

## ASSESSMENT REPORT

### Orica Ammonium Nitrate Facility, Kooragang Island Section 75W Modification Flares and Nitric Acid Tank (08\_0129 MOD 2)

#### 1. BACKGROUND

Orica Australia Pty Ltd (Orica) owns and operates an ammonium nitrate manufacturing facility on a site that it owns at 15 Greenleaf Road on Kooragang Island in the Port of Newcastle (see Figure 1).



Figure 1: Site Context



## 1.1 Site Context

The site is located on Kooragang Island, which is located between the north and south arms of the Hunter River Estuary within the Port of Newcastle. The Island was originally created during the 1950's and 1960's through extensive land reclamation activities and has grown steadily ever since. The southern part of the Island supports heavy industrial uses, transport and distribution infrastructure, waste emplacement and a range of port-related facilities.

Orica's facility is located on the southernmost site in the middle of the south eastern tip of Kooragang Island. A handful of other industrial operators including Cement Australia, Cargill and Graincorp also run import and distribution operations in this location given that this portion of Kooragang Island is so well serviced with Port-related infrastructure and has good road connections.

The Orica site is bounded to the east by Greenleaf Road, to the west by Heron Road and shares its northern boundary with a site owned by Incitec Pivot Ltd (IPL). IPL used to be part of the Orica company (as ICI Australia) up until 2006 when Orica divested IPL. The western portion of the IPL site is currently used as a primary distribution facility for IPL's solid and liquid fertiliser product range and is also used to distribute relatively low volumes of certain industrial chemicals.

IPL is proposing to build a second Ammonium Nitrate (AN) manufacturing facility on the company's Kooragang Island site next to Orica. The Department completed its assessment of this proposal and referred it to the Planning Assessment Commission (PAC) for determination in September 2014. The PAC approved the application on 16 December 2014.

The nearest residential community to the Orica facility is in Stockton, which is located on a peninsula some 800 metres to the east. Other nearby residential areas include Fern Bay, Carrington and Mayfield, which are located between 1 and 2 kilometres away to the north east, south and west of the site respectively.

## 1.2 Existing Facility

When the site first began operations in 1969, it included an Ammonia Plant, a Nitric Acid Plant (NAP) and an Ammonium Nitrate Plant (ANP), producing around 150,000 tonnes per annum (tpa) of AN for the agriculture industry.

A second NAP and NAP ammonium nitrate plant were constructed in 1989 increasing the ammonium nitrate production to 300,000 tpa. Orica gained ownership of the Kooragang Island site in 2003. The following year, a third nitric acid plant was added to the site which increased the ammonium nitrate production to its current level of approximately 400,000 tpa.

Fertiliser is no longer produced at Kooragang Island. Ammonium nitrate is now exclusively manufactured to service the mining industry.

## 1.3 Expansion Project

On 1 December 2009, the then Minister for Planning approved a Major Project Application (08\_0129) from Orica for a major expansion of the facility. The expansion also involved modernizing some older plant and infrastructure and implementing a series of risk reduction measures. The 2009 approval permitted Orica to increase overall production levels from:

- 500,000 to 750,000 tpa of AN;
- 295,000 to 360,000tpa of Ammonia; and
- 345,000 to 605,000tpa of NA.

The major items of infrastructure required to support the expansion of the operation would include:

- modification to the existing Ammonia Plant to increase capacity and efficiency;
- installation of a fourth Nitric Acid Plant;
- installation of a third Ammonium Nitrate Plant;
- additional storages for nitric acid, ammonium nitrate and ammonium nitrate solution;
- upgrade of existing infrastructure including cooling towers, air compressors, loading facilities, electrical systems, effluent treatment systems and the steam system.





Figure 2: Orica's Approved Facility and Proposed Infrastructure

On 11 July 2012, the then Minister's delegate approved a request from Orica to modify the existing layout of the expansion project and to carry out a series of risk reduction measures aimed at improving the handling and management of Ammonia at the facility. Partway through the assessment of the application for approval and in response to the incident that occurred on 8 August 2011 (see Section 1.4), Orica made a commitment to implement further risk reduction measures which were subsequently approved as part of that project modification (MOD 1).



The Orica expansion is being progressively implemented and is currently split into a series of phases, stages and sub stages, are summarised in Table 1 and illustrated in Figure 2.

*Table 1: Orica's Current Staging Plan for Approved and Proposed Stages (at 13 October 2014)*

Phase	Stage	Description of Works	Sub Stage	Post Approval Status
<b>Ammonia Plant Up-Rate</b>				
1	1A	Ammonia Plant Expansion – Plant Air Compressor Building	Complete	Operational
	1B	Ammonia Plant Expansion - Installation/Modification of Plant	Complete	
<b>Proposed Trident Nitrates Expansion Project</b>				
2	2A	<b>OBL 1(a) – Nitrates Infrastructure &amp; ANS Loadout</b> Installation of new site infrastructure and ANS product storage and despatch facilities	1. Internal access roads and civil works 2. New entrances, security offices and weighbridges 3. Civil works including piling and foundations 4. New ANS storage vessel loading equipment	<b>On hold</b> – approval for construction granted, but not yet commenced  Plans and documentation covering commissioning and operating phases yet to be lodged
		<b>OBL 1(b) – Nitrates Despatch &amp; Support Infrastructure</b> Construction of new AN Bag store, AN Despatch facilities and amenities, demolition of existing AN Bag store and despatch, construction of new AN Bulk Store, modification to existing AN bulk store, construction of WANS, construction of new control room and electrical infrastructure	Sub-staging unknown	<b>On hold</b> – no approval granted.  Some plans and documentation submitted but for construction phase only
3	3A	<b>NAP4 – Nitric Acid &amp; AN Solution Plants and Support Infrastructure</b> Construction of the NAP4/ ANS Plant and tie-ins Construction of Nitrates support infrastructure including new Nitric Acid Storage, Ammonia Storage, Boiler, Cooling Tower, Demin Plant expansion Instrument Air upgrades, new Ammonia pumps, pipebridges & transfer lines	Sub-staging unknown	<b>On hold</b>
	3B	<b>AN3 – AN Prill Plant</b> Construction of ANP3 Dry Section plant and tie-ins	Sub-staging unknown	<b>On hold</b>
<b>Ammonia Management Improvement Program</b>				
4	<b>Ammonia and Nitrates Flares</b>			<b>Approval pending</b>
5	<b>Nitric Acid Tank</b>			<b>Approval pending</b>

#### 1.4 Orica Incidents

Between October 2010 and December 2011, a series of incidents took place at Orica's site. The most significant of these incidents occurred on 8 August 2011 when there was an airborne release of sodium chromate solution from a vent stack in the Ammonia Plant. This resulted in a diluted aqueous solution of sodium chromate being released into the atmosphere which dispersed as far as Stockton for a 15 to 20 minute period.

