the environment.

Risk reduction will be achieved through the transition of the site's ammonia management systems to a new design philosophy in which potential ammonia release points are captured, reused or recycled through the process where practicable, or treated via a flare or larger scrubber systems capable of managing non-routine ammonia release volumes, prior to being discharged.

Orica's assessment of options for treatment of non-routine ammonia discharges indicated that flares are preferable compared to the installation of a new scrubbing system. A flare is less complex than a scrubbing system, would have greater availability, does not require site power or cooling water systems and is inherently more reliable. Overall the operation of the proposed flares would see a reduction in the hazard and risk associated with the ongoing operation of the KI facility.

2.5 Alternatives

2.5.1 Nitric Acid Supply and Storage

The alternatives considered in relation to nitric acid supply and storage are:

- Do nothing;
- Increase nitric acid imports; and
- Increase nitric acid production via installation of the new nitric acid plant as per the expansion approval

Do Nothing

The do nothing alternative would continue to see a business as usual situation exist and no improvements to the operational capacity of the facility achieved. If the 'do nothing' alternative continued, none of the project benefits would be realised.

Increase nitric acid imports

Without the proposed storage tank, smaller shipments would be required at a higher frequency due to the lack of storage capacity at the site. This would be an inefficient alternative as the economies of scale of larger shipments could not be achieved.

Increase nitric acid production via installation of the new nitric acid plant as per the expansion approval

Given the slow-down of market growth in the region tied to mining demand, there is not presently an economic case to construct the planned Nitric Acid Plant (NAP4) given what would be the high cost of capital for limited utilisation. The nitric acid tank provides an interim step in meeting demand via full utilisation of existing assets prior to a major expansion of capacity.

Secondary Containment Alternatives

In addition to assessment of available alternatives to the tank itself consideration has also been given to the suitability of secondary containment systems that will be integrated into the final tank design. Two alternatives for secondary containment of the proposed tank were considered. These are 'Tank in Tank' and 'Concrete Bunding'. For the proposed nitric acid tank, these secondary containment options are detailed below and the advantages of each system are considered in **Table 2**.

- **Tank-in-Tank**: This means that a tank sits within an outer tank. Both would be made entirely of 304 stainless steel (corrosion resistant, heat resistant, excellent welding properties), complete with double floor but with only one roof covering both. The distance between the two cylindrical shells will be between 1m to 2.0m (approximately) giving a total tank diameter of approximately 25 m and overall footprint of approximately 490 m^2. In the space between the two tanks it is proposed to install an emergency isolation valve, together with liquid and gas detecting instrumentation.
- **Concrete Bund**: This is a traditional circular concrete bund about 31 m diameter and 12 m high (approximately). The bund will be lined with a nitric acid resistant coating such as vinyl ester.

Table 2 Secondary Containment Alternative Comparison

Advantages of Alternative Secondary Containment Systems	
Tank-in-Tank	**Concrete Bund**
Storm water and effluent – The secondary containment will not collect rainwater and therefore does not require rain water to be pumped out to effluent after every rain event.	*Access* – In both options, the access to the secondary containment will be highly restricted. However, it will be easier with the concrete bund. Despite this, access into the Tank-in-Tank secondary containment will be less frequent compared to the 'Concrete Bund' design.
Containment Integrity -, The secondary stainless steel tank offers a potentially improved form of secondary containment for nitric acid. This also means that if the inner tank fails the Tank-in-Tank recovery can be more orderly, less hazardous and will not damage the secondary containment integrity.	*Visual Leak Verification* – In the event of an overflow or major leak the 'Concrete Bund' design offers leak verification due to visual or odour means. In the Tank-in-Tank design this warning will be via instrumentation located in the secondary containment annular space.
Foot-Print –The smaller foot-print will more efficiently use the limited space.	-
Foundation Cost – the smaller foot-print will produce a smaller pipe cap and fewer piles compares to a bund.	-
Fume – In the event of an acid spill, the nitrogen oxides (NO_x) fume from the spilled acid will be significantly reduced as the secondary containment will be roofed Recovery of any spilled acid can be carried out in a safe and controlled environment, this acid will not be contaminated and can be reused. Spilled nitric acid in a bund would be exposed and potentially hazardous.	-
Tank Breathing – The outer tank would provide a degree of thermal insulation that would reduce the maximum temperature swings of the acid and also reduce the breathing rates of the inner tank, therefore potentially reducing NO_x fumes.	-

With consideration to the benefits listed in above, Orica has determined to proceed with the tank in tank secondary containment design option. Further consideration of the final secondary containment measures have been considered during the review of the projects Preliminary Hazard Assessment (PHA). Further discussion of hazards and risks is provided in **Section 6.3**.

2.5.2 Ammonia Flares

The ammonia flares proposed as part of the overall AMI programme of works aim to rationalise the sites ammonia management and handling systems in order to reduce the risk profile of the facility as described in **Section 2.2.2**.

There are a number of activities which form a part of the AMI programme, with the proposed flares being a central component for the improved management of ammonia release site scenarios. Several alternatives have been considered. These are:

- Do nothing;
- Increase ammonia scrubbing capability/capacities; and
- Improving other 'layers of protection' to reduce the likelihood of large releases.

Do Nothing

The do nothing option would continue to see releases of ammonia vented directly to the atmosphere. The do nothing option would not reduce the potential for ammonia to adversely impact neighbouring receivers.

Increase Ammonia Scrubbing Capacity

The use of a new scrubber compared to flares to treat major ammonia releases was assessed by Orica. It was concluded that the installation of a flare was preferential due to the reduced reliance on existing site systems, greater reliability and operational simplicity and lower capital cost.

The existing scrubbing systems would continue to treat routine planned emissions from all nitrates plants including Nitric Acid Plant 1 and Ammonia Nitrate 1 and will generate weak ammonia solution (or "aqua") which will be sent to the Ammonia Bottling Plant for processing.

Improving other layers of protection

As part of the AMI programme a series of plant upgrades and works are proposed of which the ammonia flares are one component. Other components include:

- Improving ammonia scrubbing capability, as described above;
- Improving ammonia monitoring and detection systems; and
- Simplifying the ammonia handling systems to reduce potential for errant releases.

The proposed flares represent a complimentary element of the AMI programme and not an alternative to these other layers of protection which are being implemented. These other elements either reduce the potential for ammonia release or manage small scale ammonia releases. The proposed flares provide additional management capacity for non-routine release scenarios and are therefore an additional layer of protection for the facility and the community.

2.6 Proposed Construction Activities

Due to the varying nature and differing lead-in times of both the nitric acid tank and the flares Orica does not anticipate that the construction of either element will occur at the same time. As the projects are separate there will be no interdependency on the construction schedules. Therefore the following construction detail considers each element in isolation where necessary.

2.6.1 Construction Methodology

Nitric Acid Tank

The main activities, schedule and plant requirements for the construction of the nitric acid tank are detailed in **Table 3**.

Table 3 Proposed construction activities and schedule – Nitric Acid Tank

Task	Approximate Timeline (weeks)	Indicative Equipment list
Site Establishment	1 – 2	- Light vehicles - Hand tools - Backhoe - Flatbed truck
Civil Works and Bund construction	2 – 18	- Bulldozer - Backhoe - Excavator (40 tonne) - Concrete truck

Task	Approximate Timeline (weeks)	Indicative Equipment list
		- Concrete pump truck - Small truck - Hand tools - Impact piler
Tank Installation	18 – 34	- Truck - Low loader - Mobile electric welding sets
Connection of pumps, piping and safety equipment	34 – 38	- Light vehicles - Hand tools - Mobile electric welding sets
Testing and commissioning.	38 – 42	- Light vehicles - Hand tools

The tank will be supported on a concrete pile cap which in turn would sit on a series of piles to achieve the necessary stability for the site's geotechnical conditions.

Ammonia Flares

The main activities, schedule and plant requirements for the construction of the ammonia flares are detailed in **Table 4**.

Table 4 Proposed construction activities and schedule – Ammonia Flares

Task	Approximate Timeline (weeks)	Indicative Equipment list
Site Establishment	1 – 4	- Light vehicles - Hand tools - Backhoe - Flatbed truck
Civil Works, flare foundation construction.	4 – 20	- Bulldozer - Backhoe - Excavator (40 tonne) - Concrete truck - Concrete pump truck - Small truck - Hand tools - Impact piler
Flare and support superstructure construction/installation.	20 – 38	- Truck - Low loader - Mobile Crane - Tower Crane - Mobile electric welding sets
Connection of pumps, piping and safety equipment	38 – 50	- Light vehicles - Hand tools - Mobile electric welding sets
Testing and commissioning.	50 – 60	- Light vehicles - Hand tools

2.6.2 Construction Workforce and traffic

The maximum onsite workforce at any time for both the nitric acid tank and the ammonia flares would be approximately 20 personnel. There would be approximately 10 light vehicles (20 light vehicle movements) and five heavy vehicles (10 heavy vehicle movements) required per day during the peak of construction activities.

2.6.3 Material Import/Export

Construction of the proposed tank and flares would give rise to minimal fill or spoil. Some spoil may be generated during the installation of the concrete cap and piling works for the tanks and foundation works for the flares. Spoil would be stockpiled on site with appropriated environmental mitigation controls and subject to testing and classification in accordance with the waste classification guidelines prior to reuse or disposal.

Top soils removed during construction would be used in landscaping elsewhere onsite where appropriate.

2.6.4 Land Acquisition and Access Agreements

All land required for the construction and operation of the tank and flares is under the ownership of Orica (Lot 3 DP234288). No land acquisition is required for the construction of the proposed tank or flares.

2.6.5 Ancillary Works and Equipment

Nitric Acid Tank

Located immediately at the base of the proposed tank would be a bunded pad containing the pumps and NO_x scrubber. In order to connect the proposed tank to the existing site pipeline system, an elevated pipe bridge will traverse from the tank to the existing pipe bridge located approximately 10m from the proposed tank location.

Ammonia Flares

The three proposed flares will be located onsite immediately adjacent to the plant that they will service. In order to incorporate the flares into the site's existing systems, additional piping will be required to control the flow of products from existing systems and via the proposed flares when required.

2.6.6 Services and Utilities

No public owned utilities are expected to be relocated as a result of either the proposed tank or flares. Service connections from Orica's existing onsite services will be extended to the tank and flare systems for power and control functions.

2.6.7 Construction Hours and Schedule

Pursuant to Condition 33 of the Project Approval, standard working hours for the construction of both the Nitric Acid Tank and the Ammonia Flares would be between:

- 7am and 6pm Monday to Friday; and
- 8am and 1pm Saturdays.

No works would be undertaken on Sundays or Public Holidays. Works outside of these hours are unlikely to be required and would be avoided where possible.

2.7 Hunter Water Corporation Recycled Water Project

Associated with the expansion projects Conditions of Consent Orica has been exploring opportunities to reduce the site's reliance of potable water through the use of recycled water in the site's cooling water and demineralisation plants.

Hunter Water Corporation (HWC) have partnered with Orica and the surrounding industry on KI to develop the Kooragang Industrial Water Scheme (KIWS). The KIWS will contribute to sustainable water cycle management for the Hunter region by conserving drinking water resources. At present Orica's KI plant uses approximately 8.3 ML/d of potable water supplied by HWC. Approximately 99% of this water is used for high quality industrial uses such as make-up to cooling water systems, nitric acid dilution and feed for the production of demineralised water.

