CSBP KWINANA: AMMONIUM NITRATE PRODUCTION EXPANSION PROJECT: PHASE 2

Public Environmental Review

Prepared for
CSBP Limited by Strategen and Parsons Brinckerhoff

November 2010

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Public Environmental Review

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 2, 322 Hay Street Subiaco WA 6008
ACN: 056 190 419

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Disclaimer and Limitation

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In particular, it should be noted that this report is a qualitative assessment only, based on the scope of services defined by the Client, budgetary and time constraints imposed by the Client, the information supplied by the Client (and its agents), and the method consistent with the preceding.

Strategen has not attempted to verify the accuracy or completeness of the information supplied by the Client.

Acknowledgement

Strategen has prepared this report as a subcontractor to Parsons Brinckerhoff Australia Pty Ltd (PB). PB is the prime contractor to CSBP Limited.

Client: Parsons Brinckerhoff Australia Pty Ltd

Report	Version	Prepared by	For review by	Submitted to Client	
				Copies	Date
Preliminary Draft Report	V1	NZ	CSBP	Electronic	27/08/10
Draft Report	V2	NZ	CSBP	Electronic	31/08/10
Draft Report	V3	NZ	OEPA	Hard Copy	08/09/10
Draft Report for DMA review	V4	NZ	OEPA/DMAs	Hard Copy	17/09/10
Draft Report for Client Approval	V5	NZ	CSBP	Electronic	5/11/10
Final Draft Report for preliminary OEPA review	V6	NZ	OEPA	Hard Copy	8/11/10

INVITATION

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal. Both electronic and hard copy submissions are welcome. The environmental impact assessment process is designed to be transparent and accountable, and includes specific points for public involvement, including opportunities for public review of environmental review documents. In releasing this document for public comment, the EPA advises that no decisions have been made to allow this proposal to be implemented.

CSBP Limited proposes to expand its Kwinana Ammonium Nitrate Production Facility (ANPF) through the addition of further components to the existing facility, with some existing components being re-engineered to enable increased throughput (debottlenecking), which will increase ammonium nitrate production capacity from 520 000 tonnes per annum to 936 000 tonnes per annum. In accordance with the *Environmental Protection Act 1986*, a Public Environmental Review (PER) has been prepared which describes this proposal and its likely effects on the environment. The PER is available for a public review period of 8 weeks from **DATE** closing on **DATE**.

Comments from government agencies and from the public will help the EPA to prepare an assessment report in which it will make recommendations to government.

Where to get copies of this document

Printed copies of this document may be obtained from Genevieve Mannin at CSBP Limited, Kwinana Beach Road, Kwinana 6167, **or** Tel: 08-9411 8280, Fax: 09-9411 8233, at a cost of $10. Electronic copies on CD-ROM can be made available free of charge through these contacts.

The document may also be accessed through the proponent's website at **www.csbp.com.au**.

Why write a submission?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Electronic submissions will be acknowledged electronically. The proponent will be required to provide adequate responses to points raised in submissions. In preparing its assessment report for the Minister for the Environment, the EPA will consider the information in submissions, the proponent's responses and other relevant information. Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the *Freedom of Information Act 1992*, and may be quoted in full or in part in each report.

Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining a group interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the PER or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal environmentally more acceptable.

When making comments on specific proposals of the PER:

- clearly state your point of view
- indicate the source of your information or argument if this is applicable
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful
- refer each point to the appropriate section, chapter or recommendation in the PER
- if you discuss different sections of the PER, keep them distinct and separate, so there is no confusion as to which section you are considering
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name
- address
- date
- whether you want your submission to be confidential.

The closing date for submissions is: **DATE**

The EPA prefers submissions to be made by email to submissions@epa.wa.gov.au.

Alternatively, submissions can be:

- posted to: Chairman, Office of the Environmental Protection Authority, Locked Bag 33, CLOISTERS SQUARE WA 6850, Attention: John Güld, or
- delivered to the Environmental Protection Authority, Level 4, The Atrium, 168 St Georges Terrace, Perth, Attention: John Güld, or
- faxed to (08) 6467 5562.

If you have any questions on how to make a submission, please ring the EPA assessment officer, John Güld on (08) 6467 5414.

CSBP KWINANA: AMMONIUM NITRATE PRODUCTION EXPANSION PROJECT: PHASE 2

PUBLIC ENVIRONMENTAL REVIEW

EXECUTIVE SUMMARY

INTRODUCTION

CSBP Limited (CSBP), part of the Wesfarmers Limited group, proposes to expand its Kwinana Ammonium Nitrate Production Facility (ANPF), located within the CSBP Kwinana Industrial Complex. The Ammonium Nitrate Production Expansion Project: Phase 2 (the proposal) comprises the addition of components to the existing ANPF, with some existing components being re-engineered to enable increased throughput to increase ammonium nitrate production capacity from 520 000 tonnes per annum to 936 000 tonnes per annum.

Location

The CSBP Kwinana Industrial Complex is located approximately 40 km south of Perth, Western Australia (Figure 1). The entire CSBP Kwinana Industrial Complex lies within the Kwinana Industrial Area (KIA) and encompasses an area of approximately 138 ha (Figure 2) and the proposal encompasses an area of approximately 1 ha within the complex. The proposal site is bounded by the existing CSBP facilities to the south and east, BP Kwinana to the north and Cockburn Sound to the west.