The EPA immediately placed a notice on Orica's Environment Protection Licence (EPL) preventing the company from continuing to operate the facility, pending investigations into the incident, and established an 'Interagency Start-Up Committee' to determine when it was safe for Orica to recommence operations.

There were two independent investigations into the incident: one was undertaken by Mr Brendan O'Reilly for the then Premier of NSW and the second was carried out by a Select Committee on behalf the NSW Legislative Council. Following detailed consideration of the findings of these investigations, the Interagency Committee determined to lift the 'shut down' notice. Orica safely restarted its operation on 29 February 2012.



Orica was convicted and penalised in relation to charges brought by the NSW Environment Protection Authority (EPA) for these incidents, including a financial penalty for the 8 August 2011 incident which is being spent on environmental improvement works in Newcastle. The sentence hearing took place in the Land and Environment Court of NSW in December 2012 and the Court handed down the penalties judgment on 28 July 2014.

### **1.5 Ammonia Management Improvement Programme**

In 2012, Orica made a commitment to invest in a capital works program to improve and upgrade the Kooragang Island facility. As part of this program, Orica consolidated the ammonia improvement work carried out in response to the incidents during 2010-2011 (see Section 1.4) and further developed this work into an Ammonia Management Improvement Programme (AMIP).

The AMIP was specifically tasked with investigating and identifying further opportunities to reduce risks associated with the existing ammonia handling systems onsite and, since completing the AMIP review in early 2013, several ammonia handling and capture and treatment design improvements have been identified, which Orica has begun to implement.

The AMIP is made up of 4 key areas:

1. Simplification of the ammonia distribution network;
2. Improving the integrity of ammonia feed tanks;
3. Improving the site's ammonia collection and scrubbing capability; and
4. Installing 3 flare systems (2 ammonia and 1 nitrates flares) to safely manage large emergency releases of ammonia into the atmosphere during process upsets (current modification).

### **1.6 Ammonium Nitrate Production Levels**

The demand for AN has reduced in recent years as a direct consequence of a downturn in the Hunter mining industry which, in turn, has arisen as a result of a low coal price and high Australian dollar. As a result of these market conditions, Orica has so far been unable to carry out any more than the first project phase (see Table 1 and Figure 2), with NAP 4 and ANP 3 approved but not constructed.

In terms of output, AN production levels at the facility have remained at around the 400,000tpa mark. Orica proposes to install a higher capacity NA storage tank which would allow Orica to import enough extra NA to allow AN production levels at the facility to increase by around 100,000tpa, to 505,000tpa. This interim arrangement would then continue until such time as market conditions improve and Orica looks to carry out the balance of the project.

## **2. PROPOSED MODIFICATION**

On 2 December 2013, Orica lodged an application with the Department under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to modify the existing approval to allow the three new flares and associated systems to be installed and to increase the volume of the approved NA storage tank from 2,000 to 10,000 tonnes and relocate it to the western part of the site.

Construction and commissioning of the flares and NA tank is expected to take around 15 and 10 months respectively, and would generate around 20 full-time construction jobs.

### **2.1 Flaring Systems**

The first element of the proposed modification is the installation of 3 flares with self-supported flare stacks, ancillary piping and associated infrastructure:

**Flare A:** Nitrates plant flare: 8m in height (an 18m flame when operating) and 0.45m in diameter;

**Flare B:** Ammonia tank flare: 5m in height (a 10m flame when operating) and 0.30m in diameter; and

**Flare C:** Ammonia plant flare: 20m in height (a 36m flame when operating) and 1.14m in diameter.

The flares are designed as a safety measure and represent a significant risk reduction measure for the facility which would significantly reduce potential offsite risk to surrounding communities and Orica's employee's onsite.



The flares have a destruction efficiency of 97% and would activate during plant upsets. Orica estimates that these upsets could take place around every 1 to 2 years for Flares A and C and every 10 years in the case of Flare B. Once activated, Flares A and C would operate for around 5 minutes whereas Flare B could operate for a period of several weeks.

## **2.2 Nitric Acid Tank**

The second element of the proposed modification involves increasing the overall storage capacity of the NA tank from 2,000 to 10,000 tonnes, and would comprise:

- a 25m high by 25m wide metallic tank with a stainless steel appearance and designed with non-reflective surfaces or painted;
- an overhead pipe gantry to connect the proposed tank to the existing NA import/export pipeline;
- secondary tank containment;
- venting systems and a 25.5m high scrubber stack; and
- associated lighting and security.

NA would continue to be imported by ship and pumped to the new NA tank using the existing NA import/export pipeline. The approved location of the original NA tank was in the centre of the site but it is now proposed to install the tank to the western portion of the site instead as this would significantly reduce the length of piping needed to reach the tank as it would be located closer to the ship unloading berth.

## **3. STATUTORY CONTEXT**

### **3.1 Section 75W**

In accordance with Clause 12 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.

Under Section 75W of the EP&A Act, the Minister is obliged to be satisfied that what is proposed is indeed a modification of the original proposal, rather than being a new project in its own right.

The Department notes that:

- the proposed modification is to implement risk reduction measures and safety improvements and would not increase approved ammonia, nitric acid or ammonium nitrate production rates;
- the primary function and purpose of the approved project would not change as a result of the proposed modification;
- the modification is of a scale that warrants the use of Section 75W of the EP&A Act; and
- any residual environmental impacts would be minimal and are able to be appropriately managed through the existing or modified conditions of approval.

Therefore, it is considered that the proposed modification is within the scope of Section 75W of the EP&A Act. Consequently, the Department considers that the application should be assessed and determined under Section 75W of the EP&A Act rather than requiring a new development application to be lodged.

### **3.2 Approval Authority**

The Minister was the approval authority for the original project approval, and is consequently the approval authority for this application to modify it.

The Executive Director, Infrastructure and Industry Assessments may determine this application on behalf of the Minister in accordance with the terms of the Minister's delegation dated 10 November 2014, subject to the following:

- where the relevant local Council/s has not made an objection;
- where a political donations disclosure statement has not been made; and
- there are less than 25 public submissions in the nature of objections.



The Department is satisfied that the application meets the terms of the delegation and that the Executive Director may determine the application under delegated authority.

## 4. CONSULTATION

### 4.1 Consultation by the Proponent

On 26 August 2013, Orica briefed its Community Reference Group (CRG) on the function and operation of the proposed flares and supplemented this with advertisements placed in local newspapers and letterbox drops to local residents in neighbouring communities.

### 4.2 Consultation by the Department

Under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act), the Department is not required to notify or exhibit the modification application.