In preparation to ready the site to be capable of receiving recycled water, additional storage infrastructure is required to be constructed. This additional infrastructure consists of a water storage tank and associated pipe and pump infrastructure for movement of water to site systems. Whilst the recycled water may be used together with the nitric acid for dilution, the construction and operation of the proposed recycled water infrastructure is considered to be consistent with the expansion project approval and therefore has not been assessed further in this environmental assessment. Neither project would present an impediment to the ability for the other to be successfully implemented.

Existing Infrastructure Key

1	Ammonia Plant	5	Nitric Acid Plant 2	9	AN Plant 2
2	Utilities Area	6	Nitric Acid Plant 1	10	AN Plant 1
3	Acid Storage (Dilution infrastructure will be contained in the Tank 1 bund)	7	Boiler Plant	11	AN Bulk Storage
4	Nitric Acid Plant 3	8	ANS	12	Bagged Product Storage

Infrastructure Key (1 - 16)

1	New demin water system	5	New NA storage	9	Cooling water supply pumps	13	New NAP4 plant
2	New ammonia storage nitrate pumps	6	New pipe rack	10	New cooling water treat,emt skids	14	Ammonia compressor
3	New instrument air compressor and dryer	7	11kV trident switchroom	11	New cooling towers	15	Contaminated condensate tank
4	Extension to No.2 11kV substation	8	New boiler	12	New NAP4/AN3 switchroom and transformer	16	Clean process condensate tank

Infrastructure Key (17 - 32)

17	New No.6 ammonia bullet	21	New workshop	25	New concentrator plant	29	New bag store
18	New emergency generator and switchroom	22	New entry security gate	26	New ANS/WANS loadout	30	New AN road bulk loadout and weighbridges
19	New control room	23	New office	27	New first flush pi	31	2x 1.05/1.2t bag lines and 1x 25/40kg bag line
20	New entry	24	New weighbridge	28	New dispatch office and amenities	32	Switchroom

Infrastructure Key (33 - 38)

33	Transformers	39	New FEL workshop and forklift parking	45	Proposed Recycled Water Tank (consistent with existing site approvals)
34	Container bag loading area	40	Transtank		
35	New bulk store	41	Proposed AN# plant		
36	New weighbridge	42	New container storage		
37	New office	43	Nitrogen tie in		
38	New exit security gate	44	New ammonia plant nitrates pump		

Key

- Site boundary
- Existing infrastructure location
- OBL Stage 1A
- OBL Stage 1B
- OBL Stage 2
- NAP4 & ANS
- AN3

Note:
Information derived from Hatch EMA plan HEN2561-0000-00-014-0012 (**05/04/2011**)

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AECOM

APPROVED FACILITY PLAN

Proposed Modification, Greenleaf Road, Kooragang Island

FIGURE 2

3.0 Statutory Assessment

3.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The approved project was declared to be a major project and approval was granted under Part 3A of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) in 2009.

On 1 October 2011, Part 3A of the EP&A Act was repealed. At the same time, savings and transitional arrangements were put in place for projects that are classified as 'transitional Part 3A projects'. A transitional Part 3A project is defined in clause 2 of Schedule 6A of the EP&A Act, which includes projects which were approved prior to the repeal of Part 3A of the EP&A Act. For these types of projects, Part 3A of the EP&A Act (as in force immediately before the repeal of that Part and as modified under Schedule 6A after that repeal) continues to apply.

This project is defined as a transitional Part 3A project as it was approved prior to the repeal of Part 3A of the EP&A Act. As such, any modification to the approval is to be considered under section 75W of the EP&A Act.

Under section 75W of the EP&A Act, a proponent may request that the Minister modify the Project Approval if the project, as modified, would not be consistent with the project as approved.

As the proposed modifications would not be consistent with the existing approval, the Proponent requests that the Minister modify the 2009 Project Approval as outlined in this assessment.

Section 75W(3) of the EP&A Act also states that the Director-General may notify the proponent of environmental assessment requirements. As detailed in **Section 4.1**, DP&I agreed that the original project DGRs would be suitable to use for the proposed modification as applicable.

3.2 Environmental Planning Instruments

3.2.1 Newcastle Local Environmental Plan 2012

The Site is located within the Newcastle City Local Government Area where the relevant Local Environmental Planning instrument is the Newcastle Local Environmental Plan 2012 (LEP 2012). However, the proposed Site is within the boundary of the Three Ports Site as shown on the Newcastle Port Site – Land Zoning Map – LZN 001 and thus falls under the provisions of the *State Environmental Planning Policy (Major Development) 2005* (Major Development SEPP). By virtue of Part 20(4) of Schedule 3 Major Development SEPP, environmental planning instruments other than State Environmental Planning Policies do not apply to the Site as it is located within Three Ports land. Therefore the provisions of the LEP 2012 do not apply to the Site.

Newcastle Development Control Plan

The planning controls within the Newcastle Development Control Plan (DCP) have been reviewed as they relate to the proposed development. Due to the nature of the proposed modification, no specific controls from the DCP apply to the proposal. Regardless, by virtue of Part 20(4) of Schedule 3 Major Development SEPP, the provisions of the DCP do not apply to the proposed modification.

3.2.2 State Environmental Planning Policy (Major Development) 2005

The Major Development SEPP was used to identify developments that were considered to be Major Developments under the EP&A Act before the EP&A Act was amended to remove this definition. However, the approved Facility and any subsequent modifications continue to be assessed and determined under Part 3A transition provisions. The proposed development thus retains its ability to seek modification as a Major Development as originally approved under the Major Development SEPP.

The proposed modification would be in keeping with the characteristics of the site and surrounding land with its historical and current usage as an industrial area.

3.2.3 State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)

SEPP 33 was designed to ensure that sufficient information is provided to consent authorities to determine whether a development is hazardous or offensive. Conditions can then be imposed on the development to reduce or minimise adverse impacts. Any development application for a potentially hazardous development must be supported by a Preliminary Hazard Analysis (PHA).

As the proposed modification is not introducing any new materials or processes to the site, and will be undertaken in a manner which includes appropriate safety systems, it does not constitute an additional hazardous or offensive development that would require further consideration under SEPP 33. Further consideration of project specific hazards and risk is provided in **Section 6.3**.

3.3 Commonwealth Matters

3.3.1 Environment Protection and Biodiversity Conservation Act 1999

In addition to State-based approvals, actions that may significantly affect matters of National Environmental Significance (NES) require assessment and/or approval from the Commonwealth under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. The EPBC Act lists eight matters of NES that must be addressed when assessing the environmental impacts of a proposal.

A review of the potential for the proposed modification to impact on NES matter was undertaken. Due to the proposed location of the tank and flares within the boundaries of the already highly modified site, it is considered highly unlikely that any NES matters would be impacted by the proposed modification. No referral to the Commonwealth Department of Environment is considered necessary.

3.4 Other Approvals Required

Orica's KI facility currently operates under Orica's existing Environmental Protection License (EPL) No. 828.

The proposed modification would not seek to increase annual approved production limits, discharge limits or impact monitoring requirements. However Orica would consult with the Environment Protection Authority regarding the need to license the flares and nitric acid tank stack as discharge points on EPL 828. Subject to approval Orica would prepare a revised premises map to provide new site details to the EPA.

4.0 Consultation

4.1 Department of Planning and Infrastructure

Prior to the preparation of this Environmental Assessment, Orica met with DP&I to discuss the proposed modification and the likely approval path as well as environmental assessment requirements. DP&I confirmed that the proposal could be assessed as a modification to the existing Project Approval (08_0129) and that the Director General Requirements (DGRs) issued for the existing approval could be used to guide the environmental assessment for the proposed modification, as relevant to both the nitric acid tank and Ammonia Flares construction and operation.

The DGRs for Project Approval 08_0129, where relevant to the proposed nitric acid tank and flares have been addressed in this EA is detailed in **Table 5**.

Table 5 Director General's Requirements (08_0129)

Assessment Requirements	Addressed in this EA
General requirements	
An executive summary;	Executive Summary
A detailed description of the following: - historical operations on the site; - existing and approved operations/facilities, including any statutory approvals that apply to these operations/facilities; and - the existing environmental management and monitoring regime.	Section 2.1 and original EA (2009).
A detailed description of the project, including the: - need for the project; - alternatives considered; - likely staging of the project; and - plans of any proposed building works.	Section 2.4 Section 2.5 Section 2.6 Section 2.6
A risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment;	Section 4.0
A detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment (see above), which includes: - a description of the existing environment, using sufficient baseline data; - an assessment of the potential impacts of all stages of the project, including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below); and - a description of the measures that would be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any potentially significant risks to the environment.	Section 5.0 Descriptions of the existing environment, potential project impacts and recommended mitigation measures in relation to each environmental aspect is provided in Section 6.0.
A statement of commitments, outlining all the proposed environmental management and monitoring measures;	Section 8.0
A conclusion justifying the project on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the *Environmental Planning & Assessment Act 1979*;	The social environmental and economic justifications and consistency with the objects of the EP&A Act for the modification are consistent with those presented in Section 19 of the Project EA,

Assessment Requirements	Addressed in this EA
	as applicable. Furthermore the project benefits, in particular the improved risk outcome for the community as described in Section 2.4.
A signed statement from the author of the Environmental Assessment, certifying that the information contained within the document is neither false nor misleading.	Certification page
Hazards	
- A Preliminary Hazard Analysis (PHA) of the project including the combined existing and proposed operations and a detailed assessment of the potential off-site risks; - Details of the receipt, transfer and storage of chemicals on site such as ammonia and ammonium nitrate.	Section 6.3 and Appendix C Section 2.2
Air Quality and Odour	
- An assessment of all air pollutants from all sources during construction and operation and from road, rail and sea transport, including any potential volatile organic compounds, particulates, odour, NO_X, N_2O and NH_3; - Details of all control measures including NO_X and N_2O abatement and start-up venting controls for NO_X and NH_3 for the Nitric Acid Plant; - Cumulative impacts of the proposal in relation to existing and - approved developments in the area.	Section 6.1 addressed as applicable to the proposed modification.
Noise	
Construction, operational and on-site and off-site road, rail and sea transportation noise;	Section 6.2
Soil and Water	
- An assessment of the potential soil, groundwater and surface water impacts including impacts on Newcastle Harbour; - Water supply including options for reuse of process water; - Proposed erosion and sediment controls (during construction) and the proposed stormwater management system (during operation); - An assessment of contaminated groundwater and soils, and acid sulfate soils, and proposed mitigation and management measures; - Potential impacts of flooding, with consideration of climate change and projected sea level rises.	Section 6.5 as applicable to proposed modification. Site contamination assessment details are included in the original EA (2009) and have not been reinvestigated in this EA.
Greenhouse Gas	
Quantitative analysis of the Scope 1 and 2 greenhouse gas emissions of the project and a qualitative analysis of the impacts of these emissions; details of measures to improve energy efficiency.	Section 6.5 as applicable to the proposed modification. No quantitative assessment considered necessary as the proposal primarily relates to increasing storage space and improving the sites risk profile, not increasing or modifying manufacturing.

