Orica Australia Pty Ltd
20 April 2011

Kooragang Island Facility Uprate

Modification Request

Kooragang Island Facility Uprate

Modification Request

Prepared for

Orica Australia Pty Ltd

Prepared by

AECOM Australia Pty Ltd
Level 8, 17 York Street, Sydney NSW 2000, Australia
T +61 2 8023 9333 F +61 7 8023 9399 www.aecom.com
ABN 20 093 846 925

20 April 2011

60196632

AECOM in Australia and New Zealand is certified to the latest version of ISO9001 and ISO14001.

Quality Information

Document Kooragang Island Facility Uprate

Ref 60196632

Date 20 April 2011

Prepared by Ruth Baker

Reviewed by Scott Jeffries

Revision History

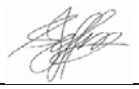
Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
V1	04-Apr-2011	Draft for Internal Review	Scott Jeffries Associate Director - Environment	
V2	05-Apr-2011	Draft for Client Review	Scott Jeffries Associate Director - Environment	
V3	20-Apr-2011	Final	Scott Jeffries Associate Director - Environment	

Table of Contents

1.0 Introduction

1.1 Overview

Orica Australia Pty Ltd's Ammonium Nitrate Expansion Project (Application 08_0129) was subject to an Environmental Assessment (EA) undertaken by AECOM Pty Ltd. The EA was submitted to the Department of Planning (DoP, now the Department of Planning and Infrastructure) in June 2009 and was approved on 1 December 2009.

Since that time, the project has entered the detailed design process with the technology aspects also being finalised. As a result of this refinement of the design and final selection of technology some minor elements of the project have changed from that outlined in the EA.

This report has been prepared by AECOM to outline the project changes referencing the EA, the Submissions Report and Project Approval, with consideration of s75W of the *Environmental Planning and Assessment Act 1979* (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.

1.2 Structure of this Report

Chapter 2 provides:

- An overview of the approval pathway to date;
- An overview of the approved project;
- A discussion of the proposed project amendments;
- Details of the Applicant;
- Discussion of agency consultation undertaken for this modification; and
- Details of the Modification Request.

Chapter 3 provides:

- Air Quality assessment;
- Hazard and Risk assessment;
- Noise assessment; and
- Overview of other environmental issues relating to the EA, Statement of Commitments, Submissions Report and Project Approval Conditions.

There are four technical appendices to this report providing the detailed site layout as well as the background to the air quality, hazard and risk and noise results.

2.0 Approved Project and Amendments

2.1 Approval Pathway

An EA was prepared for the Ammonium Nitrate Facility Expansion on Kooragang Island (Expansion Project) by AECOM under s75F of the EP&A Act to support an Application for Project Approval under Part 3A of the EP&A Act. The EA was submitted to DoP in June 2009.

A Submissions Report was prepared to respond to the twelve submissions received during the exhibition period. The submissions received were from both private individuals as well as government bodies and related primarily to hazard and risk, stormwater and water cycle management, air quality impacts and the provision of a Construction, Safety and Environmental Management Plan. The Submissions Report was submitted to DoP in September 2009.

The Expansion Project – Project 08_0129 – was approved on 1 December 2009.

2.2 The Approved Project

Approval was gained for the proposed expansion to the Ammonium Nitrate Facility located on Kooragang Island. The proposed expansion of the Ammonium Nitrate Facility included:

- An additional Nitric Acid Plant (NAP4);
- An additional Ammonium Nitrate Plant (ANP3);
- Modification of the existing Ammonia Plant;
- Additional storages for nitric acid, 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 production constraints for the Project Site of:

- 360,000 tonnes per annum (tpa) of ammonia product;
- 605,000 tpa of nitric acid product; and
- 750,000 tpa of ammonium nitrate product.

The layout of the project as approved is shown in **Figure 1**.

2.3 Project Amendments

The primary amendments relate to the layout of the project elements. Orica has also made changes to the choice of plant and equipment for the project associated with finalising technologies and capacities for individual plants. Although changes to plant and equipment are considered to be consistent with the terms of the Project Approval, and therefore need not be subject to this Modification Request, they have nonetheless been outlined in this report for completeness.

2.3.1 Project Layout

The key changes to the project layout are:

- Ammonium Nitrate (AN3) has been re-located from its originally proposed position further to the north and west, positioned amongst the bulk and bag storage and further away from Stockton;
- Incorporation of the AN3 wet section into the new NAP4 plant;
- Demolition of the existing bag store and replacement with a new bag store of same capacity at the southern end of the site.
- The bag and bulk store and container storage areas have been shifted slightly to the west and re-orientated to accommodate the AN3 position; and
- Relocation of the new boiler closer to its usage point at the NAP4.

The layout changes are shown in detail in **Appendix A**. The amendments as comparison to the approved layout as shown in the original EA are illustrated in **Figure 2**.

G:\Projects\601 Projects\60196632 Orica Kooragang Island\60196632 F1 Initial Proposed Site Layout 15 04 2011

AECOM

INITIAL PROPOSED SITE LAYOUT

Environmental Assessment

Proposed Ammonium Nitrate Facility Expansion, Greenleaf Road, Kooragang Island

FIGURE 1

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	7	Boiler Plant	11	AN Bulk Storage
4	Nitric Acid Plant 3	8	ANS	12	Bagged Product Storage

Proposed 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

Proposed 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

Proposed Infrastructure Key (33 - 38)

33 Transformers	39 New FEL workshop and forklift parking
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**)

0 100 200m

G:\Projects\60116019632\Orica Kooragang Island\60196532 P2 Proposed Site Layout Rev A 15.04.2011

AECOM

PROPOSED SITE LAYOUT

Environmental Assessment
Proposed Ammonium Nitrate Facility Expansion, Greenleaf Road, Kooragang Island

FIGURE 2

These changes have been developed via the detailed design and engineering process including layout optimisation studies seeking to improve safety and risk outcomes. As a result, the layout changes have been proposed for a variety of reasons, including:

- Improved internal traffic management;
- Minimisation of lengthy potentially hazardous pipe runs through the site;
- Minimisation of construction in existing operating plant zones; and
- Optimisation of project cost.

2.3.2 Plant and Equipment

In addition to the changes in plant layout, Orica has finalised its selection of technology vendor and capacities for the nitric acid plant and associated ammonium nitrate solution plant. This has included a selection of plant capacity for the nitric acid plant and ammonium nitrate solution plant 20% larger than described in the environmental assessment. This has been driven by opportunities presented in the identification of a "copy plant" for the production of nitric acid and ammonium nitrate solution, that is, a plant using the same technology that has been recently built and is being operated elsewhere in Europe. This has the advantage of providing proven operability and track record for the selected technology.

The solid ammonium nitrate (Nitropril ®) plant is being designed by Orica.

These changes in capacity rates mean that the potential maximum production rates are correspondingly higher (these are summarised in **Table 1** below for clarity). However, it is not Orica's intention to operate to a higher capacity than that described in the EA. It remains Orica's intention to operate within the capacity limits specified in its current Project Approval.

Table 1 - Current Production and Future Production Rates

Product / Intermediate	Current Production *ktpa*	Current Project Approval Limits *ktpa*	Possible Capacity of Current Selected Plant *ktpa*
Ammonia	295	360	360
Nitric Acid	345	605	660
Ammonium nitrate	430	750	830

One of the principle means of achieving this would be to run the new copy plant at peak capacity and to run the older existing plant at the site at a lower capacity. This would ensure compliance with the production limits in the Project Approval as well as running newer and more efficient plant over the older less efficient plant.

The above changes to plant equipment have been incorporated into the studies contained within this report along with a number of other minor changes which include:

- Using ammonia for cooling in the AN dry plant, there are some additional vessels/exchangers in the AN dry plant and an ammonia compressor in the NA plant;
- Separating the AN wet section from the AN dry section and locating the wet section to the east of the nitric acid plant where it is partially integrated into the nitric acid plant (e.g. common ammonia vaporisation);
- Reconfiguration of pressurised ammonia storage onsite with installation of a new 30-tonne bullet (No.6) and decommissioning of No.1 bullet closest to the plant boundary; and
- A single 2,000-tonne Nitric Acid storage (previously two 1000 tonne tanks)

2.4 The Proponent

The proponent for the approved project and the modification is Orica Australia Pty Ltd (Orica). Orica is an independent, Australian-owned company which operates through the following business platforms:

- Mining Services - offers commercial explosives, initiating systems and blast-based services to the mining, quarrying and construction industries;
- Minova - supplies specialist chemical products for underground mining and civil engineering activities; and
- Orica Chemicals - is a major supplier and trader of chemicals, services and technology to the water treatment, mining chemical and industrial chemical markets.

The Kooragang Island site is a part of Orica's Mining Services business platform, primarily providing ammonium nitrate which is utilised in the manufacture of commercial explosives for the mining and quarry industries.