However, following a review of the application, the Department:

- publicly exhibited the EA for a period of 15 days from **Monday 2 December 2013** until **Tuesday 17 December 2013**:
  - on the Department's website;
  - at the Department of Planning and Environment's Information Centre (Sydney);
  - at the Department of Planning and Environment's Newcastle Office;
  - at the City of Newcastle Council; and
  - at the Nature Conservation Council.
- advertised the public exhibition in the Newcastle Herald newspaper on Friday 29 November 2013; and
- consulted with Council and other relevant government authorities.

The Department received 10 submissions during the exhibition period: 4 from relevant Government agencies and 6 public submissions

A summary of the issues raised in submissions is provided below.

#### NSW Government Authorities

None of the Government authorities objected to the proposed modification but raised issues and concerns that were addressed by Orica in its response to submissions (see Section 4.3) and/or have been further assessment and resolved by the Department as part of its assessment in Section 5.

The **Environment Protection Authority (EPA)** recommended that the existing noise limits in the project approval should be retained in their current form but that noise emissions generated when the flares are in operation should be excluded from these limits primarily because they serve an important safety function during plant upsets.

The EPA requested that Orica select flare technology to be the quietest available to meet operational requirements and that all reasonable and feasible measures should be implemented to minimise flaring noise from the facility. It was further recommended by the EPA that Orica's existing community communication system should include information on and notification during flaring events.

The EPA also advised that Orica will be required to apply to the EPA for a variation to its existing Environment Protection Licence (EPL) for the premises and recommended a number of conditions including air emissions monitoring requirements for the proposed flares, an update to the existing incident reporting arrangements and the preparation and submission of an air quality verification study once the NA tank and scrubber stack have been commissioned.

The **City of Newcastle Council (Council)** advised that since MOD 1 was approved, an aircraft safety policy has been introduced which applies to all development proposals within a 15km radius of the airport. Council also requested that the Section 94 (s.94) contributions previously paid to Council by Orica for the original project should be supplemented by an additional payment under Council's



*Section 94A Contributions Plan* based on the extra capital investment for the infrastructure proposed as part of this modification.

**WorkCover NSW (WorkCover)** requested some minor clarifications relating to hazards and risks, but was able to recommend a number of conditions of approval to ensure compliance with the *Work, Health and Safety Act 2011* and *Work, Health and Safety Regulation 2011*.

**NSW Health** sought assurance that all relevant emergency response personnel, including Fire and Rescue NSW and the State Emergency Operations Controller were made aware of the proposal. NSW Health also requested that the existing Site Emergency Plan be amended to incorporate the proposal. NSW Health also highlighted the importance of conducting widespread consultation with the local community to ensure the community understands the function of the flares given that they will be visible when activated.

Although consulted, **Fire and Rescue NSW** and the **Nature Conservation Council** did not make a submission on the proposed modification.

#### General Public

4 submissions from members of the general public objected to the proposal and 2 submissions supported the proposal.

Submissions objecting to the proposed modification raised a range of issues including:

- Orica's history of environmental incidents occurring at the site (e.g. release of hexavalent chromium in 2011);
- hazards and risks associated with the manufacture, storage and distribution of AN and the need to relocate the facility away from populated areas, citing the incident in Waco, Texas;
- potential impacts associated with a malfunction of the flares, the risk of fire and explosion and excessive noise;
- excessive noise from the existing cooling towers and the expense of noise reduction strategies delaying implementation;
- inadequate community consultation and the need for a larger letterbox drop to affected residents;
- the large increase in size of the NA tank not being within the scope of a modification application; and
- increased hazards and risks, air emissions, noise and water impacts from the modified facility.

Submissions in support of the proposed modification noted that:

- the new flares would reduce the need for fugitive release of ammonia emissions at the site using a system proven in other plants around the world;
- the NA tank would allow Orica to increase AN production to meet market demand reducing the need for frequent start-up and shut-downs which has a higher potential to impact the community;
- the proposal is designed to improve environmental management at the site without impeding the approved expansion of site operations; and
- the proposed modification would improve environmental risk management of the facility and enable the facility to meet market demand within approved limits, contributing to positive impacts on the regional economy.

#### **4.4 Additional Information**

On 20 December 2013, the Department requested Orica provide further information and clarification around anticipated soil and water impacts and proposed mitigation controls, wastewater, specifically effluent that would be generated by the proposal, and greenhouse gas emissions. On 10 February 2014, Orica submitted a joint response to the issues raised during exhibition and the Department's request for further information.

At a subsequent meeting held on 13 March 2014 between representatives of the Department and Orica, a number of risk-related matters were raised by the Department. Orica was requested to respond to these issues and as part of the response, provide additional quantitative analysis within a



revised PHA report to address issues relating to cumulative risk, heat radiation effects, toxic consequence results and flare failure events.

Further, the Preliminary Hazard Analysis (PHA) for the proposed modification proposal had originally been presented as two reports: one by GHD Pty Ltd for the proposed flares and one by Pinnacle Risk Services for the NA storage tank. As well as addressing the issues raised in the meeting, the Department requested Orica combine the two PHA reports and resubmit the PHA as a single report.

In response, Orica lodged a consolidated version of the PHA report in May 2014. The Department's assessment of the revised PHA report found that whilst the majority of issues raised before had been addressed, there were still some residual outstanding issues. Orica further refined the PHA and submitted a final version of the PHA report in July 2014, which the Department used to finalise its assessment of the proposal.

#### **4.5 Review of Existing Conditions**

In the course of developing new recommended conditions to address the potential impacts associated with the proposed modification, the Department reviewed the existing approval conditions. It was found that whilst the existing conditions are generally adequate and should be retained, some of the existing conditions should be updated and enhanced.

Recommended changes to the administrative conditions in schedule 1 relate to project staging, the progressive submission of post-approval plans and documentation and would also allow minor design variations to approved plans with written approval which is one of the Department's new standard and model conditions.

It is further recommended that the environmental management and monitoring framework in schedule 3 also be updated and enhanced to reflect contemporary arrangements. Amendments are also recommended to the specific environmental conditions in Schedule 2, which are discussed in the context of each assessment issue in Section 5.

### **5. ASSESSMENT**

#### **5.1 Hazards and Risks**

##### Background:

Since MOD 1 was approved by the Minister on 11/07/2012, Orica ammonium nitrate facility at Kooragang Island has undertaken an Ammonia Management Improvement (AMI) project based on a review of ammonia management practices, including international benchmarking. Opportunities to further reduce the risks associated with existing ammonia handling systems located onsite were identified and investigated. These activities have resulted in a number of variations to the project in relation to the MOD 1 Preliminary Hazards Analysis (PHA) inputs and Quantitative Risk Assessment (QRA) model. In addition, a new Nitric Acid import tank is proposed to be installed near the Western boundary of the site, including new piping to connect the tank to the existing nitric acid import/export pipeline.