Assessment Requirements	Addressed in this EA
Transport	
Details of all transport types and impacts on the safety and capacity of the local road network in particular Cormorant Road roundabout and Tourle Street Bridge; details of the site access, internal roads and car parking.	Section 6.5 as applicable to the proposed modification and the original EA (2009).
Waste	
Classification of all potential sources of liquid and non-liquid wastes, quantities, storage, treatment and disposal or re-use.	Section 6.5 as applicable to the proposed modification and the original EA (2009).
Visual	
Impacts on nearest sensitive receivers.	Section 6.4 as applicable to the Ammonia Flares.
Flora and fauna	
Impacts on critical habitats, threatened species or populations or ecological communities and their habitats in the region.	Section 6.5 as applicable to the nitric acid tank.
Heritage	
Aboriginal and non-Aboriginal.	Section 6.5 as applicable to the nitric acid tank.

4.2 Community Consultation

Orica uses the site Community Reference Group (CRG) as a forum to keep the community regularly updated with site activities including project work. A briefing on the AMI project, including describing the function and operation of ammonia flaring, was presented to group on the 26 August 2013. The presentation was also uploaded onto the site's website. Orica will continue to update the CRG, including the broader community regularly during the approval assessment process including at quarterly CRG meetings Scheduled during 2014.

Due to the limited size of this component of the project, no specific community consultation has been undertaken in relation to the proposed Nitric Acid Tank. However following exhibition of this modification application, Orica will provide a briefing to the community Reference Group (CRG) regarding the project.

Orica regularly consults with regulatory authorities regarding site improvement projects and site performance. A specific briefing were held with EPA, WorkCover and Department of Planning during June 2013, regarding progress made to date in implementation of the different stages of the AMI programme.

5.0 Prioritisation of Issues

A risk analysis was completed to rank potential environmental risks associated with the proposed modification.

5.1 Risk Matrix

The prioritisation of issues for the Proposed Project was based on the need to recognise that a higher degree of assessment is required for the issues with the highest severity and greatest possible consequences. **Table 6** shows the issues prioritisation matrix used to identify priorities.

Each issue was given a ranking between one and three for the potential severity of risks and the perceived consequence of those effects if left unmanaged. These two numbers were added together to provide a numerical ranking for the issue that was used to categorise each issue into high, medium and low priorities.

Potential Consequences:

1) Broad scale environmental impact.

2) Regional environmental impact.

3) Local environmental impact.

4) Minor environmental impact.

5) Insignificant environmental impact.

Likelihood of adverse impact:

A) Almost certain.

B) Likely.

C) Possible.

D) Unlikely.

E) Rare.

Table 6 Issues Prioritisation Matrix

	Likelihood of adverse impact					
Potential Consequence		A	B	C	D	E
	1	High	High	Medium	Low	Very Low
	2	High	High	Medium	Low	Very Low
	3	Medium	Medium	Medium	Low	Very Low
	4	Low	Low	Low	Low	Very Low
	5	Very Low	Very Low	Very Low	Very Low	Very Low

5.2 Assessment

The prioritisation of environmental issues related to the Proposed Project is provided in **Table 7**.

This environmental risk analysis prioritises environmental issues in the absence of appropriate safeguard measures to manage environmental effects. This analysis was then used to inform the environmental assessment and the engineering and environmental design of the Project and in the identification of appropriate safeguards.

Table 7 Prioritisation of Environmental Issues

Issue	Potential Environmental Issue	Severity	Consequence	Priority
Air Quality and Odour	Dust and vehicle emissions during construction. Odours and emissions during operation.	3	B	Medium
Noise and Vibration	Construction and operational noise and vibration impacts. Flare noise impacts.	3	C	Medium
Hazards and Risk	Material leaks/spills and interaction with materials and equipment of materials on Orica's or neighbouring sites.	3	C	Medium
Visual	Visual impacts of the proposed flare stacks	3	B	Medium
Soils and water	Erosion, sedimentation and contamination during construction and contamination during operation.	4	C	Low
Greenhouse Gas	Increased emissions from construction plant and electricity required for the modification	4	C	Low
Transport	Construction traffic generation.	4	C	Low
Waste	Waste generated by the construction.	4	B	Low
Flora and fauna	Grass clearing.	4	E	Very Low
Heritage	Impacts to unidentified indigenous or non-indigenous heritage items.	4	E	Very Low

5.3 Final Assessment

In summary, the final prioritisation of issues identified for the Proposed Project is:

Medium:

- Air Quality and Odour;
- Noise and Vibration;
- Hazard and Risk; and
- Visual;

Low:

- Soil and water;
- Greenhouse Gas;
- Transport;
- Waste;

Very Low:

- Flora and fauna; and
- Heritage.

Environmental issues identified as either 'low' or 'very low' have been addressed in **Table 23** in **Section 6.5**.

6.0 Environmental Assessment

6.1 Air Quality

An Air Quality Impact Assessment (AQIA) was prepared to examine potential impacts of the proposed modification. The AQIA provides a quantitative assessment of the predicted air quality impacts associated with the proposed modification. The AQIA is summarised below and attached at **Appendix B**.

Two modelling scenarios were selected for the assessment: routine operations (routine operating conditions at the site with no flaring) and non-routine operations (routine operating conditions at the site with flaring (all three flares operating at once as a conservative measure). Both scenarios include existing background emissions and the addition of scrubber emissions from the proposed nitric acid tank.

6.1.1 Existing Conditions

Air quality in Newcastle is dominated by motor vehicle emissions and major industry located around the port of Newcastle. Nearby industrial facilities likely to be contributing to the existing air quality include Incitec Pivot, Tomago Aluminium, OneSteel, Koppers Coal Tar facility and Cargill grain terminals and seed processing.

The closest residential premises to Orica are located at Stockton, approximately 800 m east of Orica's property boundary. There are also residential properties 1.5 km to the southwest at Carrington and 2 km to the west at Mayfield.

There are a number of industrial facilities on KI and in the neighbouring Mayfield East and Mayfield West. According to the National Pollutant Inventory, the main sources of Oxides of Nitrogen or NO_x (incorporating nitrogen oxide (NO) and Nitrogen dioxide (NO_2)) in the area are Orica, motor vehicles, OneSteel, Koppers and Pacific Carbon. For the purposes of this assessment Oxides of Nitrogen will be measured using NO_2, as all nitric oxides emitted into the atmosphere are eventually oxidised to NO_2.

Orica operates an ambient air quality and meteorological station at Fullerton Street Stockton. The station continuously monitors general air quality as well as wind speed and direction. Air quality parameters measured are dust (PM_{10} and $PM_{2.5}$), NO_x and ammonia (NH_3). The data is publically available at the following web address http://www.stocktonairqualitymonitoring.com/.

A summary of the currently available data for the period October 2012 to August 2013 for NO_2 and NH_3 is provided in **Table 8**.

Table 8 Stockton Monitoring Station Ambient Air Quality Data; October 2012 to August 2013

Parameter	NO_2 (ug/m3)	NH_3 (ug/m3)
Minimum recorded	0	0
Average recorded	15	11
Maximum recorded	91	391
95th Percentile	49	52
70th Percentile	20	8

6.1.2 Potential Impacts

Potential air quality impact may occur during construction as a result of dust and machinery emission. Due to the natural of the project most works will be limited to existing hardstand areas minimise the potential for dust generation. Emissions from plant and machinery would be temporary in nature and are not deemed significant in the context of the wider industrial and transport operations on and around KI.

Potential air quality impacts during the operation of the proposed modification may occur from the importation and transfer of nitric acid in to the proposed nitric acid tank and from the operation of the proposed ammonia flares. Therefore the pollutants of interest are:

- Oxides of nitrogen (NO_x) (to be measured as nitrogen dioxide or NO_2); and
- Ammonia (NH_3).

Section 3.0 of the AQIA (**Appendix B**) provides a detailed review of the modelling inputs and parameters used to examine the potential air quality impacts of the proposed modification. A brief summary is provided below.

Assessment Methodology

In order to model the potential impacts of the proposed modification, Ausplume modelling software was used in accordance with the *Approved Methods for Modelling and Assessment of Air Pollutants published by NSW EPA (DEC, 2005).* This document prescribes calculation methods to account for terrain effects, building wake effects, horizontal and vertical dispersion curves, buoyancy effects, surface roughness, plume rise, wind speed categories and wind profile exponents. Six categories of input data were required for input into the air model:

- Meteorology;
- Terrain effects;
- Building wake effects;
- Modelling scenarios;
- Source characteristics; and
- Emissions inventory.

Full details of all model inputs are described in Section 3.0 of the AQIA.

Assessment Criteria

Facility Assessment

Based on the existing air quality of the site (**Table 8**), project specific air quality criteria were derived in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW DEC, 2005). These criteria apply to the air impacts from the facility alone (isolation) and the combined impacts of the facility and background values (cumulative). The project specific assessment criteria are presented in **Table 9**.

Table 9 Air Quality Impact Assessment Criteria

Air Emission	Averaging Period	Regulatory Limit (µg/m^3)	Assessment Percentile
Nitrogen Dioxide (NO_2)	1 hour	246	100th
	Annual	62	100th
NH_3	1 hour	330	99.9th

Cumulative Assessment Input - Incitec Pivot Limited

Cumulative assessments seek to look more broadly at how the predicted impacts of a proposed modification interact with the impacts of the surrounding industries both current and proposed. For a cumulative assessment the background air quality accounts for the existing industries, however this does not account for any known future or proposed development.

Orica is not the sole emitter of the pollutants of concern in the vicinity of KI. Incitec Pivot Limited (IPL) has previously submitted an application to the Department of Planning and Infrastructure for the expansion of its ammonium nitrate facility which adjoins the Orica site to the immediate north. An assessment of the potential cumulative impacts of the proposed IPL facility and Orica's proposed modification was undertaken. However we do note that publically available information (i.e. local media) suggests that the IPL expansion project is not expected to proceed.

A review of IPL's environmental assessment documentation (URS, 2012) predicted impacts for both routine and non-routine operations of the existing facility and expansion. The results of the routine (normal plant) operations have been used in this assessment of cumulative air quality assessments as routine operation is the most likely scenario when a flaring event may be happening at the Orica site.

The IPL incremental data (IPL site operations alone) has been used in the assessment. By doing this the current impacts from the IPL site would be double counted as part of the background values resulting in conservative results for this current assessment. A summary of the maximum IPL routine incremental impacts at a discrete

receptor are presented in **Table 10**. Theses have been incorporated into the impact assessment results and reported as part of this cumulative assessment.

Table 10 Predicted IPL Routine Discrete Receptor Results (from URS 2012)

Pollutant	1 Hour Impact (µg/m3)	Annual Average Impact (µg/m3)
NO_2	25	0.4
NH_3	1.2	NA

Impact Assessment

Nitrogen Dioxide (NO_2)

The Ausplume model produced maximum predicted ground level concentrations of NO_2 for the 1 hour average and annual average. These are presented in **Table 11** and **Table 12** respectively. The impact from the facility alone (incremental) and cumulatively with the Stockton monitoring data and IPL impact are provided.

Table 11 Maximum Sensitive Receptor 1 Hour Average Predicted Ground Level Concentrations – NO_2

Scenario	1 Hour Maximum NO_2 (µg/m^3)			
	Orica Incremental	Stockton Background	IPL Routine Impact	Cumulative
1 – Routine Operations	91	49	25	165
2 – Non-routine operations	130	49	25	204
Criteria	**246**			

The 1 hour average NO_2 results for both the routine and non-routine (with flaring) operations are predicted to meet the NSW EPA criterion. The highest predicted NO_2 1 hour average concentrations occurred at industrial receptors on KI located in proximity to the Orica site.