2.5 Agency Consultation

Consultation was undertaken with DoP by Orica and AECOM on three separate occasions:

- Orica consulted with Derek Mullens of the Major Hazard Unit of DoP on 7 February 2011;
- A meeting was held with Orica, AECOM and DoP at Bridge Street on 9 March 2011; and
- A meeting was held with Lilia Donkova of the Major Hazard Unit of DoP on 28 March 2011 to discuss with Hazard & Risk Report.

At the meeting on 7 February 2011 an overview of the project amendments was presented. DoP advised that only the location changes of project elements would be considered to require a modification under s75W of the EP&A Act as other amendments would be deemed to be consistent with the original approval. Nonetheless they have been included here for clarity, given that the modelling for air, hazard and noise has included the updated plant designs.

DoP also provided its requirements in relation to what should be addressed in this Modification Request. These requirements included an updated assessment of air quality, hazard and risk and noise issues.

2.6 Modification Request

This report has been prepared to support a Modification Request in relation to Project Approval 08_0129. The amendments to the project relate to the location of items within the Project Area and do not relate specifically to any of the Project Approval conditions. As such, the only condition that would be required to be modified is Schedule 2, Condition 2 as follows (amendments shown in coloured text):

The Proponent shall carry out the Project generally in accordance with the:

a) EA;

b) Statement of commitments;

c) Submissions Report;

d)** Conditions of this approval; **and

e) The report supporting the Modification Request (AECOM, April 2011).

Schedule 2, Condition 3 states that *"If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency."* This condition is supportive of an additional document within Condition 2, providing for the inconsistencies between the EA and this Modification Request.

3.0 Environmental Assessment

3.1 Air Quality

When minor changes to the project as presented in the original EA were identified, Orica undertook a "Consistency Report" with respect to key elements of the assessment. The assessment covered both the layout changes (as outlined for this Modification) and a change in NAP4 and AN3 wet section plant type with a greater capacity. This change in plant type and capacity was discussed with DoP and, since no change in the approved production limits was to be sought, it was determined that the proposed plant and equipment changes are consistent with the Project Approval.

The Air Quality Consistency Report in (provided in **Appendix B**) outlines the results of both layout and plant and equipment changes. Both are presented in full as the changes to the assessment results for the layout amendment are inherently based on the changes in results for the new plant type. The assessment report shows the results from the new modelling to illustrate that the changes are minor and as such are consistent with the results in the original EA. Some of the key results are:

- **Nitrogen dioxide:** The highest predicted concentrations occurred at an industrial receiver on Kooragang Island. No exceedances of the guideline criteria were predicted.
- **Total Suspended Solids:** No exceedances of the guideline criterion were predicted. There was very little difference between predicted maxima from the 2009 EA and this report (i.e. maximum predicted difference of 0.4 $\mu g/m^3$). In addition it should be noted that predictions at some modelled locations were shown to decrease as a result of the modification. As such, the revised proposal is expected to have the same effect on local TSP levels as the approved proposal.
- **Fine Particulates:** Only minor differences were predicted between the approved and revised proposed projects with the maximum difference between the predicted maxima being 2.2$\mu g/m^3$ for the 24 hour averaging period and 0.2 $\mu g/m^3$ for the annual averaging period. The revised proposal is, therefore, considered to have the same effect on local PM_{10} levels as the approved proposal. It is noted that the modification to the emissions is predicted to result in a minor exceedance of the 24 hour assessment criterion at Receptor 3. Given the very low level of the predicted exceedance (0.4$\mu g/m^3$) it is considered unlikely that this exceedance would be able to be distinguished from the concentration predicted in the 2009 EA. In addition, given the conservative nature of the assessment (plant operating 365 days per year and at maximum throughput), this exceedance is not considered likely to cause any adverse effects. As noted in the original EA, Orica is in the process of investigating options for reducing emissions from the ANP1 Prill Tower in keeping with its commitments. As this represents the largest particulate point source on the site, any reduction in emissions would be expected to result in the reduction of the predicted emissions to levels well below the assessment criteria.

3.2 Hazard and Risk Assessment

The Hazard and Risk Assessment undertaken for the purposes of reviewing consistency of the amendments against the results of the hazard and risk assessment in the EA is provided in **Appendix C**.

The Quantitative Risk Assessment (QRA) model developed in the original PHA was updated to incorporate the changes to the design and layout of the new plant and equipment. As with the Air Quality assessment, the changes in the layout were inherently linked with changes in the plant selection and so both were assessed together.

The original PHA model (developed using SAFETI v6.42) was converted into the newer version of Phast Risk v6.53. This is due to the fact that DNV no longer supports SAFETI v6.42. Significant updates to the SAFETI / Phast Risk software have resulted in a noticeable impact on the injury and irritation risk contours, mainly larger for the model created using Phast Risk v6.53. This is due to numerous changes made to the software relating to the toxic modelling and property data in order to reflect latest research.

The risk contours for the layout change only differ slightly to the contours created for the original PHA case using Phast Risk v6.53. The updated PHA confirms that the contours of the design and layout changes comply with all of the risk criteria given in HIPAP No 4. This has also resulted in condition 18. (Risk Reduction Program) of the Project Approval pertaining to the new plant and equipment overpressure propagation contour being addressed in the project design.

3.3 Noise Assessment

The Noise Assessment undertaken for the purposes of reviewing consistency of the amendments against the results of the Noise assessment in the EA is provided in **Appendix D.**

As with air and hazard and risk, the new plant type was inherent in the re-modelling. The modelling of the locational changes shows that there is a reduction of noise at key receivers from the original EA due to the relocation of AN3 and its shielding by other buildings on site.

3.4 Visual Assessment

With respect to the potential visual amenity impacts, minor changes in the location and physical scale of plant and equipment is expected to alter the visual appearance of the project. The table below is reproduced from Chapter 15 of the EA.

Table 2 – Approximate Dimensions of Proposed Infrastructure of Visual Significance

Item	Height (m)	Diameter/Width (m)
Stacks/Columns/Towers		
Pre-reformer stack	27	1.35
NAP4 stack	55	1.4
NAP4 absorber	55	4.4
Ammonia scrubber vent stack	55	0.16
AN3 prill tower	Up to 65	Up to 6
AN3 final scrubber stack	24	1.7
AN3 ammonia scrubber vent stack	24	0.2
Boiler stack	40	1.4
Major Buildings & Structures		
NAP4 structure	25	35x35
AN3 building/structure	25	65x30
AN3 bulk store	15	70x35
Road bulk loadout building	25	37x13
NAP4 cooling tower	15	50x10

In comparison with table 2, there are no changes to the dimensions with the exception of the NAP4 absorber which is anticipated to be an additional 0.4m in diameter and an additional 5m in height. With reference to the assessment in Chapter 15 of the EA and the photomontages as illustrated in Figures 15.2 and 15.3 of the EA, it is not anticipated that these changes would affect the results of that assessment. Nor would it change the Project Approval conditions (specifically Schedule 3, condition 45 with respect to visual impacts).

In terms of the locations, one of the more visually intrusive elements was the proposed AN3 and prill tower (refer Figure 15.2 of the EA). This will be relocated slightly further away from Stockton residents and would appear in view from Stockton as closer to the existing prill tower. Visually, this is likely to be marginally better as it groups the taller and more intrusive buildings together more. However, overall, the location changes are still consistent with the assessment, findings and mitigation measures proposed in the EA.

3.5 Other Environmental Issues

The proposed project changes are consistent with the findings and proposed mitigation measures outlined in the EA which included:

- **Greenhouse Gas Emissions**. The project changes would not affect the emission of GHG's as assessed in the EA
- **Traffic**. While the layout changes are more beneficial to internal traffic systems, the access and external traffic as assessed in the EA remain the same and no additional traffic requirements result from the proposed amendments;

- **Surface Water Quality**. The total hardstand areas generally remain the same and onsite catchment management is undertaken via the existing Environmental Management Plan. The layout changes remain consistent with the requirements as laid out in the EA, Statement of Commitments and Project Approval.

  The site effluent is likely to experience a minor increase in flow associated with increased cooling water blowdown from that identified in the EA. This minor increase will remain within the site effluent discharge flow limits.

- **Resource Implications**. The plant and equipment changes to NAP 4 require a minor increase in water use from 3.6 to 3.8 ML/day resulting in a project increase from 4.8ML/day to 5.0ML/day. Orica will continue to progress discussions with Hunter Water relating to use of recycled water and any additional measures identified during the preparation of the water efficiency plan.

  There is likely to be some additional reductions in electricity as the motor generator on the new NAP 4 plant will return 2.6MW from the previously identified 2.2MW.

- **Soil and Groundwater**. The layout changes are confined to the southern end of the site and have not brought any of the construction activities within the location of the arsenic contamination currently being treated under the sites Voluntary Remediation Agreement;

- **Flora and fauna**. The site is highly disturbed, lacking any undeveloped Greenfield areas. As such, the proposed layout changes do not change any implications for flora and fauna;

- **Heritage**. Similar to the flora and fauna, the lack of undeveloped areas mean that the location changes to not affect the conclusions made with respect to heritage;

- **Climate change**. The project changes are not expected to result in any implications with respect to climate change – neither the effect of the project on potential climate change, nor the effect of climate change on the proposed project. Orica will continue to meet its conditions of approval and statements of commitment for the implementation of emissions reduction technology as identified in the EA,. and

- **Waste**. No additional solid waste is expected to be generated by the proposed project changes.