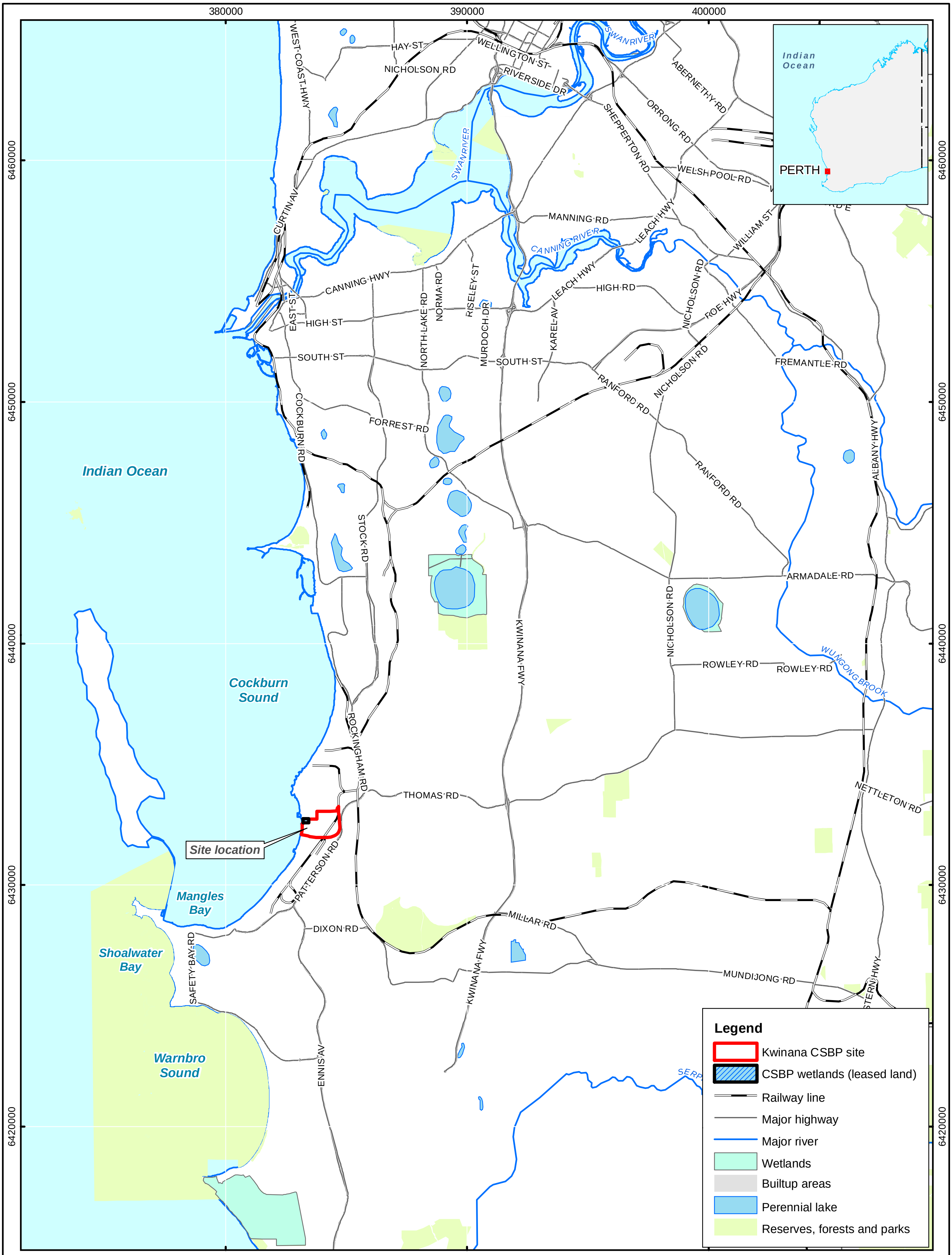
Overview

The proposal comprises the installation of an additional nitric acid ammonium nitrate plant (for a total of three similar nitric acid plant ammonium nitrate plants at the ANPF) and then debottlenecking (increasing capacity) of the current and proposed nitric acid ammonium nitrate plants and the 2008 prilling plant to increase the production of ammonium nitrate prill.

Project components

The existing ANPF at Kwinana consists of the following components:

- two nitric acid plants
- nitric acid storage tanks
- two ammonium nitrate solution plants
- ammonium nitrate storage tanks
- 2008 ammonium nitrate prilling plant (original prilling plant decommissioned in February 2009)
- packaging facility
- combined bulk and bagged ammonium nitrate solids storage
- despatch facilities.



CSBP

PARSONS BRINCKERHOFF

0 1 2 3 4 km

Scale:1:200,000 at A4

Coord. System.: MGA50 GDA94

Drawing No.: 2162254A_GIS_F001	
Revision: A	Date: 23/04/2010
Drawn By: CT	Checked by: RD
Source: Landgate (2010) Google Earth (© 2010 DigitalGlobe)	