Table 12 Maximum Annual Average Predicted Ground Level Concentrations – NO_2

Scenario	Annual Maximum NO_2 (µg/m^3)			
	Orica Incremental	Stockton Background	IPL Routine Impact	Cumulative
1 – Routine Operations	7	15	0.4	22
2 – Non-routine operations	9	15	0.4	24
Criteria	**62**			

The annual average NO_2 results for both the routine and non-routine (with flaring) operations are also predicted to meet the NSW EPA criterion. The highest predicted cumulative NO_2 annual average concentrations occurred at industrial receptors on KI located in proximity to the Orica site.

Ammonia (NH_3)

The maximum predicted sensitive receptor ground level concentrations of NH_3 for the 1 hour average are presented in **Table 13**. The impact from the facility alone (incremental) and cumulatively with the Stockton monitoring data and IPL impact are provided.

Table 13 Maximum Sensitive Receptor 1 Hour Predicted Ground Level Concentrations – NH_3

Scenario	1 Hour Maximum NH_3 ($\mu g/m^3$)			
	Incremental	Stockton Background	IPL Routine Impact	Cumulative
1 – Routine Operations	58	52	1.2	111
2 – Non-routine operations	91	52	1.2	144
Criteria	**330**			

The 1 hour average NH_3 results for both the routine and non-routine (with flaring) operations are predicted to meet the NSW EPA criterion. The highest predicted NH_3 1 hour average concentrations occurred at industrial receptors on KI located in proximity to the Orica site.

6.1.3 Conclusion and Environmental Safeguards

Based on a review of previous AQIA's undertaken for the Orica KI site against the proposed modification, it is unlikely there would be any significant impacts from either NO_X or NH_3 emissions associated with the proposed modification.

Two modelling scenarios were selected for the assessment: routine operations (routine operating conditions at the site with no flaring) and non-routine operations (routine operating conditions at the site with flaring (all three flares operating at once)). Both scenarios include the addition of NOx scrubber emissions from the 10,000 t NA tank.

This flaring non-routine operations scenario is considered highly conservative due to the following:

- It is unlikely that the plant will remain running at full operational capacity if the flaring event occurs;
- The three flares are for separate operational sections of the site and are unlikely to be utilised or required at the same time; and
- It is expected that a flaring event would only occur under exceptional circumstances, with a predicted occurrence frequency of once every two years.

The 1 hour average NO_2 and NH_3 results for both the routine and non-routine (with flaring) operations are predicted to meet the NSW EPA criteria.

The annual average NO_2 and NH_3 results for both the routine and non-routine (with flaring) operations are predicted to meet the NSW EPA criteria.

6.2 Noise

A Noise Impact Assessment (NIA) was prepared to assess the potential noise impacts of the construction and operation of the proposed modification. The NIA is summarised below and attached at **Appendix C**.

6.2.1 Existing Conditions

The existing noise environment surrounding the site is dominated by industrial operations and land uses on KI. The closest residential premises to Orica are located at Stockton, approximately 800 m east of Orica's property boundary. There are also residential properties 1.5 km to the southwest at Carrington and 2 km to the west at Mayfield.

The nearest residential receiver (R1) in proximity to the study area is located approximately 800 metres to the east of the Orica site boundary. Other nearby receivers have been selected to demonstrate the noise contribution due to the proposed modification. These receivers are presented in **Table 14** and shown on **Plate 1**.

Table 14 Receiver locations assessed within this report

ID	Address	Type	Distance from site boundary
R1	284 Fullerton Road, Stockton	Residential - Suburban	750 m
R2	218 Fullerton Road, Stockton	Residential - Suburban	730 m
R3	38 Elizabeth Street, Carrington	Residential - Urban	1080 m
I1	39 Heron Road, Kooragang Island	Industrial	Adjacent

Plate 1 Receiver Locations

In order to determine background noise levels associated with the operation of the Orica facility, previous noise assessments undertaken by Atkins Acoustics (2013) and Wilkinson Murray (2010) have been reviewed. These assessments included both attended and unattended noise measurements. **Table 15** details the existing site noise levels, based on the findings of these previous noise assessments, at the identified receivers. This includes noise contributions from Orica's existing operations.

Table 15 Logged Noise Levels, attended noise measurements and observations

ID	Measurement location	Night			Comments
		RBL* L_{A90}	Ambient L_{Aeq}	Orica Site contribution L_{Aeq}	
R1	284 Fullerton Road, Stockton	45	54	50	Stockton Beach Surf Ammonia Plant Pumps and Converter Valves General industrial noise Intermittent passing road traffic
R2	218 Fullerton Road, Stockton	49	53	53	
R3	38 Elizabeth Street, Carrington	39	40	39	Industrial noise in the direction of the Orica plant Passing heavy road traffic
I1	39 Heron Road, Kooragang Island	56	61	56	Ammonia plant Ammonia plant pipe noise (convertor valves) Pumps (500 Hz) Steam pipes

**RBL= Rating Background Level*

6.2.2 Potential Impacts

Construction Noise

Construction plant and machinery has the potential to generate noise impacts that are audible at the receivers. In order to examine the potential impact of this construction noise, an assessment was made of the existing noise environment to determine background noise levels.

Construction Noise Management Levels - Construction Noise Criteria

Utilising the methodology for calculating Noise Management Levels (NML) as described in Table 2 of the *Interim Construction Noise Guidelines* (ICNG) (OEH, 2009), the construction NMLs detailed in **Table 16** have been determined for the proposed modification based on the existing noise conditions at the identified receivers as detailed in **Table 15**.

Table 16 Construction noise management levels (NML) – Residential receivers

Residential receivers	Recommended standard hours RBL[1] dB(A[2])	Recommended standard hours NML[1], $L_{Aeq, 15min}$ dB(A)
R1	50	60
R2	47	57
R3	44	54
	NML, $L_{Aeq,15min}$ (applies when properties are being used)	
I1	External noise level 75 dB(A)	

1 Calculated in accordance with Section 2.2 of Appendix C.

2 Refer Appendix A of Appendix C.

Construction Noise Impact Assessment

Using the NMLs listed in **Table 16** modelling was undertaken of the likely noise output from typical construction plant and machinery that could be used during the construction scenarios. Full details of the modelling can be found in Section 5.0 of the NIA. The results of the construction noise assessment modelling are detailed in **Table 17**.

Table 17 Construction noise assessment results

Receiver	Noise management level $L_{Aeq\ (15min)}$, dB(A)	Predicted noise level $L_{Aeq,15min}$, dB(A)	Exceedance dB(A)
		Neutral weather	Neutral weather
Nitric Acid Tank			
R1	60	37	-
R2	57	38	-
R3	54	36	-
I1	75	55	-
Flare A – Nitrates Flare			
R1	60	41	-
R2	57	43	-
R3	54	34	-
I1	75	46	-
Flare B – Ammonia Storage Tank Flare			
R1	60	38	-
R2	57	38	-
R3	54	33	-
I1	75	60	-
Flare C – Ammonia Plant Flare			
R1	60	39	-
R2	57	39	-
R3	54	32	-
I1	75	61	-
Cumulative Noise Levels			
R1	60	45	-
R2	57	49	-
R3	54	47	-
I1	75	64	-

Based on the modelling outcomes, it was concluded that no exceedances of the project specific NMLs are expected to occur as a result of the construction works associated with the proposed modification.

While construction works involving both the nitric acid tank and the flares are not expected to occur simultaneously, and would be staged where possible to minimise noise impacts, an assessment of the potential cumulative noise impacts was also undertaken. As detail in **Table 17** no exceedance of the project specific NMLs is expected to occur as a result of cumulative construction noise should concurrent construction of either the flares or nitric acid tank occur.

Construction would be undertaken during recommended standard hours in accordance with Condition 22 of the Project Approval. Therefore the impacts of construction activities out-of-hours and on sleep disturbance do not need to be assessed.

Section 6.5 of the NIA also includes an assessment of the potential construction traffic noise impacts. This assessment concluded that construction traffic is likely to result in less than a 2dB(A) increase to the existing traffic noise on the local road network. Construction traffic noise would therefore result in a negligible impact.

Operational Noise

Operational Noise Criteria

Operational noise criteria for the Orica facility have been derived pursuant to Conditions 30 – 32 of the Project Approval as described in Section 3.1 of the NIA, with Orica having undertaken a noise verification program as per Condition 31.

Based on night-time attended noise measurements, the project specific operational noise limits as shown in **Table 19** are applicable to the proposed modification. The proposed modification will be assessed against the most conservative night-time criteria, thus verifying compliance with the less stringent day and evening noise levels.

Table 18 Project specific noise limits for assessment receivers

ID	Assessment receiver address	Noise limits, $L_{Aeq,\ 15\ minute}$
		Night
R1	284 Fullerton Road (Residential)	40
R2	218 Fullerton Road (Residential)	43
R3	38 Elizabeth Street, Carrington	29
I1	39 Heron Road, Kooragang Island	70

Nitric Acid Tank

The potential noise source during operation of the nitric acid tank would be the operation of a pump used to move nitric acid out of the tank and around the facility. The pump may operate at any time of the day or night as required by operations.

Orica's proposed pump for the NA tank has a Sound Power Level (SPL) of 82dB(A) at 1m. A pump of 90dB(A) was modelled to add a level of conservatism when determining operational noise impacts

The modelling incorporated the existing background noise levels which include the noise contribution of the existing Orica operations. Meteorological parameters were also used in the model to determine noise impacts during average and adverse meteorological conditions. The results of the operational noise modelling for the most stringent night time criteria are shown in **Table 19**.

Table 19 Normal Operation Assessment Results

ID	Location	Type	Criteria, $L_{Aeq\ (15min)}$, dB(A)	Predicted Noise Level $L_{Aeq,15min}$, dB(A)		Exceedance, dB(A)	
				Neutral Met[1]	Adverse Met[2]	Neutral Met[1]	Adverse Met[2]
Night Period							
R1	284 Fullerton Road, Stockton	Residential	40	23	30	-	-
R2	218 Fullerton Road, Stockton	Residential	43	24	30	-	-
R3	38 Elizabeth Street, Carrington	Residential	29	21	28	-	-
I1	39 Heron Road, Kooragang Island	Industrial	70	38	40	-	-

1) Neutral Meteorology = stable or average conditions.

2) Adverse Meteorology = conditions which may trap or increase noise at receiver's (i.e. temperature inversion).

The results of the operational noise model indicate that the proposed tank pump would meet the night time noise criteria for the nearest sensitive receivers. As the day and evening criteria are higher than the night-time level, the pumps would also meet the day and evening criteria.

Ammonia Flares

In the event that the flares become operational, gas flares would activate to burn the released ammonia and relieve pressure build up in the ammonia distribution system. Flare noise associated with the proposed flares is derived from three sources:

i) Relief valve;

ii) The vent gas exit velocity at the stack;

iii) Combustion noise from the reaction between the vent gas, oxygen and ammonia.

These potential sound sources and the SPLs that they equate to are detailed in Table 16 of the NIA. The SPLs for these sources have been incorporated into the operational noise model for the flares.

It is highly unlikely the three flares would be activated simultaneously as each of the three flare systems operate independently of another and thus activation of one does not lend itself to increase the chances of another being activated. Despite this both individual and simultaneous flare operation was assessed to determine the likely and worst case noise impacts of the flares.