3.6 Consistency with the Statement of Commitments

None of the items within the Statement of Commitments will require amendment on the basis of the proposed changes to the project.

3.7 Consistency with the Submissions Report

Submissions were received on a variety of topics including:

- Hazard and risk;
- Water management;
- Traffic and transport;
- Adjacent land uses;
- Construction, Safety, Environmental Management Plan; and
- Noise Management.

None of the issues raised, nor the responses to them would be affected by the proposed changes to the project.

3.8 Consistency with the Project Approval

The updated project is consistent with all other clauses of the Project Approval. The only amendment required is as outlined in **Section 2.6** of this report.

4.0 Conclusion

Under s75W of the EP&A Act, the Minister may approve a modification to an approved project. This report has been prepared in consultation with DoP to support an application to modify Project Approval 08_0129. The element to be modified relates to the change of layout proposed as identified in **Figures 1** and **2** of this report.

Orica has undertaken an assessment to identify elements that may differ from the original EA. As such, this report incorporates detailed Air Quality, Hazard and Risk and Noise reports in relation to the proposed project changes. These assessments confirmed that the project changes would not result in any significant changes to the project and that all effects remain within acceptable limits. In addition, the project changes would not require modification to any of the elements within the Project Approval.

The amendments to the project relate to the location of items within the Project Area. They do not relate specifically to any of the Project Approval conditions. As such, the only condition that would be required to be modified is Schedule 2, Condition 2 (amendments shown in coloured text):

The Proponent shall carry out the Project generally in accordance with the:

f) EA;

g) Statement of commitments;

h) Submissions Report;

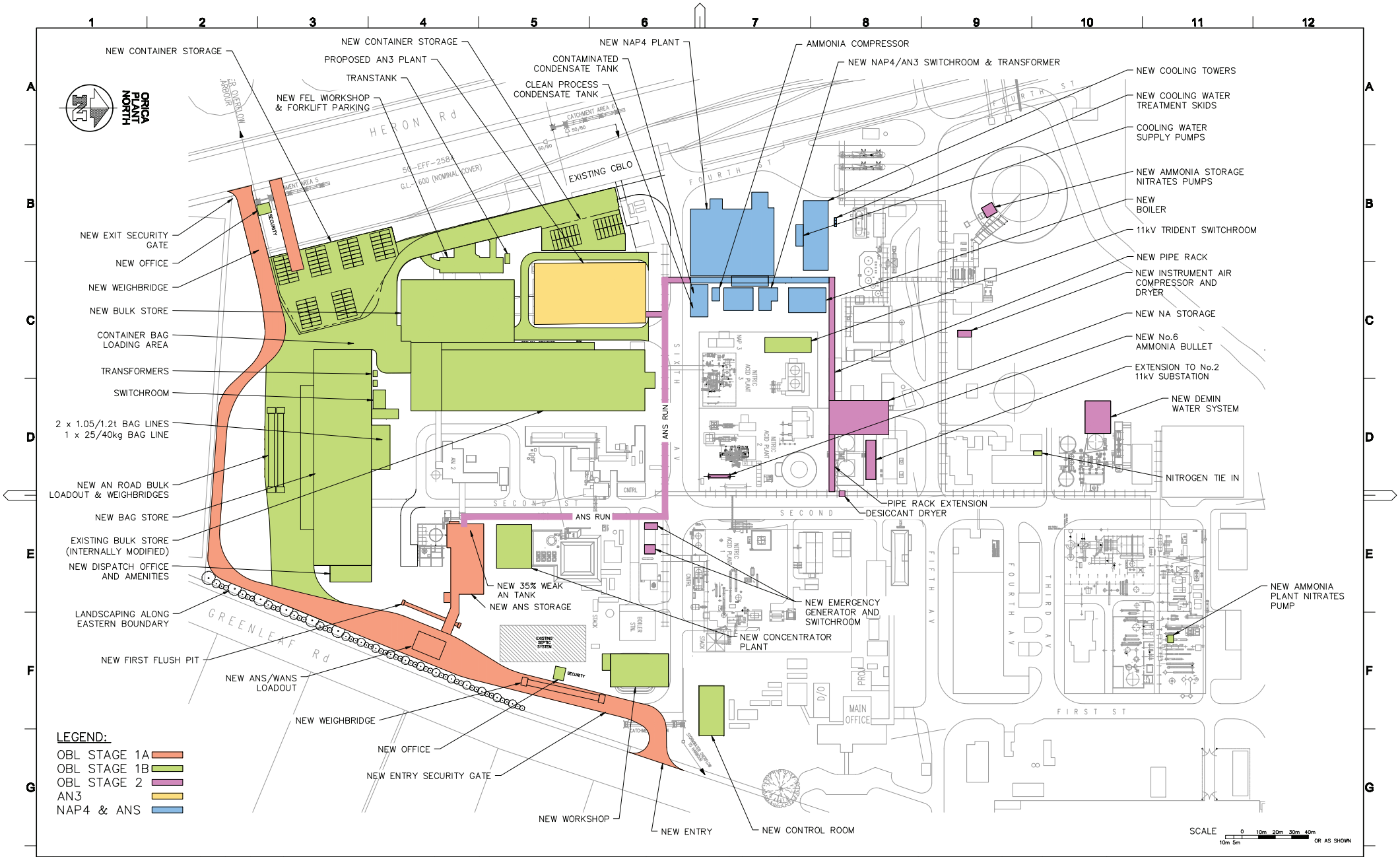
i)** Conditions of this approval; **and

j) The report supporting the Modification Request (AECOM, April 2011).

Schedule 2 Condition 3 states that *"If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency".* This condition is supportive of an additional document within Condition 2, providing for the inconsistencies between the EA and this Modification Request.

Appendix A

Detailed Site Layout



REV	REVISIONS	DRAWN	APP	DATE	REFERENCE DRAWINGS	DRG.No.
P01	ISSUED FOR REVIEW	FAM		05.04.11	SITE LAYOUT	2561-0000-00-014-001

HATCH ema
ABN 22 653 995 620
7 WARABROOK BOULEVARD
WARABROOK, NSW 2310
AUSTRALIA

HEN2561-0000-00-014-0018

INTER-DISCIPLINE REVIEW	REV	DATE
PROCESS		
MECHANICAL		
CIVIL		
ELECTRICAL		
RELIABILITY		
PROJECT		
CONSTRUCTION		

DRAWN: F.MACKAWAY	DATE 05.04.11	SITE KOORAGANG ISLAND	
DESIGNED: HATCH EMA JV	DATE SEPT '10	PLANT SITE GENERAL	
CHECKED:	DATE	SECTION ARCHITECTURAL & CIVIL	
PASSED:	DATE	PROJECT – WO No	
AUTHORISED:	DATE	SCALE 1:1000	

ORICA Mining Services — Kooragang Island Newcastle N.S.W

TITLE
ORICA KOORAGANG ISLAND
PROJECT TRIDENT
SITE LAYOUT
PROPOSED SCOPE

SHEET SIZE A1 841 x 594

DWG No HEN2561-0000-00-014-0018 REV P01

STATUS PRELIMINARY

INDEX

564

0,0 801

Appendix B

Air Quality Report

Air Quality Impact Assessment

Consistency Report

Air Quality Impact Assessment

Consistency Report

Prepared for

Orica Australia Pty Limited

Prepared by

AECOM Australia Pty Ltd
17 Warabrook Boulevard Warabrook NSW 2304,
T +61 2 4911 4900 F +61 2 4911 4999 www.aecom.com

28 March 2011

Quality Information

Document	**Air Quality Impact Assessment**	
Ref	Orica_Addendum_Report_28Mar2011_Final.docx	
Date	28 March 2011	
Prepared by	Holly Marlin	Author Signature
Prepared by	Adam Plant	Author Signature
Reviewed by	David Rollings	Technical Peer Reviewer Signature

Distribution

Copies	**Recipient**	**Copies**	**Recipient**
1	**Carey Gent** **Orica Australia Pty Ltd** 15 Greenleaf Road Kooragang Island NSW 2304	**1**	**AECOM File Copy**

Revision History

Revision	**Revision Date**	**Details**	**Authorised**	
			Name/Position	**Signature**
1	7/2/2011	Final Draft Report	Graham Taylor	
2	28/3/2011	Final Report	David Rollings	

Contents

List of Tables

Body Report

List of Figures

Figures Section

1.0 Introduction

AECOM was commissioned by Orica Australia Pty Limited (Orica) to conduct an Air Quality Impact Assessment (AQIA) in association with an Environmental Assessment (EA) prepared by ENSR Australia Pty Limited in 2009 that was submitted with the Development Application for the expansion of the Orica Kooragang Island site. Project Approval was granted on 1 December 2009 by the Minister for Planning. Since the Project Approval was issued, Orica has identified a number of opportunities to optimise the project design and constructability that will affect the site layout. This report forms an addendum to the 2009 AQIA.