Therefore, the QRA model developed for MOD 1 PHA was updated by the applicant to incorporate the proposed changes to the plant design and layout due to the AMI project and the hazardous scenarios associated with the proposed Nitric Acid tank (MOD 2). The main objective of MOD 2 PHA is to examine the impact of those changes on the site's risk profile as previously established through the approved MOD 1 PHA. The MOD 2 PHA demonstrates that the site's risk results did not significantly change from those reported for MOD 1.

The Department's *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6, Hazard Analysis* establishes the following risk analysis and assessment sequence which should be followed when preparing a PHA to gain an understanding of whether or not a given development proposal would impose an unacceptable level of risk on the surrounding locality:

- identification of the hazard/s;



- an analysis of the potential consequences and likelihood;
- a calculation of the risk;
- an assessment of the risk against Departmental risk criteria; and
- consideration of risk mitigation and management options.

In summary, the calculation of potential offsite risk from the facility is driven by modelling the consequence and likelihood of various pre-determined hazardous incident scenarios. The risk results are then used to demonstrate compliance with the NSW risk criteria for surrounding land uses or, if necessary, inform the development of risk reduction measures. Table 1 summarises the relevant NSW individual risk criteria for land use safety planning from *HIPAP 4*.

*Table 1: Relevant Risk Criteria by Risk Type for Land Use Safety Planning (HIPAP 4)*

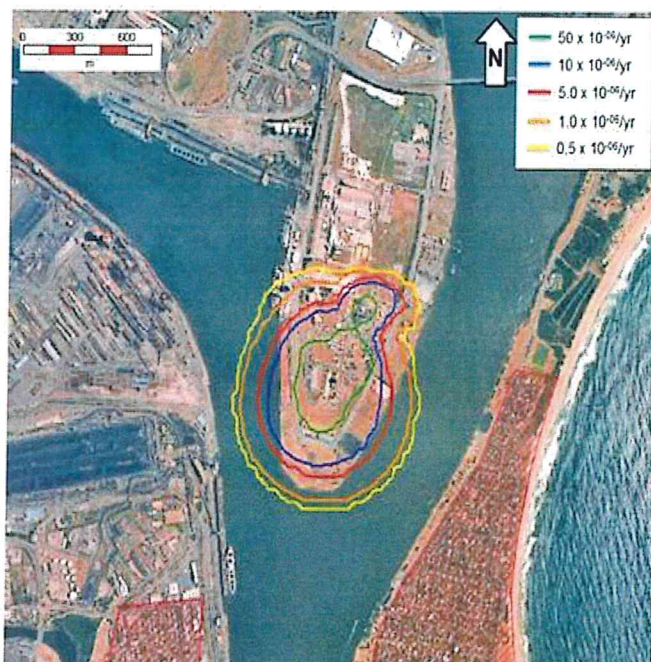
Type of Risk	Summary of Land Use	Suggested Criteria (chances in a million per year)
Fatality	Hospitals, schools, child-care, old age housing	0.5
	Residential, hotels, motels, tourist resorts	1
	Commercial, offices, entertainment and retail centres	5
	Sporting complexes and active open space	10
	Industrial	50
Toxic Exposure – Injury	Residential, hotels, motels, tourist resorts	10
Toxic Exposure – Irritation	Residential, hotels, motels, tourist resorts	50
Property Damage and Accident Propagation	Industrial (14 kPa and 23 kW/m <sup>2</sup> )	50

*Note: A detailed explanation of the criteria in Table 1 is provided in HIPAP 4.*

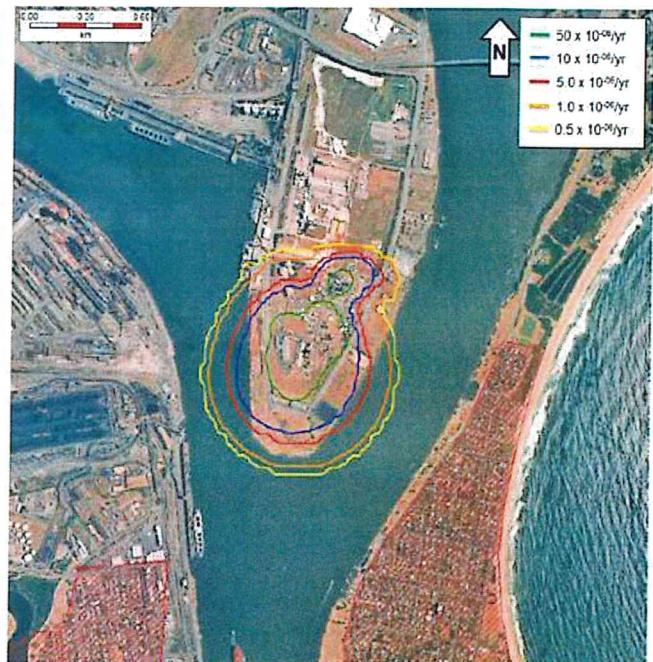
#### Findings:

The Department is satisfied that the PHA for MOD 2 has adequately met the requirements of the Department's *HIPAP No. 6*. The methodology adopted for hazard identification, estimation of consequences, selection of accident likelihood, and risk analysis is typical, appropriate and consistent with other similar potentially hazardous facilities QRAs. Therefore, the Department considers the methodology of the PHA to be acceptable. The Department also considers the methodology of the PHA to be consistent with that of the previously approved MOD 1 PHA.

Compared to the risk profile of MOD 1, the individual fatality risk contours remain largely unchanged as shown in *Figures 1 & 2*. Notably, the 50 chances in a million per year fatality risk contour from the facility (of relevance to industrial land use) remains within the boundaries of the site, as shown by the green contour in *Figure 2* below.



*Figure 1 – Individual Fatality Risk – MOD 1*



*Figure 2 – Individual Fatality Risk – MOD 2*



The toxic injury risk contours in *Figures 3 & 4* show that injury risk has marginally decreased due to the proposed MOD 2 changes associated with the Ammonia Management Improvement (AMI) program.



Figure 3 – Toxic Injury Risk – MOD 1



Figure 4 – Toxic Injury Risk – MOD 2

Conversely, the toxic irritation risk contours in *Figures 5 & 6* show that the risk of irritation has marginally increased. This is mainly due to the installation of additional ammonia piping necessitated by the proposed design improvements aimed at simplifying the ammonia distribution network (see section 1.4). Although slightly increased, this risk still complies with the Department's relevant land use safety risk criterion for toxic irritation risk of 50 chances in a million per year at residential and sensitive land use areas. The toxic irritation risk contour extends across the foreshore onto Stockton peninsula and skirts Fullerton Street, however it does not encroach onto any residential property (refer to *Figure 7*).