Modelling of potential noise impacts was undertaken using the SPLs for the noise sources associated with the operation of the flares. The $L_{Aeq\ 15\ minutes}$ noise levels due to operation of the three ammonia flares are presented in **Table 20**.

A 5 dB addition, in accordance with the INP, was added to the final predicted noise levels due to the potentially impulsive (short lived or sudden) nature of the pressure relief valve. This 5 dB is included in **Table 20**.

Table 20 Operational Flare Assessment Results

ID	Type	Night Time Noise Criteria $L_{Aeq,15\ minute}$, dB(A)[1]	Predicted Noise Level $L_{Aeq,15\ minute}$, dB(A)		Exceedance, dB(A)	
			Neutral Met*	Adverse Met*	Neutral Met*	Adverse Met*
Flare A – Nitrates Flare						
R1	Residential	58	53	57	-	-
R2	Residential	56	54	59	-	3
R3	Residential	49	45	50	-	1
I1	Industrial	75	58	61	-	-
Flare B – Ammonia Storage Tank Flare						
R1	Residential	53	49	54	-	1
R2	Residential	51	49	54	-	3
R3	Residential	44	44	49	-	5
I1	Industrial	75	71	73	-	-
Flare C – Ammonia Plant Flare						
R1	Residential	58	57	62	-	4
R2	Residential	56	57	62	1	6
R3	Residential	49	51	55	2	6
I1	Industrial	75	80	81	5	6
Cumulative Noise Levels (all three flares simultaneously)						
R1	Residential	58	59	64	1	6
R2	Residential	56	59	64	3	8
R3	Residential	49	53	57	4	8
I1	Industrial	75	81	82	6	7

1) *Night-time noise criteria calculated in accordance with Section 3.2 of Appendix C.*

The results of the operation of the flares can be summarised as:

Flare A

- Noise levels are expected to comply during both neutral wind and adverse weather conditions with R1 and R2 experiencing minor 1 dB(A) and 3 dB(A) exceedances respectively.

Flare B

- Flare B, which could operate for a duration of a few seconds up to several weeks, complies with the noise limits for all receivers during neutral weather conditions.
- R1 and R2 may exceed by 1-3 dB(A) during adverse weather conditions. A level of 2 dB(A) is considered barely perceptible to the human ear and therefore is considered marginally acceptable.
- R3 may exceed by 5 dB(A) during adverse weather conditions. The predicted noise level is 49 dB(A) during these adverse weather conditions, which will result in an approximate internal noise level of 39 dB(A) with windows open and 29 dB(A) with windows closed. These levels are within the acceptable ranges of noise level for bedrooms located near major roadways, according to '*Australian Standard 2107:2001 – Recommended design noise levels for internal noise levels and reverberation times for building interiors'*.

Flare C

- During neutral weather conditions noise levels experienced by the industrial receiver are likely to exceed by 5 dB(A) and residential receivers R2 and R3 are likely to exceed by 1 dB(A) and 2dB(A) respectively. These exceedances at R2 and R3 would be barely perceptible to the human ear.
- During adverse weather conditions, receivers R1 exceeds by 4 dB(A) and R2, R3 and I1 exceed by 6 dB(A).
- It should be noted that the flare C will only operate for a period of 5 minutes, and thus the receiver will only experience the noise level quoted for this period.
- The emergency use of the flare is predicted to occur once in every two years.
- It should also be noted that these noise levels were assessed against a night time RBL. The emergency flare systems have the equal potential to activate within the day, evening or night.

Cumulative Impact

- The noise levels demonstrate the highly unlikely worst case scenario with all three flares being activated simultaneously.
- The noise impact of all three flares operating simultaneously would be 1-2 dB(A) higher than that of the Flare C activated by itself, for both neutral and adverse weather conditions.
- These noise levels would only be experienced by receivers for a period less than 15 mins – after this period of 15 mins, flares A and C will cease operation and the remaining noise contribution of the flares would be solely due to Flare B. Flare B has been shown to be generally compliant with the noise criteria.
- The likelihood of this occurrence is extremely low considering the frequency of operation and duration at which the flares are activated.

The modelling results show that the night-time non-routine operation of the three flares would generally comply with the criteria during neutral meteorological conditions at the sensitive residential locations, with only a small number of minor exceedances and an exceedance of 5dB(A) – 6dB(A) only occurring during adverse weather conditions. This is a conservative comparison as the flares have the equal potential to operate during the day and evening to the night. Therefore the overall cumulative operational noise impact of the flares is expected to be low.

Sleep Disturbance

A sleep disturbance assessment was conducted to predict the impact to receivers. The results of this assessment are detailed in **Table 21**.

Table 21 Sleep disturbance results

ID	Type	Criteria $L_{A1,1min}$ dB(A)	Predicted noise Level $L_{A1,1min}$ dB(A)		Exceedance, dB(A)	
			Neutral Met*	Adverse Met*	Neutral Met*	Adverse Met*
Flare A						
R1	Residential	65	66	70	1	5
R2	Residential	65	67	72	2	7
R3	Residential	65	58	63	-	-
Flare B						
R1	Residential	65	57	62	-	-
R2	Residential	65	57	62	-	-
R3	Residential	65	52	57	-	-
Flare C						
R1	Residential	65	70	75	5	10
R2	Residential	65	70	75	5	10
R3	Residential	65	64	68	-	3

The sleep disturbance findings can be summarised as:

- The sleep disturbance assessment reveals that the criterion will be triggered due to flares A and C. Both flares are expected to operate for a period of 5 minutes each, approximately every two years.
- Flare A only exceeds the criteria during neutral weather conditions by 2 dB(A), which is a minor exceedance and generally not discernible. Under adverse conditions this exceedance would be 5 dB(A) and 7dB(A) for receiver's R1 and R2 respectively.
- It should also be noted that these noise levels were assessed against a night time RBL. The emergency flare systems have equal potential to activate within the day, evening or night.
- Flare B, which operates for a significantly longer period of time, is not expected to trigger awakening reactions and thus disturb the sleep of receivers indoors.
- Flare C may experiences exceedances of up to 10 dB(A) under adverse meteorological conditions. Due to this being assessed as the worst case scenario, the short lived nature of the noise source and the additional attenuation provided by a dwelling, it is unlikely such an exceedance would occur.

The flares will operate at a significantly lower flow rate during maintenance and thus are deemed to comply. Flares should be tested during the day to reduce the noise impact on nearby receivers.

6.2.3 Conclusion and Environmental Safeguards

Typical construction scenarios have been assessed against the requirements of the ICNG. The construction noise assessment demonstrated that the criteria would be met at all assessed receivers, which included residential and industrial receivers.

Noise generated from light and heavy construction traffic due to the modification of the plant was assessed. It was found that noise caused by these vehicles will not increase road noise levels by more than 2 dB and hence will comply with the established Road Noise Policy criteria.

The operation of the nitric acid tank pump was assessed against the criteria prescribed by the Project Approval 08_0129. The assessment demonstrated that the noise at all assessed receivers complied against the operational noise criteria.

The assessment demonstrates that the use of the flares generally complies with the noise limits under neutral meteorological conditions. Operation of Flare C, which would operate for a short period of time, was found to cause minor noise exceedances (0-2 dB(A)) at receiver locations during neutral weather conditions. Noise levels are predicted to exceed noise criteria by up to 6 dB(A) during adverse weather conditions during the operation of Flare C. However, due to the infrequent use Flare C, the short duration it operates and the safety function for which the flares serves, these exceedances are deemed to be acceptable.

In the extremely unlikely event that all three flares would operate simultaneously, the noise impacts would be 1-2 dB(A) higher than that of the Flare C activated by itself, for both neutral and adverse weather conditions. These noise levels would only be experienced by the receivers for a period less than 15 mins – after this period of 15 mins, flares A and C would cease operation and the remaining noise contribution of the flares would be solely due to Flare B. Flare B has been shown to be generally compliant with the noise criteria.

Flare A was found to comply with the criteria set for all receivers during neutral meteorological conditions. During adverse conditions, noise levels would exceed the criteria at R2 and R3 by 3 and 1 dB(A) respectively during adverse meteorological conditions. Flare B complied with the criteria during neutral weather conditions at all receiver locations and had marginal exceedances of between 1 and 5 dB(A) during adverse weather conditions at receivers R1, R2 and R3..

The sleep disturbance assessment revealed that Flare B, which would operate for a long term, complied at all receiver locations and weather conditions. Flares A and C were found to trigger the sleep disturbance criteria , however exceedances were considered acceptable owing to the short duration of operation (expected to be 15 minutes) and the frequency at which these flares would be activated (two yearly intervals).

It is recommended that where possible nearby (e.g. scheduled maintenance flaring or testing) potentially affected receivers are kept informed of likely times of flaring through Orica's website and through the provision of regular updates to the KI Community Reference Group. Orica's community hotline (1800 789 044) is also available for community member to obtain information or raise concerns.

In order to manage construction and operational noise the following measure would be applied during the project:

- All construction works would be undertaken during hours as specified by Condition 33 of the Project Approval;
- All reasonable and feasible construction noise mitigation measures would be implemented during construction to minimise noise impacts;
- The final pump specification would comply with a Sound Power Level of 82dB(A) at 1m; and
- Maintenance and testing of the flare would be limited to standard working hours.

6.3 Hazard and Risk

The existing site Preliminary Hazard Analysis (PHA) was prepared by GHD in 2009 as part of the approval for upgrades and expansions of the Orica facility as part of DA 08_0129. GHD has undertaken further assessment of the potential hazards associated with the proposed ammonia flares by undertaking an update of this PHA. The outcomes of this assessment are summarised below. The GHD PHA is attached at **Appendix D**.

In relation to the proposed nitric acid tank Pinnacle Risk Management (PRM) has prepared a standalone PHA to assess the potential hazards and risk associated with the operation of the proposed 10,000t nitric acid tank. This is attached at **Appendix E**.

6.3.1 Existing Conditions

The PHA (GHD 2009) for the expansion of the KI facility was undertaken in accordance with DP&I's Hazardous Industry Planning Advisory Papers (HIPAP) No 6 – *Guidelines for Hazard Analysis.* The PHA determined the development was "hazardous" under the State Environment Planning Policy No. 33 (SEPP 33) and provides recommendations that allowed risk to be managed to acceptable levels. The PHA found that the risks associated with the plant as proposed at the time complied with all risk criteria for individual fatality, injury, irritation and societal risk in accordance with the requirements of HIPAP 4.

A further PHA update was undertaken by GHD in April 2011 to check the consistency of the then modifications to the site layout with the hazard analysis undertaken for the existing site in the 2009 PHA, and to ensure that HIPAP No. 4 criteria would continue be met. The new risk contours incorporating the revised plant and equipment layout complied with all of the risk criteria given in HIPAP No. 4.

In summary all existing plant and equipment within the Orica site is deemed to operate in accordance with the necessary hazard and risk requirements.

6.3.2 Potential Impacts

Ammonia Flares

As described in **Section 2.0** Orica has undertaken a review of alternative ammonia treatment options for large non-routine release scenario's at the site. The review identified that a flaring system is the preferred option. The flares will provide the site with a final layer of ammonia treatment capability, with the three new ammonia flares being able to thermally oxidise ammonia released from relief valves located in the Ammonia Plant, Nitrates and Ammonia Storage tank areas. In order to examine the potential risks associated with the proposed flares Orica engaged GHD to update the site's existing PHA. This includes updating the risk model and the associated documentation to accurately reflect the proposed changes associated with the proposed flares.