Since the Project Approval was issued, Orica has advanced its engineering and selection process for the plant that constitute part of the approved site expansion project [i.e. new nitric acid plant (NAP4), which will also incorporate an ammonium nitrate solution facility, the ammonium nitrate solids plant (ANP3) and associated Prill Tower (AN3), and a new boiler]. The selected nitric acid plant has a capacity of 900 tonnes per day (tpd), with a potential operating capacity of 315 ktpa of nitric acid, which is 20% greater than that originally proposed. The corresponding ammonium nitrate wet section included in the NAP4 plant would have capacity of 1143 tpd, with a potential operating capacity of 396 ktpa ammonium nitrate solution. The ammonium nitrate dry section will have a capacity of 300 ktpa Nitropril®.

Despite the increase in capacity of new plant over that originally proposed, Orica intends to operate within the production constraints specified in the Project Approval (summarised in **Table 1**), which are largely dictated by the availability of manufactured ammonia.

Table 1: Existing and Proposed Production Rates

Product/Intermediate	Existing	Approved (consent limits)
Ammonia	295	360
Nitric acid	345	605
Ammonium nitrate	430	750

The purpose of this assessment was to determine whether the proposed changes in capacity and location would result in substantially different air emissions from the facility and associated effects on sensitive receptors than those predicted in the original Development Application.

1.1 Scope of Work

AECOM revised the modelling undertaken in 2009 by amending source locations and emission rates to reflect the proposed modifications. Specifically, the changes consisted of:

- Relocation of the new ammonium nitrate plant (ANP3) and its associated Prill Tower;
- Modification of emissions from the new nitric acid plant (NAP4); and
- Relocation of the new boiler.

Modelling was undertaken for the worst case operational scenario for the following pollutants:

- Oxides of nitrogen (NO_X);
- Total suspended particulates (TSP); and
- Fine particulates (PM_{10}).

Emission rates and stack parameters were of the same order as those used in the original assessment with slight modifications made to the emissions inventory by Orica to reflect the proposed revisions. As per the original assessment, only point sources were assessed.

In order to maintain consistency with the original AQIA, this assessment used the same dispersion model (AUSPLUME) with the same input data as that originally used, with modifications made to source locations and emission rates where required.

"This page has been left blank intentionally"

2.0 Proposed Modifications to Approved Operations

2.1 Emissions

Since the Project Approval was issued, Orica has identified a number of opportunities to optimise the project design and constructability that will affect the site layout. The primary changes that may potentially affect air quality are:

- Relocation of the new ANP and its associated Prill Tower from the southern end of the site closer to the new NAP4 on the western side of the site;
- Demolition of the existing bag store and replacement with a new bag store of same capacity at the southern end of the site;
- Relocation of the new boiler to a point closer to its usage point at the new NAP; and
- The installation of a NAP with a greater capacity than that originally proposed in the EA.

A comparison of the production rates under the existing, approved and proposed operating scenarios is provided in **Table 2**.

Table 2: Expected Production Rates under Different Operating Scenarios.

Plant	Production Rates (ktpa)				
	Existing	Development Application	Proposed Production	Maximum Production Capacity Worst Case (Consent Limits)	Maximum Plant Potential Production Capacity
NAP1	150	150	140	150	150
NAP2	90	90	70	90	90
NAP3	105	105	80	105	105
NAP4	N/A	260	315	260	315
Total	345	605	605	605	660

Despite the increase in capacity of new plant over that originally proposed, Orica intends to operate within the production constraints specified in the Project Approval summarised in **Table 1**. As such, the most likely operating scenario for the facility is the "Proposed Production" scenario, where the new NAP plant (NAP4) would be preferentially operated at full capacity with subsequent reductions in capacity of the existing plant. As the new NAP4 plant has lower NO_X emissions than the existing plant, overall NO_X emissions from the site are, therefore, likely to decrease. Plant would, however, be managed according to availability.

This assessment investigated the worst-case scenario, which, in relation to NO_X, is as follows:

- Maximum Production Capacity Worst Case (consent limits) – annual production limited to consent production rates but with plant of highest emissions being preferentially operated (i.e. existing plant). This scenario was used to assess long-term (annual) NO_X emissions.
- Maximum Plant Potential Production Capacity –all NAP plant operating at full capacity for short periods of time. This scenario was used to assess short term NO_X emissions.

It should be noted that the Maximum Production Capacity Worst Case (Consent Limits) scenario represents the same emission rates as those modelled for the Development Application (Scenario 3), with modified locations and emissions for NAP4.

In addition, while the changes to the approved project will not affect total TSP and PM_{10} emissions, the proposed move of the ANP3 Final Scrubber Stack emission point to the western side of the site from its previous southern location was assessed to determine any potential affects on resultant ground level concentrations at sensitive receptor locations.

2.2 Assessment Criteria

The relevant assessment criteria specified for the modelled pollutants by the Department of Environment, Climate Change and Water (DECCW) are shown in **Table 3**. These criteria are designed to be applied to maximum cumulative pollutant concentrations.

Table 3: Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	Criteria (µg/m^3)
NO_X (as NO_2)	1 hour	246
	Annual	62
TSP	Annual	90
PM_{10}	24 hour	50
	Annual	30

2.3 Ambient Air Quality

Local background pollutant concentrations used in the original modelling for the cumulative assessment were used for the current assessment for consistency. Background concentrations of NO_2 and particulates are shown in **Table 4**.

Table 4: Background Pollutant Concentrations

Pollutant	Concentration (µg/m^3)	Averaging Period
NO_2	70.2	1 hour
	15.4	Annual
TSP	43	Annual
PM_{10}	25.3	24 hour
	18	Annual

3.0 Methodology

The dispersion modelling undertaken as part of this consistency report was performed using the same methodology as outlined in the original EA Report. The only difference to the modelling undertaken in 2009 was in the emission inventory (modified stack parameters, stack emission rates and stack locations). Again, it should be noted that while Orica proposes to change the location of one of the TSP/PM_{10} sources, the emission rates are the same as those assessed previously.

To allow an analysis of the changes likely to occur as a result of the modification, the following modelling scenarios were compared with the previously approved EA modelling results:

- Scenario 1: The facility operating at maximum capacity for each of the individual plant items for short-term averaging periods only (1 hour average and 24 hour average concentrations).
- Scenario 2: The facility operating at consent maximum conditions for the full year (annual average concentrations).

From an operational perspective, the aim of the modelling is to ensure that operating scenarios with the plant operating at maximum individual unit capacities for short periods of time (for production reasons) are possible without adversely affecting surrounding receptors.

The emission sources modelled are shown in **Table 5**.

Table 5: Modelled Emission Sources (Scenarios 1 and 2)

Stack Designation	Stack ID	Modelling Stack Description
Existing Plant	BS1	Boiler Stack
	1NA1	Nitric Acid Plant Stack (NAP1)
	2NA1	Nitric Acid Plant Stack (NAP2)
	3NA1	Nitric Acid Plant Stack (NAP3)
	1AN5	CDC Evaporator Scrubber Stack
	1AN6	Existing Prill Tower
	1AN9	Pre-Dryer Scrubber Stack
	2AN4	Granulator Scrubber Stack
	ND1	RBLO Scrubber
	ND2	Scrubber
Proposed Plant	A8G2	Reformer Flue Stack (uprated)*
	PRF	New Pre-Reformer Furnace
	E1	Nitric Acid Plant Stack (NAP4)
	E3A	AN Final Scrubber Stack
	E5	NFG New Boiler Stack
* This source is the existing Reformer Flue Stack that is being uprated as part of the approved project.		

Stack characteristics and emissions data for the proposed facility (including existing plant that is to remain unchanged) are summarised in **Tables 6** to **9**, which define the parameters for the maximum emissions (Scenario 1; **Tables 6** and **7)** and average emissions (Scenario 2; **Tables 8** and **9**).

Table 6: Maximum Stack Characteristics (Scenario 1)

Type	Stack ID	Stack Gas Flow Rate (Nm^3/s)	Stack Tip Area (m^2)	Stack Height (m)	Stack Internal Diameter (m)	Stack Velocity (m/s)	Gas Temp. (°C)
Existing Plant	BS1	3.5	1.6	39.47	1.43	2.19	131.0
	1NA1	16.7	0.73	83.82	0.965	22.79	133.0
	2NA1	10.0	0.44	54.86	0.746	22.88	50.0
	3NA1	11.1	0.43	55.1	0.74	25.83	170.0
	1AN5	17.3	1.65	19.0	1.448	10.51	52.4
	1AN6	8.6	10.31	48.15	3.6	0.83	37.3
	1AN9	8.6	0.77	21.84	0.99	11.20	40.2
	2AN4	24.0	1.77	27	1.5	13.56	36.0
	ND1	2.1	0.14	3.3	0.42	15.30	15
	ND2	2.1	0.14	4.3	0.42	15.30	15
Proposed	A8G2*	46.4	5.60	47	2.67	8.29	93.0
	PRF	5.3	1.43	27	1.35	3.69	110.0
	E1	33.5	2.01	55	1.6	25.53	145.0
	E3A	29.2	2.27	25	1.7	12.85	48.0
	E5	19.3	2.01	40	1.6	16.61	200.0

* This source is the existing Reformer Flue Stack that is being uprated as part of the approved project.