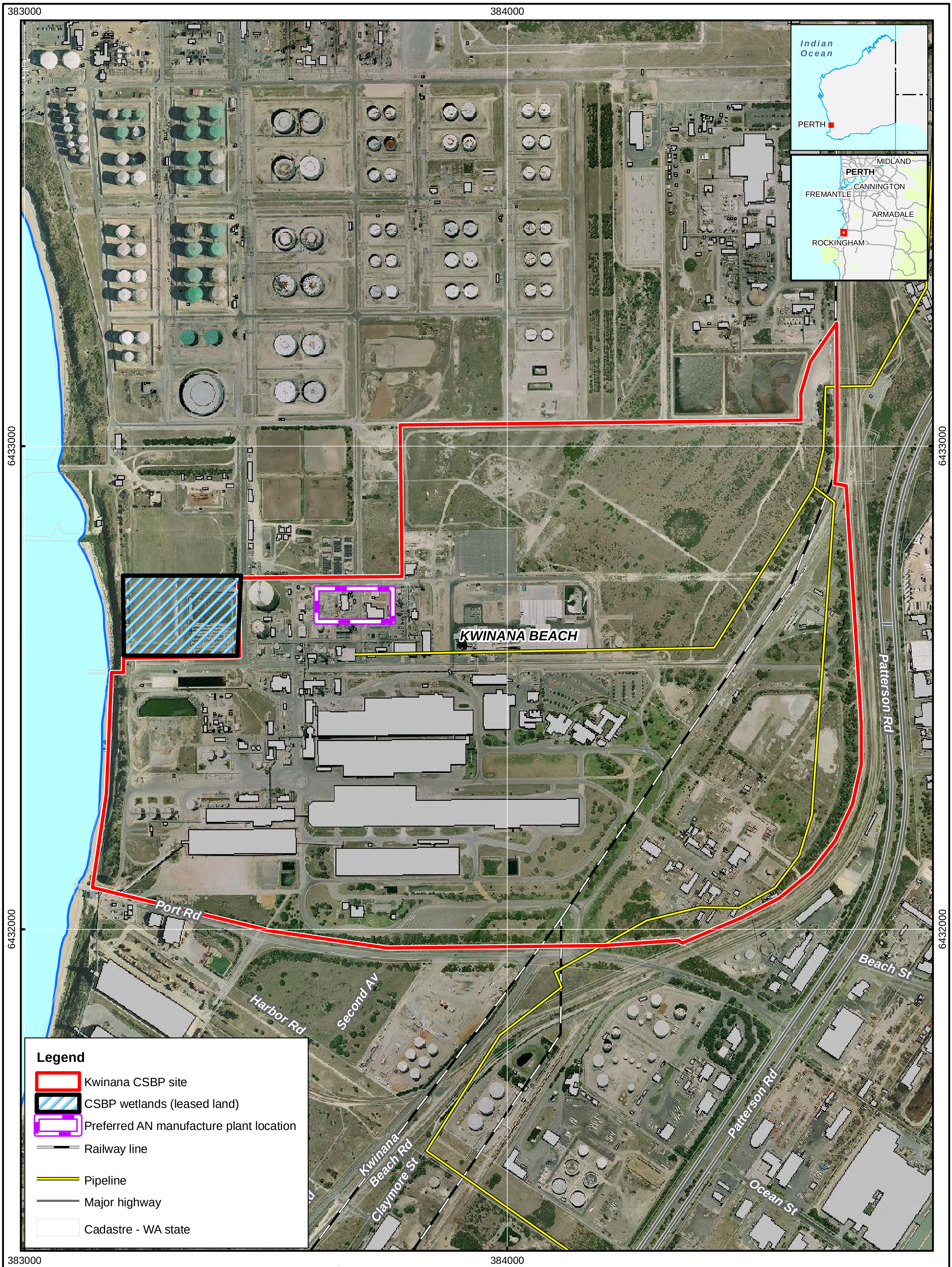
CSBP

Ammonium Nitrate Production Expansion Project: Phase 2

Regional location plan

Figure 1

GIS File: \\AUPERF\proj\C\CSBP\2162254A_EXPRESSION_OF_INTEREST_EIA\10_GIS\Projects\Drawings_Figures_Sketches\2162254A_GIS_F001_A.mxd



CSBP PB PARSONS BRINCKERHOFF	Scale: 1:10,080 at A4 0 100 200 m Coord. System.: MGA50 GDA94	Drawing No.2162254A_GIS_F002 Revision: A — Date: 23/04/2010 Drawn By: CT — Checked by: RD Source: Landgate (2010) Google Earth (© 2010 DigitalGlobe)	**CSBP** Ammonium Nitrate Production Expansion Project: Phase 2 **Site location plan** **Figure 2**

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In order to implement the proposal, CSBP proposes to undertake the following changes to the existing ANPF:

1. Debottlenecking of existing nitric acid ammonium nitrate plants (by 20 per cent) and construction of an additional nitric acid ammonium nitrate plant, which will then be debottlenecked (by 20 per cent), for a total nitric acid production capacity of 720 000 tonnes per annum as feedstock for a total ammonium nitrate solution production capacity of 936 000 tonnes per annum.
2. Debottlenecking of the 2008 prilling plant by 100 per cent (doubling output).
3. Construction of an additional 3500 tonne 63 per cent nitric acid solution tank.
4. Construction of an additional 305 m^3 ammonium nitrate solution tank.
5. Construction of an auxiliary boiler.
6. Construction of additional bagged ammonium nitrate storage (within existing approval of 27 000 tonnes).
7. Increased ammonia imports (up to 25 shipments per year) via Kwinana Bulk Jetty.
8. Upgrade of existing ammonium nitrate solid and solution despatch facilities.
9. Upgrade of existing and construction of new utilities and supporting infrastructure to support the expansion.

Construction of the third nitric acid ammonium nitrate plant is planned to be completed before debottlenecking activities are undertaken on the existing nitric acid ammonium nitrate plants. Debottlenecking of the nitric acid ammonium nitrate plants will occur as required to meet increased demand for product. The 2008 prilling plant will be debottlenecked to enable increased ammonium nitrate production capacity.

There will be no increase in the capacity to produce ammonia on site and storage capacity will not need to be increased. However, there will be an increase in ammonia shipments to the CSBP site as throughput is increased. The proposal will result in a maximum of 25 shipments of ammonia per year. It is likely that around 14 shipments per year will be needed under normal operating circumstances and the higher rates will be under circumstances that result in the ammonia plant being shut down.

This proposal encompasses the expected maximum production rates of ammonium nitrate on the CSBP site.

The new ammonium nitrate production infrastructure will be located within the CSBP Kwinana Industrial Complex. The exact location of individual expansion components within the expansion envelope is still to be confirmed and this PER considers the highest impact option for factors which are location-dependent, such as noise.

All additional infrastructure for the proposed expansion will be located within the existing CSBP Kwinana Industrial Complex and there will be no additional land acquisition or disturbance required and no resultant impact on any existing natural flora or fauna habitats as the area has been previously cleared.

This document

The purpose of this document is to present a description of the principal components of the proposal (including environmental impact assessment, mitigation and management measures) being tendered by CSBP for consideration by the EPA at the level of PER.

This document is the PER of the proposal and has been prepared for assessment by EPA under Part IV of the EP Act. This PER has been prepared in accordance with EPA *Environmental Impact Assessment Administrative Procedures 2002* and with the Environmental Scoping Document.

LEGISLATIVE REQUIREMENTS AND ASSESSMENT PROCESS

Relevant legislation

The key legislation for this proposal is the *Environmental Protection Act 1986* (EP Act).