Figure 5 – Toxic Irritation Risk – MOD 1



Figure 6 – Toxic Irritation Risk – MOD 2



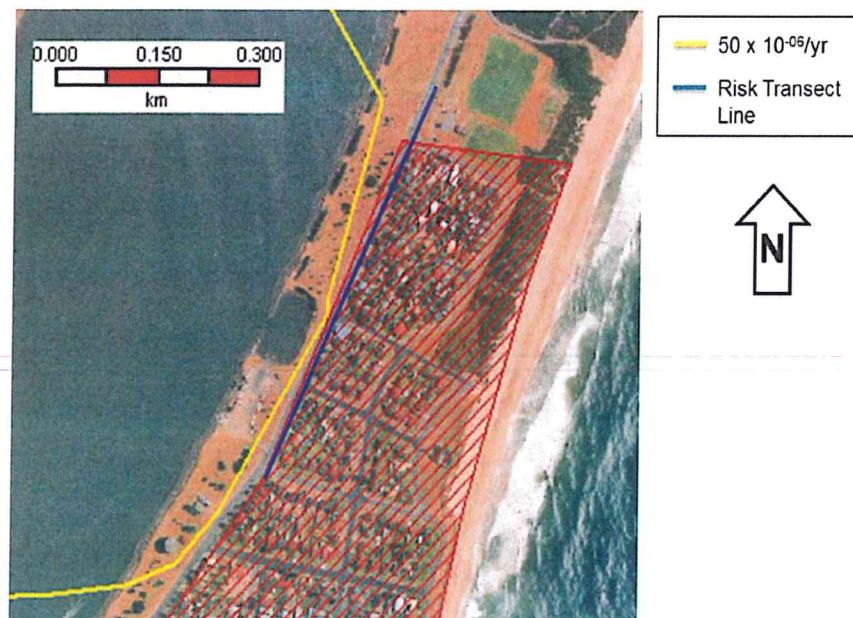


Figure 7 – Toxic Irritation Risk Close-up – MOD 2

The societal risk remains unchanged, as shown in the FN curves (relationship between cumulative event frequency and the cumulative severity of outcome, in this case fatality) in Figures 8 & 9. Societal risk is a measure which takes into account the fact that society is particularly averse to accidents with a potential to cause multiple fatalities. Societal risk is in the 'negligible' region. In this region, the societal risk is not considered significant provided that all other individual risk criteria are met, which is the case for MOD 2.

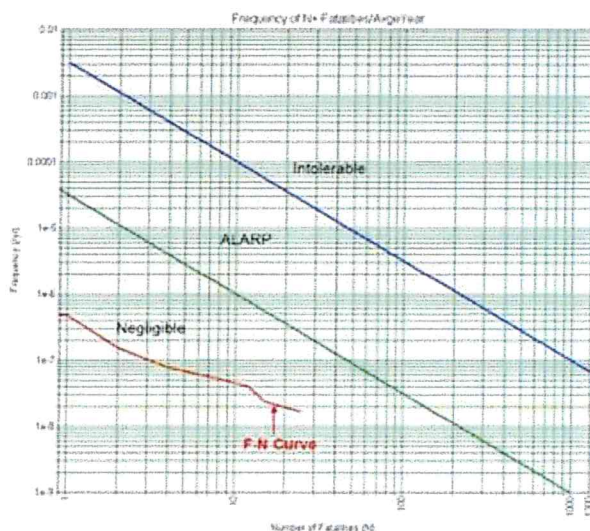


Figure 8 – Societal Risk – MOD 1

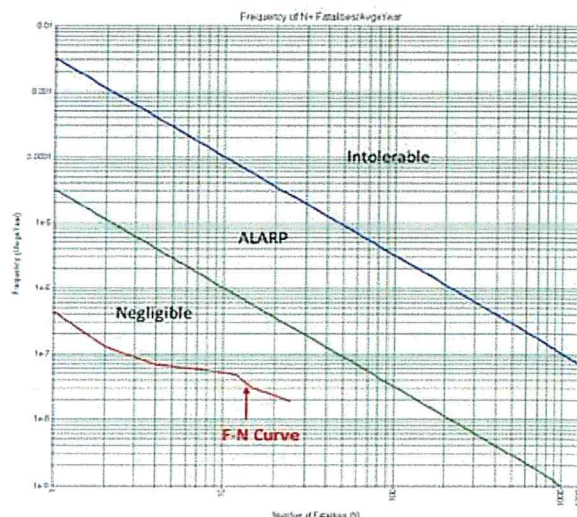


Figure 9 – Societal Risk – MOD 2

### Conclusion:

Therefore, the Department considers that all relevant risk criteria for “potentially hazardous” developments are met, and that the facility remains compliant with the land use safety planning risk criteria adopted in NSW and provided in *HIPAP No. 4*. The Department is also satisfied that the proposed changes associated with the modification (MOD 2) would not result in an increase in the offsite risks to people, and to all types of surrounding land use, when compared to the site’s offsite risk profile presented for MOD 1. Further, risks to the biophysical environment, and the risk of property damage and accident propagation to neighbouring industrial operations have been demonstrated to be compliant with the Department’s guidelines.



Based on the information provided in the "Orica Mining Services Kooragang Island Uprate PHA MOD 2, Rev1, May 2014" by GHD, including Appendix VIII "Nitric Acid Tank PHA, Rev C, May 2014" by Pinnacle Risk Management, and assuming that all contained risk reduction measures and PHA recommendations are implemented in accordance with the approval conditions, the Department is satisfied that the modified facility will, in general, continue to contribute to further risk reduction in the Kooragang Island area.

It is also noted that the existing site is registered as a Major Hazard Facility (MHF) and is regulated by the NSW WorkCover Authority under the *Work, Health and Safety Regulation 2011* (WHS Regulation). Like all operators of MHFs, Orica has certain obligations to continually manage and control on-site and off-site risk. The Department consulted with WorkCover during the assessment and the Authority has advised that there are no significant matters to preclude the modification from being approved subject to a number of conditions of approval being incorporated to ensure compliance with the WHS Regulation.

The Department has updated the existing Hazards-related conditions to modernise the wording of some of these conditions and to ensure consistency with the relevant findings of the Department's assessment undertaken for the adjacent IPL's proposed AN facility, including a requirement to comply with SAFEX stack distances. One other update of note to the conditions is a requirement for Orica to address all relevant findings and recommendations from the official investigation report(s) relating to the accident that occurred at West, Texas in April 2013.

## 5.2 Noise

The EA included a specialist Noise Impact Assessment (NIA) which was undertaken by AECOM in accordance with relevant policies and guidelines, and assessed the potential construction and (change in) operational noise that could be generated by the proposed new flare and altered tank infrastructure.