Table 7: Maximum Emissions Characteristics (Scenario 1)

Type	Stack ID	Pollutant Conc. (mg/m^3)			Pollutant Emission Rates (g/s)		
		TSP	PM_{10}	NO_x	TSP	PM_{10}	NO_x
Existing Plant	BS1	-	-	49.5	-	-	0.17
	1NA1	-	-	559	-	-	9.31
	2NA1	-	-	431	-	-	4.31
	3NA1	-	-	381	-	-	4.23
	1AN5	19.04	11.804	-	0.33	0.20	-
	1AN6	96.68	17.23	-	9.98	1.78	-
	1AN9	16.08	5.71	-	0.14	0.05	-
	2AN4	20.68	14.32	-	0.50	0.34	-
	ND1	5	4.75	-	0.011	0.010	-
	ND2	5	4.75	-	0.011	0.010	-
Proposed Plant	A8G2*	-	-	234	-	-	10.9
	PRF	-	-	234	-	-	1.2
	E1	--	-	286	-	-	9.6
	E3A	20	8	-	0.58	0.23	-
	E5	-	-	234	-	-	4.5

* This source is the existing Reformer Flue Stack that is being uprated as part of the approved project.
- Indicates this pollutant is not relevant for this source.

Table 8: Average Stack Characteristics (Scenario 2)

Type	Stack ID	Stack Gas Flowrate (Nm^3/s)	Stack Tip Area (m^2)	Stack Height (m)	Stack Internal Diameter (m)	Stack Velocity (m/s)	Gas Temp (℃)
Existing Plant	BS1	3.5	1.6	39.47	1.43	2.19	131.0
	1NA1	16.7	0.73	84	1.0	22.8	133.0
	2NA1	10.0	0.44	55	0.7	22.9	50.0
	3NA1	11.1	0.43	55	0.7	25.8	170.0
	1AN5	17.3	1.65	19	1.4	10.5	52.4
	1AN6	8.6	10.31	48	3.6	0.8	37.3
	1AN9	8.6	0.77	22	1.0	11.2	40.2
	2AN4	24.0	1.77	27	1.5	13.6	36.0
	ND1	2.1	0.14	3	0.4	15.3	15
	ND2	2.1	0.14	4	0.4	15.3	15
Proposed	A8G2	46.4	5.60	47	2.7	8.3	93.0
	PRF	5.3	1.43	27	1.4	3.7	110.0
	E1	27.7	2.01	55	1.6	21.1	145.0
	E3A	29.2	2.27	25	1.7	12.8	48.0
	E5	9.6	2.01	40	1.6	8.3	200.0

Table 9: Average Emissions Characteristics (Scenario 2)

Type	Stack ID	Pollutant Conc. (mg/m^3)			Pollutant Emission Rates (g/s)		
		TSP	PM_{10}	NO_x	TSP	PM_{10}	NO_x
Existing Plant	BS1	-	-	49.5	-	-	0.17
	1NA1	-	-	558.6	-	-	9.3
	2NA1	-	-	431.3	-	-	4.3
	3NA1	-	-	380.7	-	-	4.2
	1AN5	19.0	11.8	-	0.3	0.2	-
	1AN6	96.7	17.2	-	10.0	1.8	-
	1AN9	16.1	5.7	-	0.1	0.0	-
	2AN4	20.7	14.3	-	0.5	0.3	-
	ND1	5.0	4.8	-	0.01	0.01	-
	ND2	5.0	4.8	-	0.01	0.01	-
Proposed Plant	A8G2*	-	-	234.0	-	-	10.9
	PRF	-	-	234.0	-	-	1.2
	E1	-	-	285.5	-	-	7.9
	E3A	20.0	8.0	-	0.58	0.23	-
	E5	-	-	234.0	-	-	2.3

* This source is the existing Reformer Flue Stack that is being uprated as part of the approved project.
\- Indicates this pollutant is not relevant for this source.

"This page has been left blank intentionally"

4.0 Modelling Results and Discussion

The configuration and input files used for this assessment were the same as those used in the original assessment with modifications made where required. For details regarding input data, please refer to ENSR (2009)[1].

The results of the revised modelling were compared against the predictions made in the EA. Results for each pollutant and averaging period assessed is described in **Tables 10**, **11** and **12**. It should be noted that the predicted concentrations for the short-term averaging periods (1 and 24 hours) are considered to be overestimates of the likely emissions from the facility as these emissions are expected to only result from short term events such as peak production requirements; e.g. following a plant breakdown, all plant may operate at peak levels until production rates have caught up to levels allowed under the consent.

4.1 Nitrogen Dioxide

The predicted ground level concentrations of NO_2 are shown in **Table 10** for both the 1 hour and annual averaging periods. The highest predicted concentrations occurred at an industrial receptor on Kooragang Island. No exceedences of the guideline criteria were predicted.

The dispersion pattern of the revised model differed slightly from the original modelling as shown in **Figures 2** and **3**, with maximum concentrations predicted in different locations. The difference between the predicted maxima was less than 40 µg/m^3, which represents approximately 16 % of the criterion. For the annual data, the difference was smaller, at 2.9 µg/m^3 (approximately 5 % of the criterion). As such, the revised proposal is considered to have impacts on the surrounding environment of a similar scale to those predicted for the approved project.

Table 10: Maximum Predicted Ground Level Concentrations – NO_2

Receptor	1 Hour Maximum NO_2 (µg/m^3)			Annual Average NO_2 (µg/m^3)		
	Original EA	Maximum Production Capacity Worst Case (Consent Limits)	Difference	Original EA	Maximum Plant Potential Production Capacity	Difference
1	64.9 (135.1)	74.7 (144.9)	9.8	1.6 (17)	2.7 (18.1)	1.08
2	67.8 (138)	78.4 (148.6)	10.6	2.4 (17.8)	4.4 (19.8)	1.95
3	66.1 (136.3)	75.7 (145.9)	9.6	3.2 (18.6)	6.2 (21.6)	2.95
4	70.8 (141)	80 (150.2)	9.2	3.7 (19.1)	6.5 (21.93)	2.83
5	70 (140.2)	77.6 (147.8)	7.6	3.9 (19.3)	6.6 (22.04)	2.74
6	66.1 (136.3)	72.1 (142.3)	6.0	3.4 (18.8)	5.6 (21.03)	2.23
7	58.2 (128.4)	64 (134.2)	5.8	2.4 (17.8)	3.5 (18.86)	1.06
8	51 (121.2)	59.1 (129.3)	8.1	1.7 (17.1)	2.3 (17.67)	0.57
9	63.8 (134)	72.1 (142.3)	8.3	2.6 (18)	4.6 (20.01)	2.01
10	61.2 (131.4)	68.7 (138.9)	7.5	3.2 (18.6)	5.7 (21.09)	2.49
11	57.9 (128.1)	64.8 (135.0)	6.9	3.7 (19.1)	5.9 (21.31)	2.21
12	56.7 (126.9)	63.8 (134.0)	7.1	3.8 (19.2)	6.1 (21.46)	2.26
13	53.6 (123.8)	64.3 (134.5)	10.7	3.3 (18.7)	5.0 (20.43)	1.73
14	50.8 (121)	61.0 (131.2)	10.2	2.2 (17.6)	3.1 (18.5)	0.9
15	50.8 (121)	61.3 (131.5)	10.5	3.7 (19.1)	5.6 (21.0)	1.9
16	48.4 (118.6)	59.5 (129.7)	11.1	3.6 (19)	5.5 (20.9)	1.9
17	47.2 (117.4)	56.9 (127.1)	9.7	3.2 (18.6)	4.6 (20.0)	1.4
18	51 (121.2)	61.5 (131.7)	10.5	1.7 (17.1)	2.6 (18.0)	0.9
19	48.8 (119)	58.2 (128.4)	9.4	1.6 (17)	2.2 (17.6)	0.6
20	47.2 (117.4)	53.5 (123.7)	6.3	1.4 (16.8)	1.9 (17.3)	0.5
21	45.5 (115.7)	50.9 (121.1)	5.4	1.4 (16.8)	1.8 (17.2)	0.4

[1] ENSR. (2009). Air Quality Impact Assessment, Kooragang Island NSW. Appendix E of AECOM. (2009). Proposed Ammonium Nitrate Facility Expansion Environmental Assessment, June 2009.