The proposed expansion will also be referred to the following decision-making authorities for approvals:

- Department of Environment and Conservation (DEC) for approval under Part V of the EP Act
- Department of Mines and Petroleum (DMP) for assessment of the dangerous goods, public risks and hazard aspects of the proposal under the *Dangerous Goods Safety Act 2004* and Regulations
- Town of Kwinana and Western Australian Planning Commission (WAPC) for relevant development and building approvals.

Project approvals process

The proposal was referred to the EPA under section 38 of the EP Act on 28 April 2010. On 10 May 2010, the EPA advised it would formally assess the proposal at the level of PER with an eight-week public review period.

An Environmental Scoping Document (ESD) was prepared for EPA approval of the scope of assessment of the proposal as well as providing an indicative timeline for the assessment process. The ESD was approved by the EPA on 7 September 2010.

The PER is intended to provide the EPA, the public and other Decision Making Authorities (DMAs) with an understanding of the proposal, its potential environmental impacts and the environmental management measures and commitments required to ensure the EPA management objectives for each environmental factor are met.

This PER is subject to an eight-week public review period. At the end of this period, issues raised in written submissions from the public and government agencies are collated and provided to CSBP, who will summarise and respond to the issues raised in the submissions. The EPA will then undertake an assessment of the PER document, submissions and the proponent responses to submissions. The EPA will provide an assessment report to the Minister for the Environment. The EPA assessment report is made publicly available and any person has the right to appeal, within 14 days, against the recommendations of that report or any matters within it. The Minister for the Environment will then, in consultation with other relevant decision making authorities, decide whether or not the proposal should be implemented and, if so, under what conditions.

The proponent

The proponent for the proposal is CSBP Limited, which owns and operates the existing ANPF at the CSBP Kwinana Industrial Complex.

THE PROPOSAL

Key components

Table 1 provides a summary of the proposed key characteristics of the ANPF following the expansion, compared with the key characteristics of the existing ANPF.

Table 1 Key characteristics of the existing and proposed ANPF

Characteristic	Existing Facility	Expanded Facility
Location	Kwinana Beach Road – Kwinana – KIA	
CSBP site area	138 ha	
Project life	20-30 years	
Plant operating hours	24 hour/day operation, 365 days per year except for maintenance shutdowns	
Plant commissioning	1996 – nitric acid ammonium nitrate plant 2007 – second nitric acid ammonium nitrate plant and 2008 prill plant	2014 – third nitric acid ammonium nitrate plant and debottlenecked 2008 prill plant
Plant components	Two nitric acid plants Nitric acid storage tanks: 2000 tonnes total capacity Two ammonium nitrate solution plants Ammonium nitrate (90% solution) storage tank of 305 m^3 capacity Ammonium nitrate (70-90% solution) storage tank of 730 m^3 capacity 2008 prilling plant Ammonium nitrate bag packaging facility Ammonium nitrate solids storage facility (Dangerous Goods Licence permits storage up to 27 000 t)	Three nitric acid plants Nitric acid storage tanks of approximately 5500 tonne capacity Three ammonium nitrate solution plants Two ammonium nitrate (90% solution) storage tanks of approximately 610 m^3 total capacity Ammonium nitrate (70-90% solution) storage tank of 730 m^3 capacity 2008 prilling plant (debottlenecked) Ammonium nitrate bag packaging facility Ammonium nitrate solids storage facility (Dangerous Goods Licence permits storage up to 27 000 t) Auxiliary boiler
Production	Total nitric acid production — 400 000 tpa, as feedstock for: Total ammonium nitrate solution production — 520 000 tpa, as feedstock for: Total prilled ammonium nitrate — 420 000 tpa	Total nitric acid production — 720 000 tpa, as feedstock for: Total ammonium nitrate solution production — 936 000 tpa, as feedstock for: Total prilled ammonium nitrate — 780 000 tpa
Inputs	Ammonia, oxygen (air), and water	Ammonia, oxygen (air), and water
Outputs	Ammonium nitrate solution and prill, plus air/water emissions	Ammonium nitrate solution and prill, plus air/water emissions
Air emissions	Nitrogen oxides Ammonium nitrate particulate Ammonia	Nitrogen oxides Ammonium nitrate particulate Ammonia
Greenhouse gas emissions	925 688 tpa of net CO_2-e	1 110 000 tpa of net CO_2-e
Liquid effluent discharges (from CSBP Kwinana Industrial Complex)	Approx 2 ML/d effluent to the SDOOL	Approx. 2.4 ML/day effluent to the SDOOL

Characteristic	Existing Facility	Expanded Facility
Noise	Within Environmental Protection (Noise) Regulations 1997 as proposed to be amended.	Within Environmental Protection (Noise) Regulations 1997 as proposed to be amended.
Net power generation	4 MW	6 MW
Shipping	15 ammonium nitrate shipments per year 6 ammonia imports per year	maximum 35 ammonium nitrate shipments per year maximum 25 ammonia imports per year

STAKEHOLDER CONSULTATION

Consultation strategy

CSBP recognises that a high degree of stakeholder participation in the consultation process will have significant benefits including:

- clearer information for the community resulting in more informed decision making
- reduction in delays due to a lack of or inaccurate information
- avoidance of misconceptions and confusion
- allowing CSBP to accommodate community expectations in the project design where feasible.

As part of its consultation process, CSBP is engaging a variety of stakeholders, including the Kwinana Industries Council Community and Industries Forum (CIF) and hosting an information session at its Kwinana site as the project develops. The opportunity to attend this information session will be widely advertised to ensure interest groups outside the Kwinana region with an interest in the issues are made aware of the proposal.

Public consultation will occur as part of this environmental impact assessment process as specific stakeholders are identified and relationships established throughout the detailed development of the project. Public consultation opportunities will be advertised in local press and through the CSBP website. As a long-term participant in the development of the Kwinana Industrial Area (KIA), CSBP has a good knowledge of the interested stakeholders and issues of concern to the community. A major contribution to this knowledge has come from involvement in the approval processes associated with the original nitric acid ammonium nitrate plant and the first phase of expansion in 2005.