The model inputs included a range of variables such as topography and prevailing meteorological conditions (including temperature inversions which are known to be a feature of the area). Noise predictions were made from representative surrounding receivers, including the nearest sensitive receivers some 800m away in Stockton. The results were then compared against applicable noise criteria.

Further, the Department is satisfied that the noise modeling undertaken is sufficiently conservative and that the noise predictions are commensurate with the nature and scale of alterations proposed to and in the context of Orica's chemical manufacturing facility. The proposal has the potential to generate noise during:

- *construction* of the three flaring systems and NA storage tank and associated infrastructure;
- *routine operation* of the NA tank from pumps and pipework; and
- *non-routine operation* of the three ammonia flares, if activated.

### Construction

During construction of the new and modified infrastructure, there is the potential for adverse noise impacts. In recognition of this, Orica proposes to limit all construction activities to standard day time hours only and separate construction of the proposed flares and NA tank so they are not built concurrently (see Table 1).

For the sake of conservatism, the NIA assessed a worst case scenario which assumed that each piece of infrastructure would be constructed simultaneously. Irrespective of this, the combined level of construction noise at the nearest receivers to Orica's facility on Fullerton Street, Stockton were predicted to be around 49dB(A) which is 8dB(A) below the ICNG Noise Management Level (NML) of 57dB(A).



Similarly, predicted construction noise levels at all other receivers were found to easily comply with their respective NML's (RBL+10dB), including the sensitive receivers located in the residential suburbs of Carrington and Mayfield on the southern side of the Hunter River.

For construction traffic, the NIA predicted a slight (less than 1 decibel) increase to existing road traffic noise on Tourle Street and Nelson Bay Road (Stockton Bridge) which is considered negligible.

Overall, the Department is satisfied that construction noise is unlikely to have a detrimental impact on surrounding receivers primarily since these activities would take place during the less sensitive daytime period and that Orica has demonstrated that the applicable NML is very likely to be complied with at all times.

The existing hours of construction work would continue to be restricted to standard daytime hours except in certain circumstances (e.g. the works are inaudible or are required for an emergency). Orica is also required to prepare a Construction Noise and Vibration Management Plan as a subcomponent of a wider Construction Environmental Management Plan for the Project to manage the environmental impacts during construction of all project related plant and infrastructure.

### Operation

Operational noise has been categorised firstly into the *routine* noise which would be generated by the pumps and pipework needed to run the NA storage tank (and scrubber) and secondly, noise from the proposed flares which given their unpredictable nature, have been classified as *non-routine*.

#### *Routine Operation*

The primary noise source from the NA storage tank is a pump which is used to transfer NA around the facility. As the facility operates 24 hours, 7 days a week, this pump is required to be operated at any time on an as needed basis.

The Department has reviewed the results of the noise assessment and considers that routine operational noise from the facility, including the NA tank and associated infrastructure would likely be indistinguishable given the heavy industrial and port-related context in which the facility is located and that the noise predictions indicate continued compliance with the existing noise limits in the approval with night time noise levels of 30dB(A) predicted during adverse weather conditions.

#### *Non-Routine Operation*

As set out in Section 1, the proposed flare(s) would be activated infrequently as a safety measure to destroy Ammonia or Nitrates gases and relieve pressure build up in the Ammonia distribution system in the event of non-routine releases of these gases. As such, the flares could activate at any time of the day or night but as they are independent are highly unlikely to be in operation simultaneously.

Figure 2 shows the location of the proposed flares and Table 3 shows the anticipated duration and frequency of operation of each of the proposed flares.

*Table 3: Duration and Frequency of each new flare*

Flare Description	Flare A	Flare B	Flare C
Flare Designation	Nitrates	Ammonia Tank	Ammonia Plant
Duration	5 Minutes	Up to a few weeks	5 Minutes
Frequency	1 to 2 years	1 to 10 years	1 to 2 years

To fully gauge the level of potential impact, the NIA predicted worst-case noise emissions assuming the flares were activated and in operation independently and simultaneously, during normal and adverse weather conditions. The assessment was carried out in accordance with the INP, with the addition of 5dB(A) for the impulsive nature of the noise source and the application of short-term noise criteria for Flares A and C and long-term noise criteria for Flare B (being 5d(B)A more stringent than the short-term limits) given the longer operating time.

In summary, the assessment found that:



- Flare A, the closest to Stockton, would comply with noise limits during normal weather conditions, marginally exceed noise limits by 1-3dB(A) during adverse weather conditions and exceed sleep disturbance criteria by up to 7dB(A) during adverse weather conditions;
- Flare B would comply with noise limits during normal weather conditions, exceed the limits during adverse weather conditions by 1-3dB(A) in Stockton and 5dB(A) in Carrington but would comply with sleep disturbance criteria during all weather conditions;
- Flare C would exceed current noise limits by up to 2dB(A) during normal weather conditions in Carrington and 6dB(A) during adverse weather conditions in Stockton and Carrington. Sleep disturbance criteria would be exceeded in Stockton by 5dB(A) during normal weather and 10dB(A) during adverse weather. There would be no exceedance of sleep disturbance criteria at Carrington; and
- When combined, the three flares would exceed current noise limits by up to 4dB(A) at Carrington during normal weather conditions and 8dB(A) during adverse weather conditions at Stockton.

The Department and the EPA acknowledge that non-routine operational noise emissions generated when the flares become active events could have an adverse impact on surrounding sensitive receivers at night, to varying degrees, including the potential for sleep disturbance in some cases. However, it is further acknowledged that noise impacts from flaring would occur infrequently and that these impacts would be experienced for a relatively short period of time.

These noise impacts must be considered against the significant positive benefits that the flares would have on the local community in the event of a Plant upset. The Department and EPA both agree that whilst flaring noise has the potential to adversely affect certain sensitive receivers at night, the safety benefits to the local community, workers onsite and any other people in the vicinity of the new flares would, on balance, outweigh these residual noise impacts.

As such, the Department and the EPA recommend that the flaring systems, once activated and in operation, should not be required to comply with the existing noise limits in the approval, and an exclusion to this effect would be added to the existing approval condition containing the noise limits.

To minimise flaring impacts, additional conditions are recommended to be included in the approval requiring Orica to operate the flares in a proper and efficient manner in accordance with relevant EPL requirements, update the company's community communication system to include information on and notification during flare activation and operation and to prepare and submit a flare activation report to the Department and other relevant government agencies within 7 days of an activation taking place.

The Department also recommends that the requirements of the Noise Management Plan be enhanced to reflect the requirements of other, more recent planning approvals. As part of the Plan, Orica is required to describe the measures that will be implemented to prevent and minimise potential adverse noise and vibration impacts from the Project, including:

- reasonable and feasible measures being employed on the Project site;
- plant and equipment being maintained to ensure that it is in good order;
- how potential noise and vibration impacts will be minimised and managed; and
- identification of the likely nature and timing of Project-related activities and works that could generate potential elevated noise emissions and a description of the mitigation measures that will be implemented to ensure compliance with the relevant conditions of this approval and the EPL.