The PHA (GHD 2013) revision was undertaken in accordance with the Hazardous Industry Planning Advisory Paper No. 4 (HIPAP 4) and examined the risks associated with the following scenarios:

- The individual fatality risk (IFR);
- Societal risk;
- Toxic Injury and Irritation risk;
- Thermal radiation; and
- Ammonium nitrate explosion overpressure (injury and property damage and accident propagation).

The results presented in the PHA (GHD 2013) include the results of the previous modifications assessment for the above scenarios.

The results from GHD (2013) have shown that with the proposed ammonia flares incorporated into the existing operations of the site there would not be a significant increase in the levels of risk associated with the facility. Importantly all risk contours remain outside residential areas.

Nitric Acid Tank

PRM (2013) undertook a separate assessment of the risk associated with the proposed nitric acid tank. Again the assessment was undertaken in accordance with the relevant HIPAP guidelines. The following scenarios where assessed as part of the PRM PHA:

- Nitric acid spill – safety and health risk;

- Pipe failures;
- Nitric acid tank overflow;
- Nitric acid tank failure;
- Scrubber failure pump failures;
- Assessment of risk to the biophysical environment;
- Cumulative risk; and
- Societal risk.

The results of the PRM PHA show that the risks associated with the proposed nitric acid tank and associated systems comply with the DP&I guidelines for tolerable fatality, injury, irritation and societal risk. Also, risks to the biophysical environment, the risk of propagation and the impact on cumulative risk in the Kooragang Island area from releases are acceptable.

It is noted that previous hazard assessments (GHD, 2009) have taken into consideration risks associated with the nitric acid transfer pipeline that will connect to the proposed tank to allow for importation of nitric acid. This infrastructure was also found to be designed with the necessary HIPAP criteria.

Cumulative Risk

Both GHD (2013) and PRM (2013) included assessment of cumulative risks of each of the flaring components and nitric acid tank against the existing background conditions. These cumulative risk assessments concluded that risks are within acceptable limits. Furthermore, as each component of the proposed modification is for separate systems within the site, an event in one element would not result in an overall increased risk from the other.

6.3.3 Conclusion and Environmental Safeguards

The risks associated with the proposed ammonia flares, nitric acid tank and associated systems at the Orica Kooragang Island have been assessed and compared against the DP&I risk criteria.

In relation to the proposed ammonia flares, GHD (2013) has shown that the site risk results for the proposed flares would not change significantly from the existing base case. The risks associated with the Orica facility operating the proposed flares would continue to comply with HIPAP 4 risk criteria for “intensification of hazardous activities in an existing complex”. Risk contours were shown to not encroach into residential areas and the cumulative risks remain acceptable.

In relation to the nitric acid tank, PRM (2013) concluded that the risks associated with the proposed nitric acid tank and systems comply with the DP&I guidelines and that risks are acceptable provided the following recommendations are implemented:

- Include the tank level instrumentation in a Layers of Protection Analysis (or similar) to determine the required level of reliability to reduce the risk of tank overflow to an acceptable level;
- Perform a Layers of Protection Analysis (or similar) during the design phase of the project to ensure the risk of liquid releases to the environment is acceptable. Preferably, the bund sump pump system should be designed using the principles of inherent safety, i.e. design out the hazard. For example to prevent an accidental release of nitric acid due to pipe and pumping arrangements.
- Perform a HAZOP study and a construction safety study on the proposed changes; and
- Update the existing safety management system, including the emergency response plan, for the proposed new tank and equipment.

6.4 Visual Impacts

A Visual Impact Assessment (VIA) was undertaken to examine the potential impacts of the proposed modification. The VIA assessed the existing visual catchment, identified potential sensitive receivers and assesses the potential visual impact of the proposed modification on those receivers. The VIA is attached at **Appendix F**.

6.4.1 Existing Conditions

The area surrounding the site is predominantly heavy industrial, chemical plants, and port related activities. The nearest residential area is Stockton. The closest residential homes are located approximately 800 metres from the site, on the opposite side of the north arm of the Hunter River.

The overall character in the area immediately surrounding the site is industrial with a range of industrial operations being undertaken on KI, dominated by coal loading facilities located to the north west of Orica's site. In the vicinity there are heavy trucks using Cormorant Road to the northwest; freight ships passing along the Hunter River, and loading and unloading activities occurring on KI to the west.

Access to the Orica site is via Greenleaf Road from Heron Road and Cormorant Road. Do to the sites location on a peninsular of the island, traffic does not pass the site frontage directly. Due to the presence of other industrial operations and buildings the site is mostly out of view for commuters traveling along Cormorant Road. The exception to this is for commuters when traveling over the Stockton Bridge, the height of which allows visibility of the Orica site. Due to the height of the bridge however the site does not dominate views from this vantage point.

The nearest sensitive visual receivers to the site are located at Stockton, approximately 800m to the east of the site. For the purposes of this assessment two sensitive receivers have been identified on Stockton as;

- Receiver S1 – In proximity to the Fullerton St – Griffith St intersection, Stockton; and
- Receiver S2 – In proximity to the Fullerton St – Hereford St intersection.

A photo record of these locations is provided in Section 4.0 of the VIA.

6.4.2 Potential Impacts

The proposed modification involves the construction of 3 flare stacks and a nitric acid tank. Ancillary works would also require piping and connection of electrical control, safety and security systems. These ancillary works would be located at ground level and would not be visible offsite due to shielding from existing plant. Therefore the potentially visible elements of the proposal would be the flare stacks and nitric acid tanks as detailed in **Table 22**.

Table 22 Proposed Infrastructure Heights

Flare / Tank	Approximate Height* (m)
Ammonia Plant Flare	20
Ammonia Storage Tank	5
Nitrates Plants	8
Nitric Acid Tank	25

**above existing ground level.*

The appearance of the proposed infrastructure consists primarily of painted metals consistent with the existing plant and stacks on the site. The nitric acid tack would be stainless steel.

In order to determine the potential impacts of the flare stacks and nitric acid tanks as a result of their size and appearance, a series of artist's impressions were prepared for receivers S1 and S2. These are presented in the VIA.

These artists' impressions indicated that:

- The flare stacks would have a negligible visual impact due to:
  - The size of the smaller stacks not protruding above other site infrastructure; and
  - The large (ammonia plant flare) stack would be lower than other existing stacks onsite and be silhouetted against existing stacks from the receiver locations limiting visual impacts.

- The nitric acid tank would have a low visual impacts as:
    - It will be partly visible where it extends above the existing plant and the vegetated screen that extends along the eastern boundary of the site; and
    - While it may be visible, due to the offset distances to receivers the tank is not of a scale that produces a significant visual impact; and
    - The appearance of the tank would be consistent with existing tanks on KI.

6.4.3 Conclusion and Environmental Safeguards

The proposed modification represents development associated with an existing industrial operation that is consistent with the historical land uses of the site and surrounding area. Although having only a small development footprint and being located wholly with the existing Orica site, the heights of the proposed infrastructure have potential to cause visual impacts to nearby residents.

The assessment of the potential visual impacts of the project concludes that overall, a low level of visual impact is expected to occur, due to:

- The scale of the proposed flares and their shielding by existing site infrastructure;
- The shielding of much of the nitric acid tank by existing plant and vegetation;
- The project being consistent with the industrial context of the site and surrounding land;
- The offset distances between the site and the sensitive receivers; and
- The anticipated limited use of the flaring, and short duration of flaring events.

The project would be compatible with the surrounding industrial development along the Hunter River, and is consistent with the nature of the port infrastructure. The appearance of the project would fit well within the existing industrial landscape of the area.

Despite this it is recommended that the following measures be implemented to minimise ongoing visual impacts:

- All lighting design should be undertaken in accordance with *AS 4282(INT)-Control of Obtrusive Effects of Outdoor Lighting*;
- All infrastructure, would be maintained to a high standard and appearance with a focus on the external skin of the nitric acid tank; and
- The existing landscaping and vegetation screens of the Orica site be subject to ongoing upkeep to maintain the effectiveness of the vegetated screen, while not impaction on security concerns.

6.5 Other Environmental Issues

A number of other environmental factors require assessment in relation to the proposed modification. **Table 23** provides a summary of other environmental aspects that have been considered for the proposed modification.

Table 23 Other Environmental Issues

Issue	Summary of Potential Impact
Soil and Water	The proposed modification would result in a minor increase in hardstand area on the site and therefore some additional runoff. Runoff from impacted areas would drain to the existing site water management systems. Water for use in the various project elements will be sourced from existing site supplies. Notably Orica is reducing its dependency on potable water supplies through the use of recycled water as described in **Section 2.7**. Mitigation measures outlined in the 2009 EA would be used to manage potential soil and water impacts during construction and operation. This includes a review of stormwater management during the detailed design phase. All safeguards outlined in the 2009 EA regarding potentially contaminated soil or groundwater would be applicable to the proposed modification.
Greenhouse Gas	Greenhouse gases (GHGs) are gases found in the atmosphere that absorb outgoing heat that is reflected from the sun. The primary GHG is carbon dioxide (CO_2). Different GHGs have different heat absorbing capacities. In order to achieve a basic unit of measurement, each GHG is compared to the absorptive capacity of CO_2, and measurements and estimates of GHG levels are reported in terms of CO_2 equivalent emissions (CO_2-e). Estimation of the GHG emissions associated with the proposed modification operations was undertaken using the emission factors and methods outlined in the National Greenhouse Accounts (NGA) Factors[1]. The NGA Factors provide three types of assessment categories: - **Scope (1)**, which covers direct emissions from sources within the boundary of an organisation, such as fuel combustion and manufacturing processes; - **Scope (2)**, which covers indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation; and - **Scope (3)**, which includes all other indirect emissions that are a consequence of an organisation's activities but are not from sources owned or controlled by the organisation; that is, emissions associated with the production or consumption of fuels, and emissions associated with the transmission and distribution of purchased electricity. The main operations likely to generate GHGs at the proposed terminal are electricity consumption to run pumps, flaring, shipping and plant lighting (Scopes 2 and 3). Overall the proposed modification would have minor impacts in regards to GHG generation.
Transport	Transport of construction personnel and equipment would be required throughout the construction phase. Construction traffic is expected to generate approximately: - 5 heavy vehicles; and - 10 light vehicles, per day during the peak of construction activities. All access to the site would be from Heron Road via Cormorant Road. These roads are designed for large vehicles and industrial traffic and have the capacity to absorb these low volumes. Operationally the tank would result in a negligible level of traffic generation with only occasional access required by light vehicles for periodic maintenance activities. Construction traffic would be managed by a Construction Traffic Management Plan.

[1] DECCEE. (2012). Australian National Greenhouse Accounts - National Greenhouse Accounts Factors, July 2012. Commonwealth of Australia (Department of Climate Change and Energy Efficiency).