Key issues

The public information session for the previous expansion proposed in 2005 was attended by representatives from the local community, CSBP industrial neighbours, local government and the local media. The main issues raised at the session in 2005 have been addressed in this PER document:

- what air emissions will occur from this expansion?
- what effluent discharges will occur from this expansion?
- has CSBP addressed the risk aspect of this expansion?
- has CSBP considered the noise impact of this expansion?
- will traffic increase as a result of this expansion?

These issues have been addressed in the PER.

IMPACT ASSESSMENT AND MANAGEMENT

Impact assessment

The key environmental factors associated with the proposal are:

- air quality (emissions of oxides of nitrogen, particulates and ammonia)
- greenhouse gas emissions
- noise
- public risk.

A number of minor environmental factors were also identified in the scoping process:

- construction environmental impacts
- marine environment (wastewater disposal)
- water resources
- solid waste
- traffic and shipping
- visual amenity and light overspill.

Each environmental factor associated with the proposal has been assessed in terms of:

- the EPA objective
- any applicable standards, guidelines or procedures
- a description of the factor
- potential sources of impact
- assessment of potential impact
- proposed mitigation/management measures
- expected environmental outcome.

Proposed management measures

Environmental Management System

CSBP has in place an Environmental Management System (EMS), which is consistent with the international standard ISO 14001. The EMS details the operational environmental management for the CSBP Kwinana Industrial Complex.

The EMS and associated procedures are reviewed when changes occur which affect specific procedures, and as required by the CSBP document management system.

Construction Environmental Management Plan

CSBP considers that most of the environmental issues with respect to the construction of the expanded ANPF will be routinely addressed via the site EMS. Nevertheless, CSBP recognises that there may be some environmental impacts specific to the construction phase of the expansion not addressed by the existing EMS and related procedures. CSBP has consequently prepared a Construction Environmental Management Plan (CEMP) for the construction phase of the expansion.

The CEMP sets out the environmental risks, the environmental management objectives, management actions, monitoring and reporting requirements and contingency provisions applicable to their management.

CSBP and contractors undertaking any construction work related to the proposed expansion will implement the CEMP during that phase of the expansion.

Summary of impacts and proposed management measures

Table 2 presents a summary of the assessment of impacts and proposed management measures applicable to the environmental factors considered in this environmental impact assessment, and the expected outcomes.