In conclusion, non-routine, flaring noise could cause some occasional and short term noise impacts to some surrounding receivers including possible sleep disturbance. Despite this, the Department and the EPA agree that these short term amenity impacts are outweighed by the long term safety benefits that the proposed flaring systems would bring to local residents, workers on Kooragang Island and other people.

The Department is satisfied that the potential construction and noise impacts from operating the larger, relocated NA tank would not adversely affect the existing amenity of surrounding sensitive receivers.



### 5.3 Other Issues

Table 3: Assessment of other issues

Issue	Assessment	Recommendation
Air Quality	<ul style="list-style-type: none"> <li>The EA included an air quality impact assessment (AQIA) prepared by AECOM in accordance with the EPA's <i>Approved Methods for Modelling and Assessment of Air Pollutants in NSW</i>.</li> <li>During construction, the primary source of air pollution would be from vehicle generated emissions and dust but this impact would be minor because construction works would be confined to existing hardstand areas and would be temporary and relatively short-term (15 months).</li> <li>Construction of the flares and NA tank would be effectively managed under a Construction Environmental Management Plan.</li> <li>The AQIA modelled emissions from routine operations comprising the existing operations and the emissions from the modified NA tank and scrubber and also modeled a worst-case emissions scenario which assumed the simultaneous operation of all three ammonia flares (non-routine operations). A cumulative air impact assessment was also undertaken which took account of the predicted air emissions generated by Orica's modified facility and combined these results with the air modeling results in the AQIA which was carried out by Incitec Pivot to assess the potential air quality impacts of the proposed development of its ammonium nitrate manufacturing facility on an adjacent site.</li> <li>The AQIA included highly conservative assumptions and presented a worst-case assessment scenario.</li> <li>The air pollutants modeled and assessed were oxides of nitrogen [measured as nitrogen dioxide (NO<sub>2</sub>)] and ammonia (NH<sub>3</sub>).</li> <li>The AQIA predicted that ground level concentrations of NO<sub>2</sub> and NH<sub>3</sub> would meet applicable EPA air quality criteria during routine and non-routine Orica operations. The same conclusion was also reached for the cumulative case.</li> <li>Given the conservative nature of the assessment and given that emissions of oxides of nitrogen and ammonia are predicted to be below relevant assessment criteria, the Department is satisfied that the modification would not adversely impact on local or regional air quality.</li> <li>The EPA did not raise any concerns in relation to air quality and recommended that the recommended conditions include a requirement for Orica to carry out an Air Quality Verification Study for the NA storage tank scrubber stack, flare activation reporting, that there is a visible flame present when operating the flares (this wording was updated to refer to the flares being operated in a proper and efficient manner).</li> <li>The Department has incorporated the EPA's requirements as additional conditions to be inserted as requirements of the project approval.</li> <li>Additional updated conditions are also recommended to ensure the air quality impacts of the modified facility would be acceptable and appropriately managed.</li> </ul>	<p>Recommend additional conditions requiring Orica to:</p> <ul style="list-style-type: none"> <li>conduct an air emissions verification study following commissioning of the NA tank and scrubber stack;</li> <li>operate the flaring system in a proper and efficient manner in accordance with the EPL;</li> <li>provide a flare activation report to the Secretary, EPA and other relevant agencies within 7 days of any activation;</li> <li>implement all reasonable and feasible air quality mitigation measures to minimise the potential risks to air quality in the regional air shed;</li> <li>prepare and implement an Air Quality Management Plan which describes the measures that will be implemented to minimise the potential risks to air quality in the regional air-shed including: <ul style="list-style-type: none"> <li>reasonable and feasible measures being employed on the Project site;</li> <li>plant and equipment being maintained to ensure that it is in good order;</li> <li>how the air quality impacts of the Project will be minimised and managed; and</li> <li>identification of the likely nature and timing of Project-related activities and works that could generate potential elevated air emissions and a description of the mitigation measures that will be implemented to ensure compliance with the relevant conditions of this approval and the EPL.</li> </ul> </li> <li>consult with the operators of the proposed IPL AN facility (if approved and becomes operational) with the objective of developing an Air Quality Risk Management Strategy; and</li> <li>publicly report all air quality results monitoring results, and effectively respond to enquiries and complaints.</li> </ul>
Visual Amenity	<ul style="list-style-type: none"> <li>A visual impact assessment (VIA) was undertaken by AECOM to evaluate the visual impact of the proposed AN tank and three flares from two representative receiver locations in Stockton, approximately 760m east and south of the site.</li> <li>The height of the key pieces of equipment to be constructed as part of the modification include: <ul style="list-style-type: none"> <li>Flare A: Nitrates Plant – 8m high, with 18m high flame;</li> <li>Flare B: Ammonia Storage Tank– 5m high, with 10m high flame;</li> <li>Flare C: Ammonia Plant – 20m high, with 36m high flame;</li> <li>AN Tank – 25m high by 25m wide with 25.5m high</li> </ul> </li> </ul>	<p>Orica has made a commitment that all infrastructure will be maintained to a high standard and appearance with a focus on the external skin of the nitric acid tank.</p> <p>Existing conditions also require Orica to:</p> <ul style="list-style-type: none"> <li>prepare and implement a Landscaping Plan for the site; and</li> <li>ensure that all lighting meets relevant Australian Standards and is directed to ensure that it does not create a nuisance to surrounding properties or</li> </ul>