Receptor	1 Hour Maximum NO_2 ($\mu g/m^3$)			Annual Average NO_2 ($\mu g/m^3$)		
	Original EA	Maximum Production Capacity Worst Case (Consent Limits)	Difference	Original EA	Maximum Plant Potential Production Capacity	Difference
22	47.5 (117.7)	57.4 (127.6)	9.9	1.6 (17)	2.4 (17.8)	0.8
23	46.2 (116.4)	52.7 (122.9)	6.5	1.5 (16.9)	2.1 (17.5)	0.6
24	45.2 (115.4)	50.7 (120.9)	5.5	1.4 (16.8)	1.8 (17.2)	0.4
25	41.9 (112.1)	47.3 (117.5)	5.4	1.3 (16.7)	1.6 (17.0)	0.3
26	43.7 (113.9)	49.3 (119.5)	5.6	1.4 (16.8)	1.9 (17.3)	0.5
27	42.9 (113.1)	51.3 (121.5)	8.4	1.5 (16.9)	2.3 (17.7)	0.8
28	42.7 (112.9)	56.1 (126.3)	13.4	2.8 (18.2)	4.0 (19.4)	1.2
29	41.1 (111.3)	52.7 (123.0)	11.6	2.3 (17.7)	3.0 (18.4)	0.7
30	42.3 (112.5)	47.7 (117.9)	5.4	2 (17.4)	2.6 (18.0)	0.6
31	42.3 (112.5)	47.3 (117.5)	5.0	1.7 (17.1)	2.2 (17.6)	0.5
32	41.1 (111.3)	46.9 (117.1)	5.8	1.5 (16.9)	2.1 (17.5)	0.6
33	39.3 (109.5)	49.1 (119.3)	9.8	1.4 (16.8)	2.0 (17.4)	0.6
34	42.7 (112.9)	50.7 (120.9)	8.0	1.5 (16.9)	2.2 (17.6)	0.7
35	40.5 (110.7)	52.2 (122.4)	11.7	1.4 (16.8)	1.9 (17.3)	0.5
36	58.1 (128.3)	76.9 (147.1)	18.8	1.8 (17.2)	3.1 (18.5)	1.3
37	57.9 (128.1)	87.4 (157.6)	29.5	1.7 (17.1)	3.2 (18.6)	1.5
38	24.6 (94.8)	64.6 (134.8)	40.0	0.4 (15.8)	1.0 (16.4)	0.6
39	36.9 (107.1)	49.2 (119.4)	12.3	0.8 (16.2)	1.2 (16.6)	0.4
40	36.2 (106.4)	48.1 (118.3)	11.9	0.9 (16.3)	1.2 (16.6)	0.3
Maxima	70.8 (141)	87.4 (157.6)		3.9 (19.3)	6.6 (22.0)	
Criteria	**246**		**-**	**62**		**-**

4.2 Total Suspended Particulates

TSP was modelled to assess the effect of the change in location of ANP3 Final Scrubber Stack on the predicted ground level pollutant concentrations. The predicted annual average ground level concentrations of TSP are shown in **Table 11** and **Figure 4**. No exceedences of the guideline criterion were predicted. There was very little difference between predicted maxima from the 2009 EA and this report (i.e. maximum difference in prediction of 0.4 $\mu g/m^3$). It should be noted that predictions at some modelled locations were shown to decrease as a result of the modification. As such, the revised proposal is expected to have the same effect on local TSP levels as the approved proposal.

Table 11: Maximum Predicted Ground Level Concentrations – TSP

Receptor	Annual Average TSP ($\mu g/m^3$)		
	Original	Revised Location	Difference
1	2.2 (45.2)	2.3 (45.3)	0.09
2	3.5 (46.5)	3.6 (46.6)	0.13
3	6.2 (49.2)	6.4 (49.4)	0.16
4	7.6 (50.6)	7.7 (50.7)	0.12
5	8.3 (51.3)	8.6 (51.6)	0.35
6	7.6 (50.6)	7.9 (50.9)	0.33
7	4.9 (47.9)	5.0 (48.0)	0.14
8	3.2 (46.2)	3.2 (46.2)	0.0
9	3.8 (46.8)	3.94 (46.9)	0.14
10	5.5 (48.5)	5.6 (48.6)	0.15
11	6.4 (49.4)	6.6 (49.6)	0.18
12	7.1 (50.1)	7.4 (50.4)	0.32
13	6.1 (49.1)	6.4 (49.4)	0.25
14	4 (47)	4.1 (47.1)	0.09

Receptor	Annual Average TSP (µg/m^3)		
	Original	Revised Location	Difference
15	6 (49)	6.2 (49.2)	0.21
16	6.1 (49.1)	6.3 (49.3)	0.21
17	5 (48)	5.1 (48.1)	0.1
18	3.3 (46.3)	3.2 (46.2)	-0.11
19	2.8 (45.8)	2.8 (45.8)	-0.02
20	2.4 (45.4)	2.4 (45.4)	0.01
21	2.2 (45.2)	2.1 (45.1)	-0.06
22	2.8 (45.8)	2.7 (45.7)	-0.08
23	2.4 (45.4)	2.4 (45.4)	-0.02
24	2 (45)	2.0 (45.0)	-0.03
25	1.7 (44.7)	1.7 (44.7)	-0.02
26	1.9 (44.9)	1.9 (44.9)	0.03
27	2 (45)	2.0 (45.0)	-0.01
28	2.4 (45.4)	2.4 (45.4)	0.05
29	2.2 (45.2)	2.3 (45.3)	0.05
30	1.9 (44.9)	2.0 (45.0)	0.09
31	1.7 (44.7)	1.8 (44.8)	0.06
32	1.6 (44.6)	1.6 (44.6)	0.05
33	1.6 (44.6)	1.6 (44.6)	0.01
34	1.2 (44.2)	1.2 (44.2)	0.01
35	1.2 (44.2)	1.2 (44.2)	0.03
36	2.7 (45.7)	2.9 (45.9)	0.16
37	3.4 (46.4)	3.5 (46.5)	0.15
38	3.6 (46.6)	3.6 (46.6)	0.0
39	0.9 (43.9)	1.0 (44.0)	0.05
40	0.9 (43.9)	0.9 (43.9)	0.04
Maxima	8.3 (51.3)	8.6 (51.6)	
Criterion	**90**		**-**

4.3 Fine Particulates

PM_{10} was modelled to assess the effect of the change in location of ANP3 Final Scrubber Stack on the predicted ground level pollutant concentrations, which are shown in **Table 12** and **Figures 5** and **6** for the 1 hour and annual averaging periods. Only minor differences were predicted between the approved and revised proposed projects with the maximum difference between the predicted maxima being 2.2 µg/m^3 for the 24 hour averaging period and 0.2 µg/m^3 for the annual averaging period. The revised proposal is, therefore, considered to have the same effect on local PM_{10} levels as the approved proposal.

It is noted that the modification to the emissions is predicted to result in a minor exceedence of the 24 hour assessment criterion at Receptor 3. Given the very low level of the predicted exceedence (0.4 µg/m^3) it is considered unlikely that this exceedence would be able to be distinguished from the concentration predicted in the 2009 EA. In addition, given the conservative nature of the assessment (plant operating 365 days per year and at maximum throughput), this exceedence is not considered likely to cause any adverse effects.

As noted in the original EA, Orica is in the process of investigating options for reducing emissions from the ANP1 Prill Tower. As this represents the largest particulate point source on the site, any reduction in emissions would be expected to result in the reduction of the predicted emissions to levels well below the assessment criteria.

Table 12: Maximum Predicted Ground Level Concentrations – PM_{10} ($\mu g/m^3$)