Issue	Summary of Potential Impact
	Nitric Acid will be transported to the tank via ship and the existing transfer pipeline from the nearby wharf. Ship movements are expected to number approximately 1 per month. Operational shipping would be managed via the existing systems of the Port of Newcastle and Orica.
Waste	Some minor construction waste may be generated during construction including: - Spoil – from footing excavation; - Wood – from formwork; - Steel – from reinforcement, piping and flare structure offcuts; and - Plastics from materials packaging. Where possible components of the tank and flares will be prefabricated offsite and brought to the site for installation, minimising waste generation. No additional solid waste is expected to be generated by the operation of the proposed modification. The waste management measures outlined in the 2009 EA would be adequate to manage construction and operational waste where applicable.
Flora and Fauna	The proposed modification is unlikely to impact upon flora and fauna. The KI site is on reclaimed land and is highly disturbed. The proposed location for the 10,000 tonne nitric acid tank is a grassed, former rail corridor. Potential impacts to flora and fauna as a result of the proposed modification would be managed through the mitigation measures specified in the 2009 EA.
Heritage	The site is on reclaimed land that is highly disturbed. The 2009 EA did not identify any indigenous or non-indigenous heritage constraints across the Orica site. It is highlight unlikely that any indigenous or non-indigenous heritage items would be present within the construction disturbance footprint or the wider area. Despite the low likelihood of heritage items being present, in the event a heritage item is uncovered, works would cease and the NSW Office of Environment and Heritage or Local Aboriginal Land Council contacted for advice.

6.6 Cumulative Impacts

A cumulative assessment the potential impacts of the proposed modification in relation to air quality and noise impacts was undertaken in **Sections 6.1** and **6.2** respectively. These assessments look at both the cumulative impacts of the existing Orica facility and the proposed infrastructure collectively, as well these same components with background air and noise impacts from nearby industrial operations.

The assessment concluded that impacts would generally be minor with some low level acoustic impacts occurring during flare operation. Due to the infrequent nature of the flare operation and the low level of anticipated impacts, they are not considered significant.

7.0 Residual Risk Analysis

The Environmental Risk Analysis for the proposed modification is based on a process adapted from *Australian Standard AS 4369:1999 Risk Management*. The process is qualitative and is based on the Residual Risk Matrix shown in **Table 26**.

Residual Environmental Risk is assessed on the basis of the significance of environmental effects of the Proposed Project and the ability to confidently manage those effects to minimise the risk of harm to the environment.

The significance of environmental effects is given a numerical value between one and five, based on:

- The receiving environment (its sensitivity and values).
- The level of understanding of the type and extent of impacts.
- Likely community response to the environmental consequences of the Project.

The manageability of environmental effects is similarly given a numerical value between one and five based on the complexity of mitigation measures, the known level of performance on the safeguards proposed, and the opportunity for adaptive management. The numerical value allocated for each issue is based upon the following prescription.

Table 24 Significance of Effects

No	Significance	Receiving Environment
5	Extreme	Undisturbed receiving environment, type or extent of impacts unknown, substantial community concern.
4	High	Sensitive receiving environment, type or extent of impacts not well understood; high level of community concern.
3	Moderate	Resilient receiving environment, type and extent of impacts understood; community interest.
2	Minor	Disturbed receiving environment; type and extent of impacts well understood; some local community interest.
1	Low	Degraded receiving environment; type and extent of impacts fully understood; uncontroversial project.

Table 25 Manageability of Effects

No	Significance	Mitigation Measures
5	Complex	Complicated array of mitigation measures required; safeguards or technology are unproven; adaptive management inappropriate.
4	Substantial	Significant mix of mitigation measures required; past performance of safeguards is understood; adaptive management feasible.
3	Straightforward	Straightforward range of mitigation measures required; past performance of safeguards is understood; adaptive management easily applied.
2	Standard	Simple suite of mitigation measures required; substantial track record of effectiveness of safeguards; adaptive management unlikely to be required.
1	Minimal	Little or no mitigation measures required; safeguards are standard practice; adaptive management not required.

The chosen numbers are added together to provide a result which provides a ranking of potential residual effects of the Project when the safeguards identified in this EA are implemented.

Table 26 Residual Risk Matrix

Significance of Effects	Manageability of Effects				
	5 Complex	**4 Substantial**	**3 Straightforward**	**2 Standard**	**1 Minimal**
1 Low	6 Medium	5 Low/Medium	4 Low/Medium	**3 Low**	**2 Low**
2 Minor	7 High/Medium	6 Medium	5 Low/Medium	4 Low/Medium	**3 Low**
3 Moderate	8 High/Medium	7 High/Medium	6 Medium	5 Low/Medium	4 Low/Medium
4 High	**9 High**	8 High/Medium	7 High/Medium	6 Medium	5 Low/Medium
5 Extreme	**10 High**	**9 High**	8 High/Medium	7 High/Medium	6 Medium

7.1 Analysis

The analysis of residual environmental risk for issues related to the Proposed Project is shown in **Table 27**. This analysis indicates the environmental risk profile for the Proposed Project based on the assessment of environmental effects, the identification of appropriate safeguards, and the Statement of Commitments shown in this EA.

Table 27 Risk profile – proposed modification

Issue	Significance	Manageability	Residual Risk
Air Quality and Odour	2	1	3 Low
Noise and Vibration	2	2	4 Low/Medium
Hazards and Risk	2	2	4 Low/Medium
Visual	2	2	4 Low/Medium
Soils and water	1	1	2 Low
Greenhouse Gas	1	1	2 Low
Transport	1	1	2 Low
Waste	1	1	2 Low
Flora and fauna	1	1	2 Low
Heritage	1	1	2 Low

7.2 Conclusion

The above residual risk analysis indicates that the proposed modification, including appropriate safeguards as outlined in this EA, would give rise to predominantly a low risk in relation to the identified environmental issues.

8.0 Statement of Commitments

Table 28 provides a summary of the safeguards which will be implemented during the construction and operation of the proposed modification. Unless otherwise stated, the Statement of Commitments included in the 2009 EA will be implemented as applicable to the construction and operation of both the nitric acid tank and the ammonia flares.

Table 28 Summary of environmental mitigation measures

Aspect	Mitigation measure
Air Quality and Odour	- All construction works will be undertaken in accordance with Conditions 25 and 26 of the Project Approval. - Operational air quality verification will be undertaken for the proposed modification in accordance with Condition 23 of the Project Approval. - Ongoing operational air quality monitoring would be undertaken in accordance with Condition 22 of the Project Approval.
Noise and Vibration	- All construction works will be undertaken during hours as specified by Condition 33 of the Project Approval; - All reasonable and feasible construction noise mitigation measures will be implemented during construction to minimise noise impacts; - The final pump specification will comply with a Sound Power Level of 82dB(A) at 1m; and - Maintenance and testing of the flare will be limited to standard working hours.
Hazards and Risk	- A Layers of Protection Analysis (or similar) will be implemented for the nitric acid tank level instrumentation to determine the required level of reliability to reduce the risk of tank overflow to an acceptable level; - A Layers of Protection Analysis (or similar) will be undertaken during the design phase of the project to ensure the risk of liquid releases to the environment is acceptable; - A HAZOP study and a construction safety study will be undertaken in relation to the proposed modification; and - The existing safety management system, including the emergency response plan will be updated.
Visual	- All lighting design will be undertaken in accordance with *AS 4282(INT)-Control of Obtrusive Effects of Outdoor Lighting* pursuant to Condition 46 of the Project Approval; - The existing landscaping and vegetation screens of the Orica site will be subject to ongoing upkeep to maintain the effectiveness of the vegetated screen in accordance with the Landscape Plan prepares under Condition 45 of the Project Approval; and - All infrastructure will be maintained to a high standard and appearance with a focus on the external skin of the nitric acid tank.
Soils and water	- In accordance with Condition 44 of the Project Approval, a Construction Sediment and Erosion Control plan will be prepared in accordance with the 'Managing Urban Stormwater; Soils and Construction' (Landcom, 2004).
Greenhouse Gas	- Construction plant and equipment not be left idling for prolonged periods and will where feasible be turned off.
Transport	- Orica will ensure that the movement of oversized loads to the site during the construction phase is undertaken in accordance with the standard procedures documented by the Roads and maritime Services (RMS) and with appropriate approval from the RMS. - In accordance with Condition 36 of the Project Approval a Construction Traffic Management Plan will be prepared for the construction of both the nitric acid tanks and ammonia flares.

Aspect	Mitigation measure
Waste	- Construction waste will be managed in accordance with the waste hierarchy and the conditions of the Project Approval. - The Operational Waste Management Plan prepared under Condition 48 of the Project Approval will be updated to incorporate potential waste streams from the proposed modification.
Flora and fauna	- Sediment and erosion controls will be implemented to control runoff into, and ecological impact to, nearby water bodies. - Other potential impacts to flora and fauna will be managed through the implementation of the mitigation measures specified in the 2009 EA where applicable.
Heritage	- Any indigenous or on-indigenous objects that are uncovered during the remediation works should be left undamaged and in situ. Construction works should cease and an assessment be conducted by a qualified archaeologist in consultation with Aboriginal stakeholders and the OEH for direction as to its preservation, historical recording and / or removal if such items are uncovered.

9.0 Conclusion

In 2009, Project Approval 08_0129 was granted for the expansion of Orica's KI facility under Part 3A of the EP&A Act. As a result of changes to the site layout, the Project Approval was modified in 2012 under s75W of the EP&A Act (DA 08_0129 MOD 1). Orica is now proposing to build:

- A 10,000 tonne nitric acid storage tank instead of the 2,000 tonne tank previously approved; and
- three ammonia fares as part of the Ammonia Management Improvement programme.

The proposed modification application is to be assessed under s75W of the EP&A Act.

This EA has been prepared in consultation with DP&I to address the potential environmental issues associated with the proposed modification. Key environmental issues associated with the proposed modification include air quality, noise, hazard and risk and visual impacts. Other environmental issues addressed include soil and water, GHG emissions, transport, waste, visual amenity, flora and fauna, and heritage impacts.

The assessments of each of these factors in relation to both the Nitric Acid Tanks and the Ammonia Flares have shown that the proposed modification would not have a significant impact on the environment or community provided that the appropriate management and mitigation measures are implemented as identified in this EA.

10.0 References

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DECC (2009) *Interim Construction Noise Guideline*. Department of Environment and Climate Change (now known as Office and Environment and Heritage), Sydney.

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DoP (1992) *Hazardous Industry Planning Advisory Paper (HIPAP) No 6 – Guideline for Hazard Analysis*, 2nd Edition. NSW Department of Planning (now known as Department of Planning and Infrastructure), Sydney.