Table 2 Assessment of environmental factors relating to the proposal

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Biophysical				
Marine Environment	Ensure that any impacts on marine communities are avoided and to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	The proposed expansion will result in generation of additional liquid wastes during both the construction and operations phases. Around 360 kL/day is expected to be generated from cooling water blowdown for the new nitric acid and ammonium nitrate solution plant. Stormwater may increase marginally as the proposed area of construction is on previously developed land in close proximity to pre-existing stormwater collection. The proposed average discharge to the SDOOL from the CSBP Kwinana Industrial Complex following the implementation of this Proposal is expected to be about 2.4 ML/day. The generation of additional liquid wastes during the proposed expansion is considered to be a manageable impact and the additional liquid waste volumes will be handled using the existing liquid waste management system. There is adequate capacity in the existing wastewater management system including the nutrient-stripping wetland for increased wastewater storage and only minor additions to the stormwater collection system in the proposal footprint are required. The discharges from the CSBP Kwinana Industrial Complex will continue to comply with the CSBP EP Act Licence Marine Pollution Control Conditions. Treatment through the nutrient-stripping wetland and other CSBP water recycling initiatives will aid this endeavour.	CSBP will continue to manage wastewater discharges to the marine environment in accordance with EP Act Licence requirements, and the Environmental Management System for the site. CSBP will continue to discharge to the SDOOL, however the Cockburn Sound outfall remains as a licensed discharge point, maintained as an emergency back-up for the discharge to SDOOL. The emergency beach outfall is maintained in the event of overflows caused by extreme stormwater flows. Current operations are such that overflows to the beach and discharges to Cockburn Sound via the diffuser are no longer part of CSBP normal operations. CSBP will continue to explore methods for optimising the efficiency of the nutrient-stripping wetland. CSBP will continue to contribute to the State ambient monitoring program of Cockburn Sound waters.	The amount of additional wastewater generated is not expected to be substantial and will be able to be managed within the existing liquid waste management system.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Water Resources	To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected (EPA 2009a).	The preferred outcome for meeting the increased process water demands resulting from the proposal is to use recycled water from the KWRP. In the event that this source is not available and/or is inadequate to meet the project demands, CSBP considers there is sufficient access to sustainable groundwater (superficial and artesian aquifers) to supply water for this proposed project within the allocation limit on the current RWI Act licence. Scheme water from the Water Corporation reticulated system is available to the site if needed to supplement the other sources, however is the least preferred alternative. While the preference would be to use KWRP, CSBP is confident that alternative water sources are available to satisfy projected ANPF water demands if required.	CSBP will source water for this project from KWRP, sustainable ground water supplies within existing licence allocations or other sustainable and appropriate sources as they are identified. Water Corporation scheme water will not be used extensively for process purposes except in emergency or supply disruption situations. CSBP will continue its internal programs directed at increasing water use efficiency and source protection.	CSBP will use recycled water from the KWRP or sustainable ground water supplies under licence, and the proposal is not expected to adversely impact on environmental values.
Pollution Management				
Air Quality - Oxides of Nitrogen	To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	Modelling indicates that direct and cumulative NOx emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to the NEPM standards. Monitoring trends indicate that ozone production in the KIA is not a dominant driver of photochemical smog in Perth; hence, the relative impact from the contribution to the generation of photochemical smog from the proposed expanded ANPF will be minimal.	CSBP will continue to manage emissions in accordance with EP Act Licence conditions, and the Environmental Management System for the site. The proposed nitric acid plant will include best available technology for controlling NOx emissions to levels comparable to the existing nitric acid plants. This will include the installation of a selective catalytic reactor and monitoring control as installed in the existing plants. CSBP considers that this factor can be managed through conditions applying to works approvals and licences under Part V of the EP Act.	As the modelling indicates that direct and cumulative NOx emissions will comply with the NEPM standards, the proposal is not expected to adversely impact on environmental values. As the contribution to the generation of photochemical smog from the proposed expanded ANPF will be minimal, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Air Quality - Particulates	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	Modelling indicates that PM (as $PM_{2.5}$) emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to the NEPM advisory standards. PM (as $PM_{2.5}$) emissions from the debottlenecked 2008 prilling plant are expected to be a relatively minor contributor to the total load of nitrogen entering Cockburn Sound from the CSBP site. Note: $PM_{2.5}$ has been modelled to represent all particulate matter as a conservative approach.	CSBP will continue to manage particulate emissions in accordance with EP Act Licence conditions, and the Environmental Management System for the site. CSBP considers that this factor can be managed through conditions applying to works approvals and licences under Part V of the EP Act.	As the modelling indicates that PM emissions will comply with the NEPM advisory standards, the proposal is not expected to adversely impact on environmental values. As PM emissions are expected to be a relatively minor contributor to the total load of nitrogen entering Cockburn Sound, the proposal is not expected to adversely impact on environmental values.
Air Quality – Ammonia	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	Modelling indicates that direct and cumulative ammonia emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to the UKEA standards.	No further mitigation measures are proposed for ammonia other than the technology currently installed in the 2008 prilling plant.	As the modelling indicates that direct and cumulative ammonia emissions will comply with the UKEA standards, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Greenhouse Gases	The documented environmental objective for greenhouse gas (GHG) emissions is: • minimise GHG emissions in absolute terms and reduce emissions per unit of product to as low as reasonably practicable • mitigate GHG emissions, mindful of Commonwealth and State GHG strategies and programs (EPA 2010).	The proposed third nitric acid plant will match the capacity and technology of the second nitric acid plant assessed in the previous proposal by CSBP (2005) with the exception of the inclusion of tertiary N_2O abatement technology. The N_2O abatement technology is conservatively estimated to reduce GHG emissions due to nitrous oxide from the third nitric acid plant by approximately 90 per cent. To reduce GHG emissions, CSBP commits to fitting secondary abatement technology to Nitric Acid Plants 1 and 2 should trialling of secondary abatement technology in Nitric Acid Plant 2 in 2011 be successful.	Abatement of N_2O emissions from the nitric acid plants is expected to represent the single largest potential reduction in GHG emissions from the CSBP site. CSBP will implement the following management measures to mitigate the emissions of GHG: 1 CSBP will design and construct the new third nitric acid plant with a reactor boiler of similar size to that installed in the Nitric Acid Plants one and two. 2 CSBP will design and construct the new third nitric acid plant to include tertiary N_2O abatement technology. Tertiary abatement technology will mitigate a minimum of 90 per cent of the total N_2O produced from this nitric acid plant. 3 CSBP commits to trialling secondary abatement technology in Nitric Acid Plant 2 in 2011 and, if the trial is successful, CSBP commits to the installation of secondary abatement technology in Nitric Acid Plant 1 later in 2011. To be considered successful, N_2O reduction efficiencies must meet secondary abatement technology supplier specifications and have no adverse impact to current nitric acid plant performance; specifically, ammonia conversion to nitric acid must remain within current design guidelines and production rates unaffected. Abatement technology installed will mitigate a minimum of 80 per cent of the total N_2O produced from these plants. 4 Notwithstanding the above commitments, CSBP commits to ensuring abatement technologies are in place in the existing Nitric Acid Plants 1 and 2 when their combined production reaches 480 000 tpa nitric acid: that is, fully debottlenecked. 5 CSBP will submit an updated Greenhouse Gas Abatement Program report to the EPA three months prior to the commissioning of the new third nitric acid plant which will review the current state of testing of low	The increase in GHG from this proposal is estimated to be in the order of 184 000 tCO_2e per annum. This will result from construction and debottlenecking of a third nitric acid plant with tertiary N_2O abatement technology and from debottlenecking of the two existing nitric acid plants to a maximum production rate of 480 000 tonnes per annum nitric acid without the installation of secondary abatement. If trialling of secondary abatement technology in Nitric Acid Plant 2 in 2011 is successful and, then, Nitric Acid Plant 1 is retrofitted with secondary abatement technology, along with tertiary N_2O abatement technology fitted to the third nitric acid plant, there will be a decrease in GHG emissions estimated to be in the order of 661 000 tonnes CO_2e per annum. As the third nitric acid plant will be designed and constructed to include tertiary N_2O abatement technologies and through CSBP commitments to the minimisation of GHG, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
			N_2O emission catalysts. An update of this report will be submitted annually to the OEPA until the new technology is adopted or the EPA advises that the report is no longer required. 6 The Greenhouse Gas Abatement Program will be based on a template understood to be under development by the EPA. 7 CSBP expects to be an obligatory participant in any legislated national carbon emissions reduction scheme when operational, and will be required to conform with the legislated requirements to reduce national GHG emission rates.	