Receptor	24 Hour Maximum PM_{10}			Annual Average PM_{10}		
	Original	Revised Location	Difference	Original	Revised Location	Difference
1	6.6 (31.9)	6.9 (32.2)	0.27	0.5 (18.5)	0.5 (18.5)	0.03
2	9.3 (34.6)	9.4 (34.7)	0.11	0.8 (18.8)	0.8(18.8)	0.022
3	24.5 (49.8)	24.9 (**50.2**)	0.39	1.4 (19.4)	1.5 (19.5)	0.07
4	17.6 (42.9)	18.1 (43.4)	0.53	1.7 (19.7)	1.8 (19.8)	0.12
5	14.5 (39.8)	15.5 (40.8)	0.95	2 (20)	2.1 (20.1)	0.07
6	21.2 (46.5)	22.2 (47.5)	1.03	1.8 (19.8)	1.9 (19.9)	0.11
7	16 (41.3)	17.4 (42.7)	1.35	1.1 (19.1)	1.2 (19.2)	0.08
8	8.5 (33.8)	9.0 (34.3)	0.49	0.7 (18.7)	0.7 (18.7)	0.029
9	12.6 (37.9)	12.7 (38.0)	0.12	0.8 (18.8)	0.9 (18.9)	0.091
10	22.2 (47.5)	22.6 (47.9)	0.41	1.2 (19.2)	1.3 (19.3)	0.09
11	10.2 (35.5)	10.8 (36.1)	0.61	1.4 (19.4)	1.5 (19.5)	0.14
12	13.9 (39.2)	15.1 (40.4)	1.24	1.7 (19.7)	1.8 (19.8)	0.06
13	19.2 (44.5)	20.2 (45.5)	1.03	1.4 (19.4)	1.5 (19.5)	0.1
14	14 (39.3)	15.0 (40.3)	0.98	0.9 (18.9)	0.9 (18.9)	0.046
15	11 (36.3)	11.7 (37.0)	0.73	1.4 (19.4)	1.5 (19.5)	0.05
16	12.4 (37.7)	12.8 (38.1)	0.40	1.4 (19.4)	1.5 (19.5)	0.09
17	16.2 (41.5)	17.0 (42.3)	0.83	1.1 (19.1)	1.2 (19.2)	0.09
18	8.7 (34)	8.7 (34.0)	-0.03	0.8 (18.8)	0.8 (18.8)	-0.042
19	8.3 (33.6)	8.3 (33.6)	0.02	0.7 (18.7)	0.6 (18.6)	-0.07
20	5.6 (30.9)	5.5 (30.8)	-0.08	0.6 (18.6)	0.5 (18.5)	-0.063
21	4.7 (30)	4.7 (30.0)	0.01	0.5 (18.5)	0.5 (18.5)	-0.022
22	8 (33.3)	8.2 (33.5)	0.25	0.7 (18.7)	0.6 (18.6)	-0.065
23	7.9 (33.2)	8.1 (33.4)	0.15	0.6 (18.6)	0.5 (18.5)	-0.055
24	5.8 (31.1)	5.8 (31.1)	0.03	0.5 (18.5)	0.4 (18.4)	-0.058
25	3.8 (29.1)	3.8 (29.1)	-0.04	0.4 (18.4)	0.4 (18.4)	-0.028
26	6.8 (32.1)	6.9 (32.2)	0.13	0.5 (18.5)	0.4 (18.4)	-0.064
27	7.1 (32.4)	7.9 (33.2)	0.76	0.5 (18.5)	0.5 (18.5)	-0.029
28	5.9 (31.2)	5.9 (31.2)	0.03	0.6 (18.6)	0.6 (18.6)	-0.042
29	4.8 (30.1)	5.2 (30.5)	0.44	0.5 (18.5)	0.5 (18.5)	0.014
30	5.1 (30.4)	5.8 (31.1)	0.67	0.5 (18.5)	0.5 (18.5)	-0.044
31	5.3 (30.6)	6.1 (31.4)	0.75	0.4 (18.4)	0.4 (18.4)	0.009
32	5.1 (30.4)	5.7 (31.0)	0.56	0.4 (18.4)	0.4 (18.4)	-0.016
33	5.8 (31.1)	6.4 (31.7)	0.62	0.4 (18.4)	0.4 (18.4)	-0.023
34	3.1 (28.4)	3.1 (28.4)	0.02	0.3 (18.3)	0.3 (18.3)	-0.024
35	2.6 (27.9)	2.6 (27.9)	0.02	0.3 (18.3)	0.3 (18.3)	-0.022
36	9.3 (34.6)	10.3 (35.6)	0.99	0.6 (18.6)	0.7 (18.7)	0.115
37	10.6 (35.9)	12.8 (38.1)	2.23	0.8 (18.8)	1.0 (19.0)	0.161
38	12.2 (37.5)	13.0 (38.3)	0.75	1.1 (19.1)	1.2 (19.2)	0.09
39	3.7 (29)	4.3 (29.6)	0.64	0.2 (18.2)	0.2 (18.2)	0.019
40	4.2 (29.5)	4.7 (30.0)	0.46	0.2 (18.2)	0.2 (18.2)	0.017
Maxima	24.5 (49.8)	24.9 (50.2)		2.0 (20.0)	2.1 (20.1)	
Criteria	**50**		**-**	**30**		**-**
Exceedence noted in bold type.						

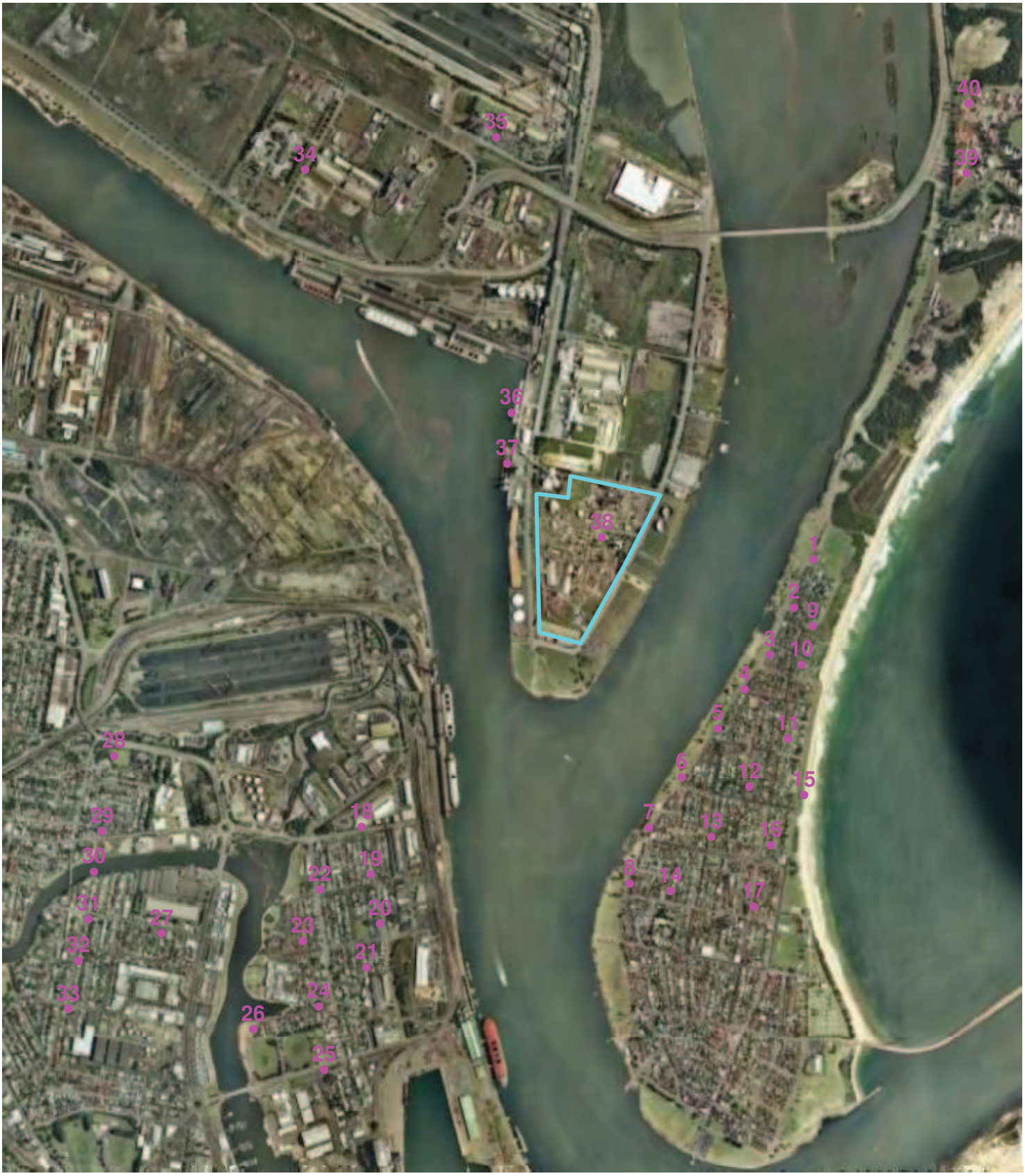
5.0 Conclusion

An air quality impact assessment was undertaken to determine whether proposed changes in plant capacity and location at the Orica site on Kooragang Island would result in substantially different air emissions from the approved development. Emissions from the modified plant were entered into the same dispersion model that was used for the 2009 air quality impact assessment (which was subsequently approved by DECCW and the Minister for Planning in December 2009). The difference in predicted ground level concentrations of particulates (TSP and PM_{10}) and NO_2 between the approved project and the proposed modifications were minor. As such, the proposed modifications are expected to result in similar air emissions and resultant ground level pollutant concentrations, and be consistent with, the approved project.