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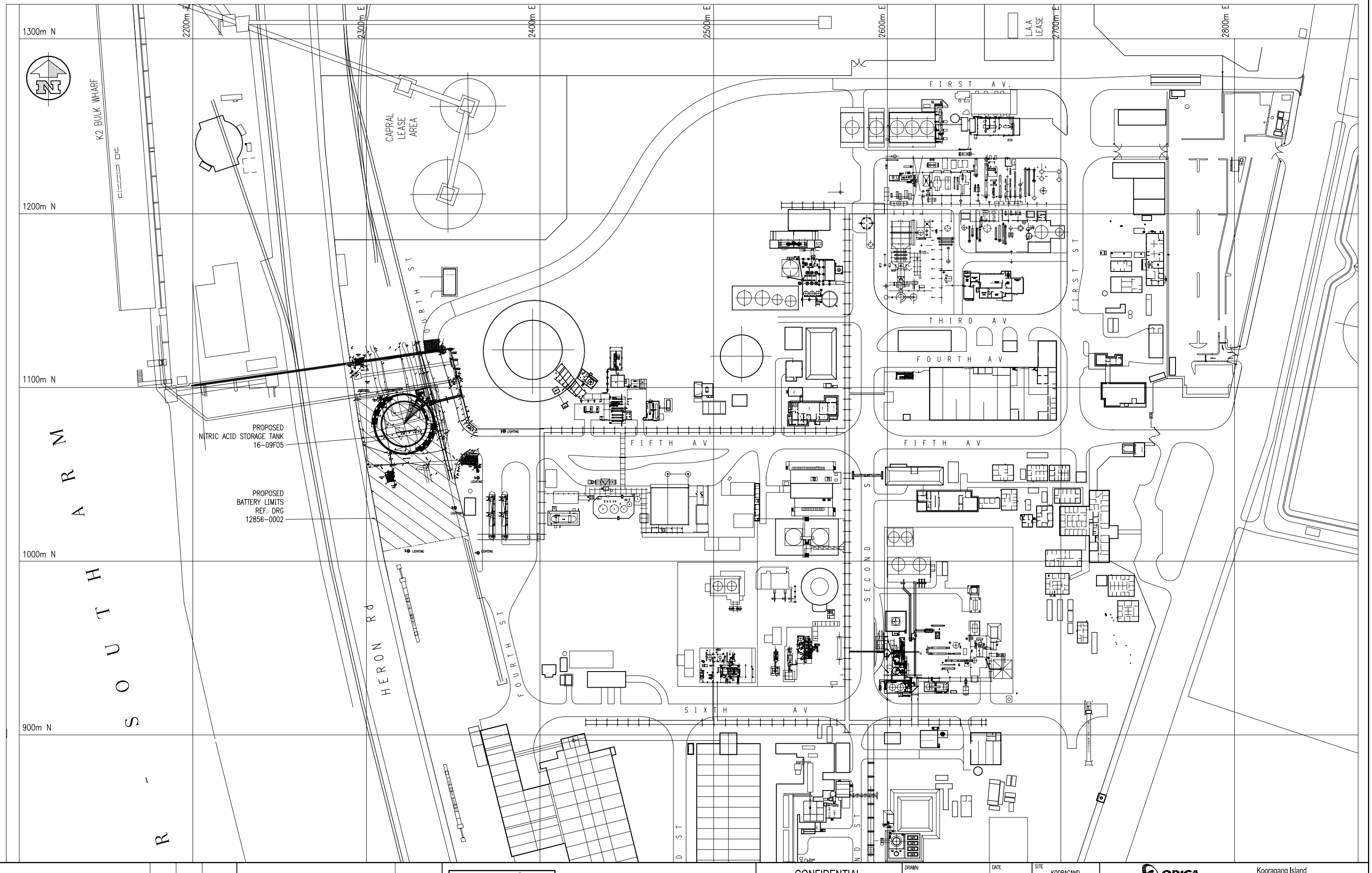
Appendix A

General Arrangement

Appendix A General Arrangement



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ORICA MINING SERVICES
Kooragang Island
Newcastle N.S.W

TITLE
ORICA SITE SERVICES
NITRIC ACID IMPORT TANK
PROPOSED SITE LOCATION
GENERAL ARRANGEMENT

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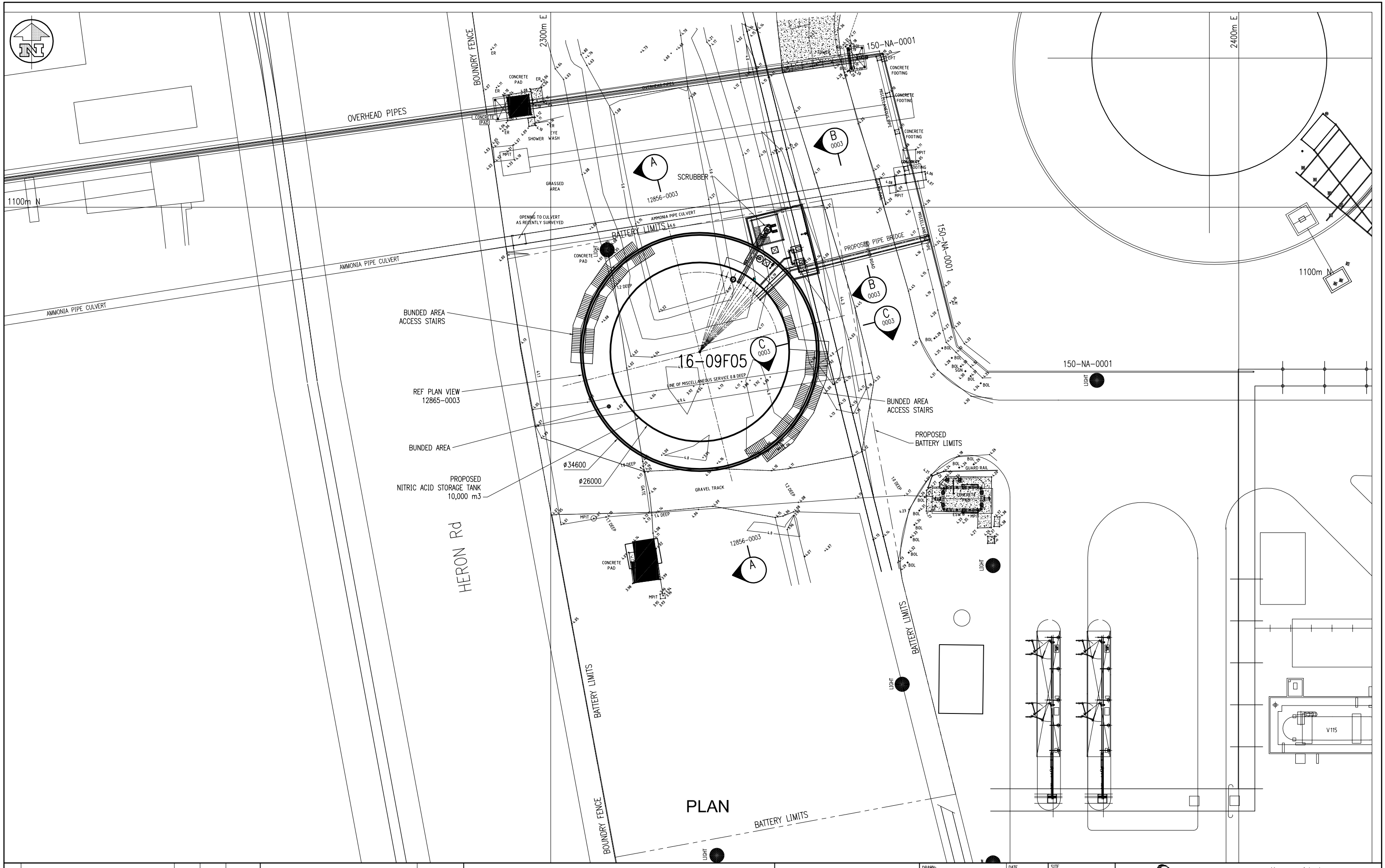

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DESIGNED:	DATE	PLANT SITE SERVICES	TITLE	ORICA SITE SERVICES NITRIC ACID IMPORT TANK PROPOSED BUNDED AREA GENERAL ARRANGEMENT
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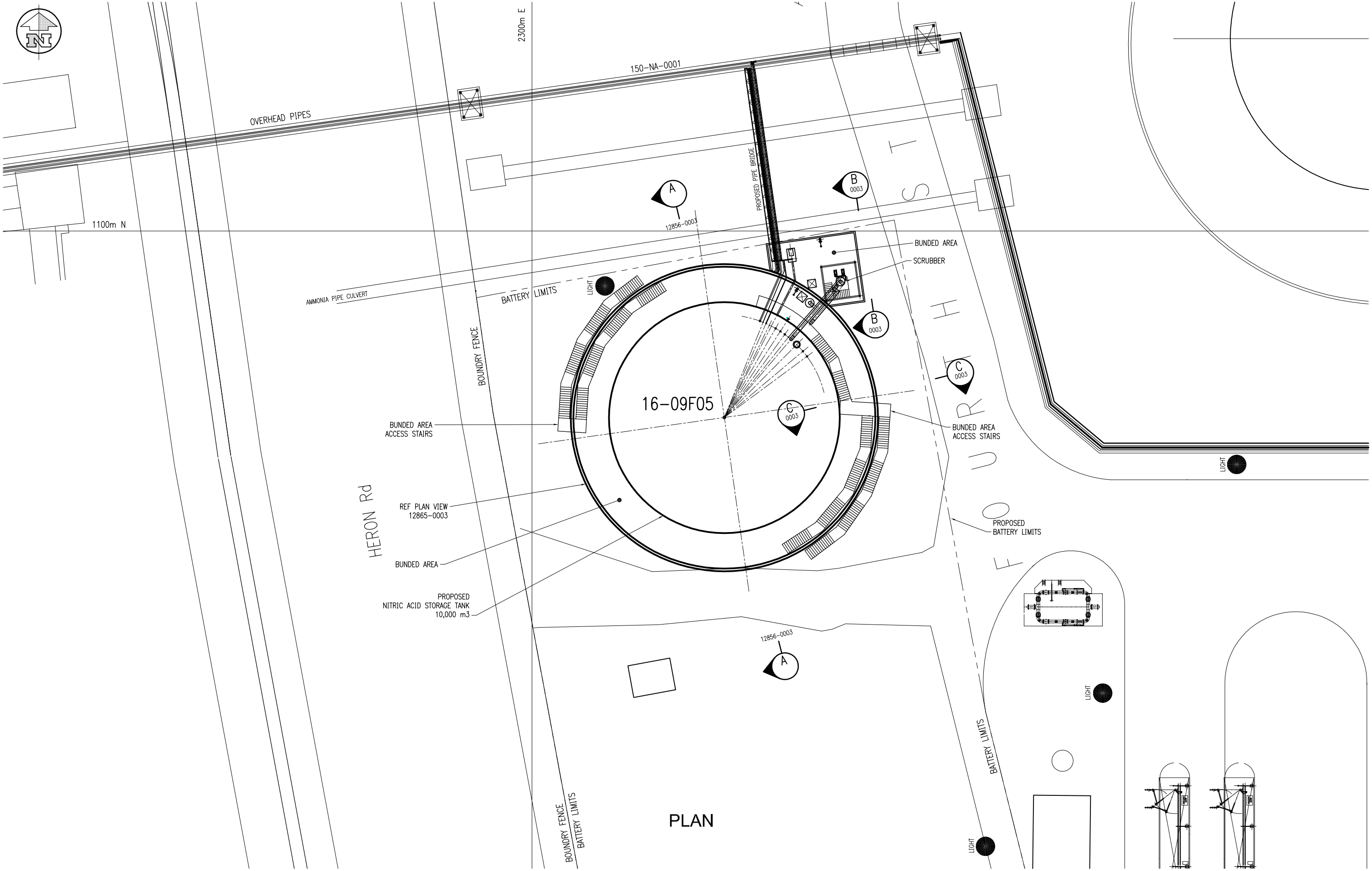

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Appendix B

Air Quality Impact Assessment

Appendix B Air Quality Impact Assessment

Appendix C

Noise Impact Assessment

Appendix C Noise Impact Assessment

Appendix D

PHA – AMI Flares

Appendix D PHA – AMI Flares

Appendix E

PHA – Nitric Acid Tank

Appendix E PHA - Nitric Acid Tank

Appendix F

Visual Impact Assessment

Appendix F Visual Impact Assessment