Issue	Assessment	Recommendation
	<p>scrubber stack.</p> <ul style="list-style-type: none"> <li>• The VIA showed that Flares A and B would not be visible from Stockton as they would not protrude above existing site infrastructure unless the flame is activated.</li> <li>• The NA tank, scrubber stack and Flare C would be visible from Stockton but would be largely consistent with the existing industrial skyline, considering: <ul style="list-style-type: none"> <li>– Kooragang Island is characterised by large industrial structures, including the existing NA Plants on site ranging from 55m to 84m;</li> <li>– the height of the flares would be less than a number of the existing stacks ranging from 48m to 84m and the 3 main stacks approved as part of the expansion project at 65m high;</li> <li>– all new flares would be designed or painted so that they are non-reflective; and</li> <li>– much of the views to the new NA tank and scrubber stack would be shielded by existing vegetation on the eastern side of the site.</li> </ul> </li> <li>• The flaring of ammonia produces a less prominent blue coloured flame, which would be most visible during the night time period. Flaring would occur very infrequently and for short periods, hence the visual impacts of flaring would be acceptable.</li> <li>• No public submissions raised concerns about visual impacts.</li> <li>• The Department concludes that the bulk, height and scale of the modification would be consistent with the existing and approved structures on site and other heavy industry on Kooragang Island.</li> <li>• The Department is satisfied that the visual impacts of the modification would be minor and has recommended conditions requiring the flares to be constructed of non-reflective metals or painted.</li> </ul>	<p>the public road network.</p> <p>No additional conditions required.</p>
Soil and Water	<ul style="list-style-type: none"> <li>• During construction, soil and water impacts are expected to be minor given works would generally be confined to existing hardstand and excavations would be shallow (around 1m below ground level). Soil and water would be managed in accordance with the approved CEMP for the project.</li> <li>• During operation, the proposal is expected to result in a minor increase in hardstand areas (i.e. around 1,500m<sup>2</sup>) generating additional stormwater run-off, which would be adequately accommodated by the existing stormwater management system.</li> <li>• The proposed modification would not be located on any areas of the site known to be contaminated and subject to the Remedial Action Plan currently being implemented by Orica.</li> <li>• A preliminary soil investigation undertaken at the proposed location of the NA tank revealed low propensity acid sulphate soils (ASS), which would be managed in accordance with the existing ASS Management Plan for the site.</li> <li>• The proposed modification would also result in a slight increase in potable water use for dilution water supply to the NA tank scrubber, which is within the existing site water supply limits.</li> <li>• The EPA did not raise any concerns in relation to soil or water.</li> <li>• The Department is satisfied that the soil and water impacts of the modified facility would be minor and appropriately managed in accordance with the existing conditions.</li> </ul>	<p>No additional conditions are required.</p>
Wastewater	<ul style="list-style-type: none"> <li>• The modification is expected to result in a negligible increase in wastewater as effluent discharge from the NA tank scrubber will be recycled back to the NA tank rather being directed to effluent.</li> <li>• A small quantity of effluent may be generated in the NA</li> </ul>	<p>No additional conditions are required.</p>



Issue	Assessment	Recommendation
	<p>pump and NA scrubber bund area/s and during tank and scrubber maintenance periods, however this volume would be within existing EPL limits.</p> <ul style="list-style-type: none"> <li>The Department is satisfied that the proposed modification would result in a negligible increase in wastewater and can be effectively managed in accordance with existing conditions.</li> </ul>	
Greenhouse Gas (GHG)	<ul style="list-style-type: none"> <li>The proposed modification would increase Scope 2 and 3 GHG emissions as a result of electricity consumed by the NA tank scrubber and transfer pumps, natural gas consumed by the ammonia flares and NA tank lighting.</li> <li>The proposed modification would generate an additional 774 tonnes of carbon dioxide equivalent (CO<sub>2</sub>-e) a year, representing a 0.05% increase in overall CO<sub>2</sub>-e generated at the site.</li> <li>Based on the above, the Department is satisfied that the proposed modification would result in a negligible increase in GHG emissions at the site.</li> </ul>	No additional conditions are required.
Transport	<ul style="list-style-type: none"> <li>Construction of the modification would generate minimal additional traffic, estimated at 5 heavy vehicles and 10 light vehicles per day, which would be adequately accommodated on the local road network without adverse impact on intersections, safety or capacity.</li> <li>Operation of the AN tank would require 1 ship movement per month to transfer AN via pipeline to the tank. The additional shipping movements are minor and would be managed via the existing systems of the Port of Newcastle.</li> </ul>	No additional conditions are required.
Aviation Safety	<ul style="list-style-type: none"> <li>Council advised that the Orica site is located within 'protected airspace', being within 15km of Newcastle Airport and the RAAF Base at Williamstown.</li> <li>Council advised that Orica may require approval from the RAAF Base in Williamstown for any construction cranes or permanent structures greater than 30m in height to ensure aircraft flight safety.</li> <li>In the RTS, Orica committed to satisfying this requirement and the Department has incorporated Council's request into the recommended conditions.</li> </ul>	<p>Recommend conditions requiring Orica to:</p> <ul style="list-style-type: none"> <li>obtain approval from the RAAF Base in Williamstown for the erection of all structures and use of construction cranes that exceed 30m in height, prior to the commencement of construction.</li> </ul>
Development Contributions	<ul style="list-style-type: none"> <li>Council requested that the development contributions agreed in the 2009 project approval be revised to reflect the increased capital investment value of the project due to the modification.</li> <li>The Department notes that the development contributions negotiated following the 2009 project approval were Section 94 contributions which Orica paid in 2010 following agreement with Council.</li> <li>Council has now requested payment in accordance with its Section 94A Development Contributions Plan 2013.</li> <li>The Department notes that Section 94A contributions cannot be levied in accordance with this plan, as Section 1, Clause 6, Subclause 2 of Council's plan states that Section 94A contributions cannot be levied where Section 94 contributions have been applied.</li> <li>In addition, the modification involves the implementation of safety measures that would not result in increased demand on local services.</li> </ul>	No amended conditions are required.

## 6. CONCLUSION

The Department has assessed the proposed modification in accordance with the requirements of Clause 8B of the EP&A Regulations. This assessment has found that the proposed modification:

- would result in some additional environmental impacts but that these impacts can be either managed and mitigated to within acceptable limits or are considered tolerable;
- would cause operational noise impacts when flares are activated which could have an adverse affect on existing amenity including sleep disturbance but these impacts are outweighed by the positive safety benefits of the flaring systems and the contribution that they would make to reducing risk;



- would significantly improve ammonia management and reduce offsite risk; and
- would allow Orica to increase its ammonium nitrate production capacity above current levels and remain within approved production limits.

The Department has assessed the merits of the proposal in accordance with the requirements of the EP&A Act. This assessment has found that the proposed modification is unlikely to cause any significant impacts.

The modification involves construction and implementation of safety measures to ensure that risks from the facility are minimised and maintained below relevant land use safety criteria.

Consequently, the Department is satisfied that the modification is in the public interest and should be approved, subject to conditions.

## 7. RECOMMENDATION

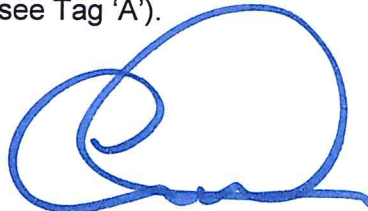
Under delegation, it is RECOMMENDED that the Executive Director, Infrastructure and Industry Assessments:

- **determine** that the proposed modification is within the scope of section 75W of the EP&A Act;
- **approve** the application subject to conditions; and
- **sign** the attached notice of modification (see Tag 'A').



Chris Ritchie  
Manager  
Industry Assessments

17/12/14



Chris Wilson  
Executive Director  
Infrastructure and Industry Assessments

17.12.14