"This page has been left blank intentionally"

Figures

"This page has been left blank intentionally"



AECOM

0 500m

Sensitive Receptor
Site Boundary

Figure 1 Site Locality and Sensitive Receptor Locations

Orica Australia Pty Ltd

Air Quality Impact Assessment - Consistency Report

Kooragang Island NSW

AECOM

0 500m

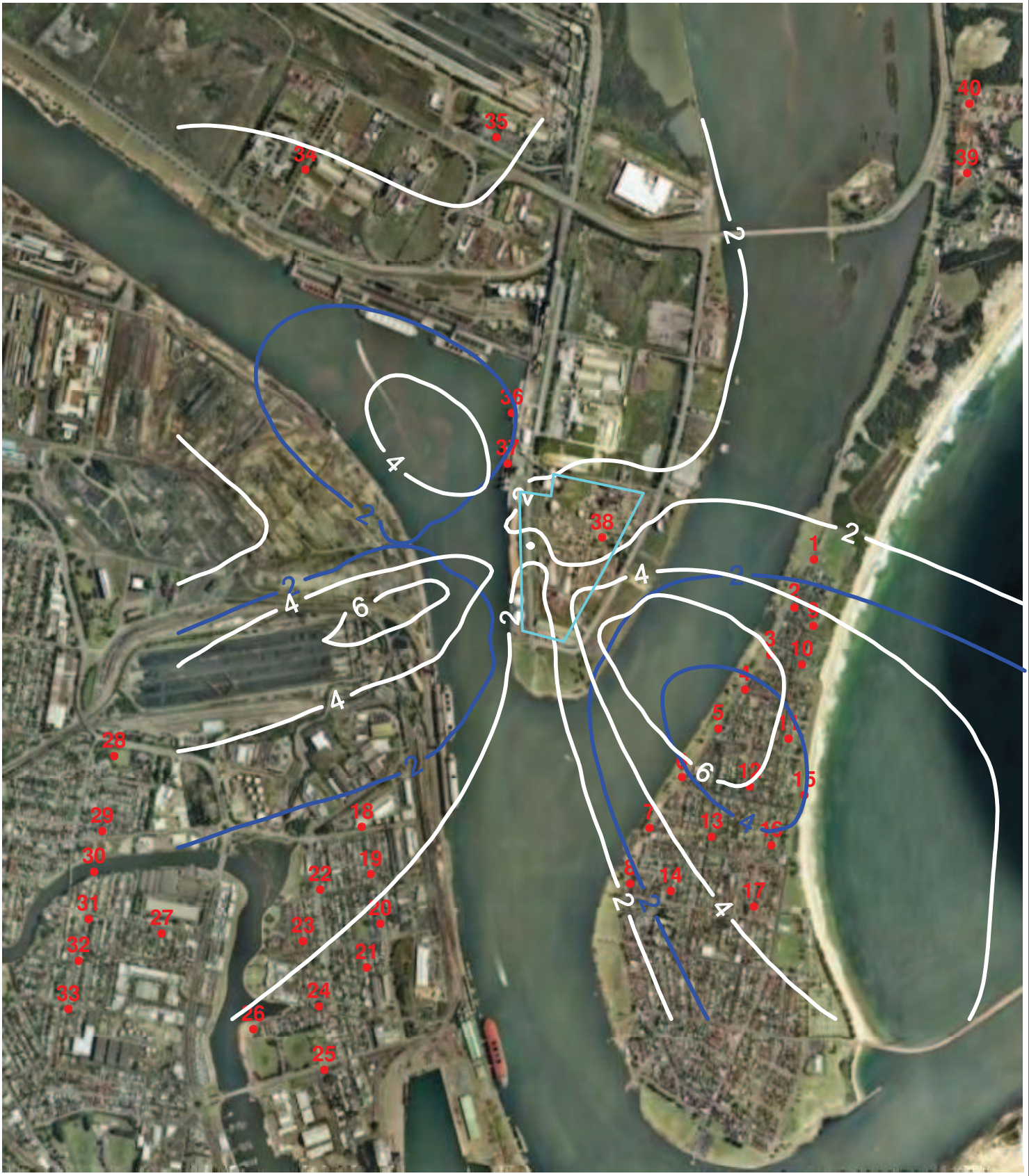
Site Boundary
Original Isopleths
Revised Isopleths
Units: ug/m³
Assessment Criteria: 246

Figure 2 Nitrogen Dioxide 1Hr. Ave. Isopleths (Isolated)

Orica Australia Pty Ltd

Air Quality Impact Assessment - Consistency Report

Kooragang Island NSW



AECOM

0 500m

Site Boundary
Original Isopleths
Revised Isopleths
Units: ug/m³
Assessment Criteria: 62

Figure 3 Nitrogen Dioxide Annual Ave. Isopleths (Isolated

Orica Australia Pty Ltd

Air Quality Impact Assessment - Consistency Report

Kooragang Island NSW

AECOM

0 500m

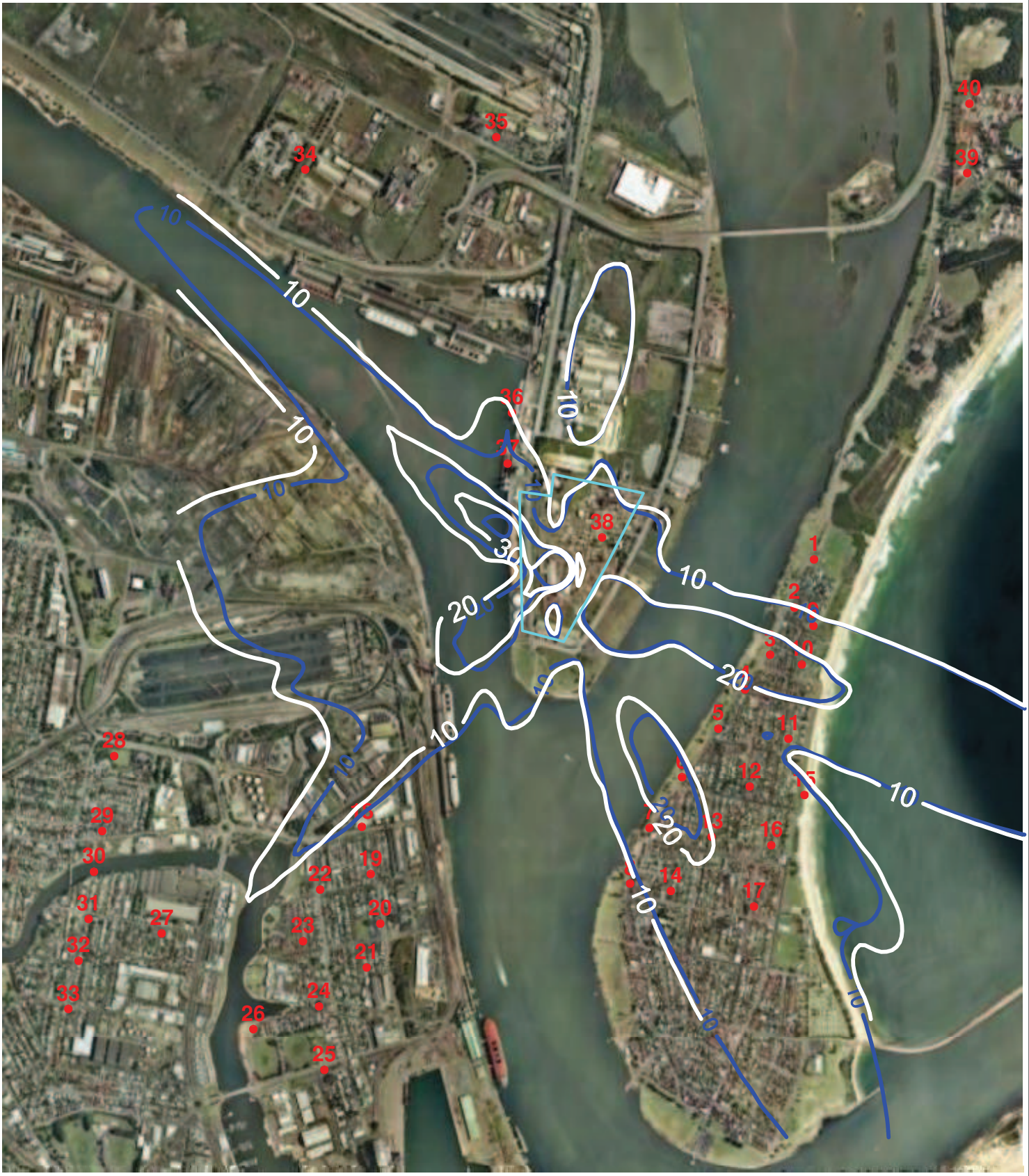
Site Boundary
Original Isopleths
Revised Isopleths
Units: ug/m³
Assessment Criteria: 90

Figure 4 TSP Annual Ave. Isopleths (Isolated)

Orica Australia Pty Ltd

Air Quality Impact Assessment - Consistency Report

Kooragang Island NSW



AECOM

0 500m

Site Boundary
Original Isopleths
Revised Isopleths
Units: ug/m³
Assessment Criteria: 50

Figure 5 PM_{10} 24Hr. Ave. Isopleths (Isolated)

Orica Australia Pty Ltd

Air Quailty Impact Assessment - Consistency Report

Kooragang Island NSW

Worldwide Locations

Australia	+61-2-8484-8999
Azerbaijan	+994 12 4975881
Belgium	+32-3-540-95-86
Bolivia	+591-3-354-8564
Brazil	+55-21-3526-8160
China	+86-20-8130-3737
England	+44 1928-726006
France	+33(0)1 48 42 59 53
Germany	+49-631-341-13-62
Ireland	+353 1631 9356
Italy	+39-02-3180 77 1
Japan	+813-3541 5926
Malaysia	+603-7725-0380
Netherlands	+31 10 2120 744
Philippines	+632 910 6226
Scotland	+44 (0) 1224-624624
Singapore	+65 6295 5752
Thailand	+662 642 6161
Turkey	+90-312-428-3667
United States	+1 978-589-3200
Venezuela	+58-212-762-63 39

Australian Locations

Adelaide
Brisbane
Canberra
Darwin
Melbourne
Newcastle
Perth
Sydney
Singleton

www.aecom.com