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Noise	To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards (EPA 2009a).	The monitored and predicted noise emissions at residential premises show that the proposal will not have a significant impact in residential receiver locations. The noise emissions to the adjacent BP Refinery premises are expected to comply with the proposed Regulation Review industrial 'assigned level' of 70 dB(A) if noise attenuation is undertaken within the CSBP Kwinana Industrial Complex. This attenuation will be finalised during the design phase of the expansion.	CSBP will, where necessary, fit noise attenuation features to new equipment installed as part of the expansion to ensure that the overall noise impact from the expanded ANPF complies with the Regulations, as they are proposed to be amended. CSBP will implement noise control measures in the proposed third nitric acid ammonium nitrate plant to match the second nitric acid ammonium nitrate plant noise attenuation measures. CSBP will ensure the engineering changes to be implemented for the debottlenecking of the nitric acid ammonium nitrate plants and the 2008 prilling plant will be reviewed by an acoustic consultant to allow identification of any potential increases in noise emission and implementation of appropriate noise control. CSBP will implement appropriate noise attenuation measures within the CSBP Kwinana Industrial Complex to ensure compliance with the noise regulations as they are proposed to be amended. The noise mitigation measures for the proposal will be incorporated into the noise management plan for the site. In the event of the proposed Regulation Review not increasing the industry-industry assigned levels as expected, then CSBP will comply with the existing Regulations within twenty four months of the Regulation review process ceasing (it is relevant that the small area of the BP Refinery currently potentially subject to exceedance is not a permanent workplace for any person).	As CSBP is not expected to significantly contribute to noise levels at sensitive residential receivers, the proposal is not expected to adversely impact on environmental values. As noise monitoring and modelling results show that noise levels will meet statutory requirements and acceptable standards with appropriate noise attenuation measures implemented, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Solid Wastes	To ensure that land uses and activities that may emit or cause pollution are managed to maintain: • physical and biological environment and the natural processes that support life • the health, welfare and amenity of people and land uses (EPA 2008). To ensure that pollutants emitted are as low as reasonably practicable, and comply with all statutory requirements and acceptable standards (EPA 2008).	The proposed expansion will result in the generation of additional wastes during the construction phase; however, solid waste from the operational phase is expected to be negligible. During construction, it is likely that the general wastes will increase to levels similar to those previously experienced at CSBP Kwinana Industrial Complex during the previous ANPF expansion; however, these increases will be temporary. It is expected that levels of general waste will reduce to close to current levels during operation. Solid waste generation on site is considered a minor impact and the additional waste volumes will be managed under the CSBP Waste Management Plan.	CSBP will continue to review and implement the existing CSBP Waste Management Plan and related Solid Waste Procedure.	As there will only be a slight increase in the generation of solid waste as a result of this proposal, and CSBP has existing management procedures for managing waste, the proposal is not expected to adversely impact on environmental values.
Social Surrounds				
Risk	To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria (EPA 2009a).	The risk posed by the scenarios for proposed development of a third nitric acid ammonium nitrate plant, debottlenecking of existing nitric acid ammonium nitrate plants, increased ammonia shipments, and debottlenecking of the existing 2008 prilling plant have been assessed against the EPA individual fatality risk criteria. The proposed expansion should not significantly affect risk levels with the exception of the historical exceedance of risk extending onto BP Refinery land. Societal risk results indicate that the proposed development, when considered with the existing societal risk, is negligible on the surrounding residential population and tolerable for the neighbouring industrial facilities if risk is maintained As Low As Reasonably Practicable (ALARP).	The historical exceedance of risk extending onto BP Refinery land is managed by BP and CSBP. The area is utilised for soil remediation by BP and therefore is not normally populated; management will continue with the proposed expansion. CSBP will continue to maintain a Safety Report as required by the MHF regulations, with the advice of the DMP. CSBP will obtain and maintain the relevant Dangerous Goods Licences for the expanded ANPF. A full QRA will be presented to the DMP for their consideration.	Considering the updated risk contours show compliance with all but one of the applicable risk criteria and that there is existing management in place and close liaison with BP regarding the incursion of risk from CSBP over the BP Refinery site, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Traffic and Shipping	To ensure that any increases in traffic and shipping do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	In terms of general light vehicle traffic, the proposal will not generate a substantial increase in traffic during operation. There will be a 48 per cent increase in truck movements for ammonium nitrate transport; however, when the increase in truck movements from CSBP and the other users on Kwinana Beach Road are taken into consideration, this increase is around 0.8 per cent, which is not considered to be significant in the long-term. The current level of ship movement in Cockburn Sound will marginally increase as a result of increased prilled ammonium nitrate exports and ammonia imports. An expected increase of 13 per cent in the context of the overall annual average number of shipping movements in Cockburn Sound is not considered to be significant in the long-term.	No additional management measures are proposed for road traffic or shipping movements.	The increase in the number of road traffic and shipping movements as a result of this proposal will be relatively small in the context of existing traffic or shipping movements. As a result, implementation of this proposal is not expected to adversely impact on environmental values.
Visual Amenity and Light Overspill	Ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable (EPA 2009a). To avoid or manage potential impacts from light overspill and comply with acceptable standards (EPA 2009a).	The potential for visual impact from the proposed expansion is considered minimal given that all new facilities will be located on the existing premises and within close proximity to each other. The visual impact of the expanded ANPF will be minimal in the context of the surrounding land use. As the proposed expansion is within close proximity to existing ANPF, the need for extra lighting will be minimal and unlikely to be noticeable in the context of the surrounding land use.	To improve the visual amenity of the proposed expansion, the following management strategies will be undertaken: • good housekeeping practices will be maintained at all times. To minimise the potential for light overspill, the following management strategies will be undertaken: • impacts will be minimised through strategic positioning of light poles and towers, and utilisation of directional lighting • where any additional light sources are installed, these will be in accordance with AS 4282-1997 for the control of light overspill.	Given that this proposal has a relatively small footprint (compared to existing industrial facilities at the CSBP Kwinana Industrial Complex), the proposal is not expected to adversely impact on environmental values. Given that CSBP currently complies with the Australian standard AS 4282-1997 for the control of light overspill and any additional lighting sources will be installed in accordance with this standard, the proposal is not expected to adversely impact on environmental values.

CSBP KWINANA: AMMONIUM NITRATE PRODUCTION EXPANSION PROJECT: PHASE 2

PUBLIC ENVIRONMENTAL REVIEW

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All appendices, together with an electronic version of this report, can be found on the CD–ROM attached inside this report.

Chapter 1 Introduction and the proposal

1 INTRODUCTION

CSBP Limited (CSBP), part of the Wesfarmers Limited group, proposes to expand its Kwinana Ammonium Nitrate Production Facility (ANPF), located within the CSBP Kwinana Industrial Complex approximately 40 km south of Perth. The Ammonium Nitrate Production Expansion Project: Phase 2 (the proposal) comprises the addition of components to the existing ANPF, with some existing components being re-engineered to enable increased throughput to increase ammonium nitrate production capacity from 520 000 tonnes per annum to 936 000 tonnes per annum.

The proposal by CSBP to expand its ammonium nitrate production was referred to the Environmental Protection Authority (EPA), under Section 38 of the *Environmental Protection Act 1986* (EP Act), in April 2010. The EPA subsequently set the level of assessment as Public Environmental Review (PER) with an eight-week public review period.

This document is the PER of the proposal and has been prepared for assessment by the EPA under Part IV of the EP Act. This PER has been prepared in accordance with EPA *Environmental Impact Assessment Administrative Procedures 2002*.

1.1 THE PROPOSAL

1.1.1 Proposal overview

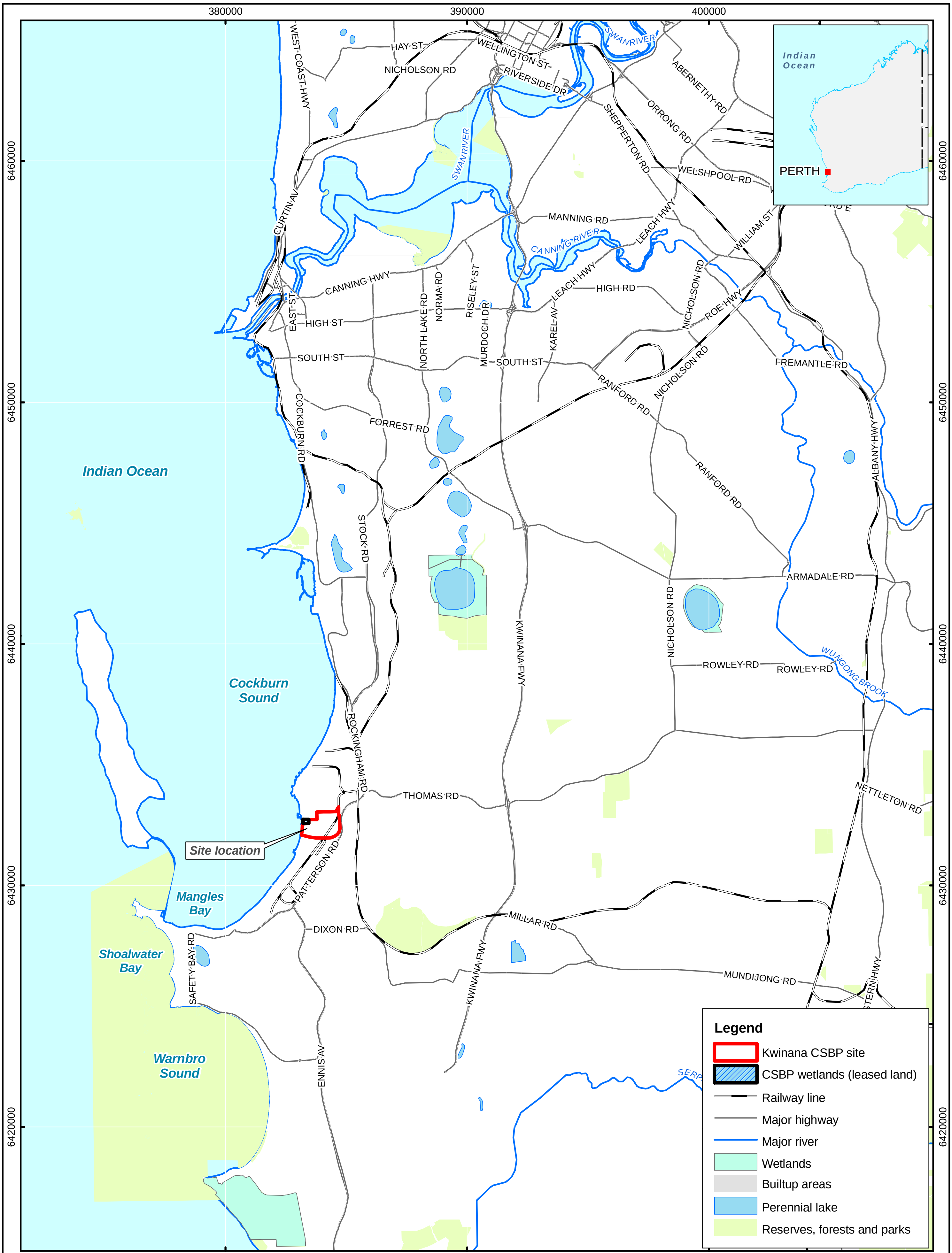
The proposal comprises the installation of an additional nitric acid ammonium nitrate plant (for a total of three similar nitric acid plant ammonium nitrate plants at the ANPF) and then debottlenecking (increasing capacity) of the current and proposed nitric acid ammonium nitrate plants and the 2008 prilling plant to increase the production of ammonium nitrate prill.

1.1.2 Proposal location

The CSBP Kwinana Industrial Complex is located approximately 40 km south of Perth, Western Australia (Figure 1.1). The entire CSBP Kwinana Industrial Complex lies within the Kwinana Industrial Area (KIA) and encompasses an area of approximately 138 ha (Figure 1.2) and the proposal encompasses an area of approximately 1 ha within the complex. The proposal site is bounded by the existing CSBP facilities to the south and east, BP Kwinana to the north and Cockburn Sound to the west.

1.1.3 Proposal schedule

Construction works on the proposal are expected to commence (pending necessary approvals) in the second half of 2011 with expected completion in the first quarter of 2014. Ministerial Conditions of approval for implementation will be accommodated in project implementation together with all other regulatory requirements.



CSBP

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Coord. System.: MGA50 GDA94

Drawing No.: 2162254A_GIS_F001

Revision: B | Date: 20/05/2010

Drawn By: CT | Checked by: RD

Source: Landgate (2010), Google Earth (© 2010 DigitalGlobe)

CSBP

Ammonium Nitrate Production Expansion Project: Phase 2

Regional location plan

Figure 1.1

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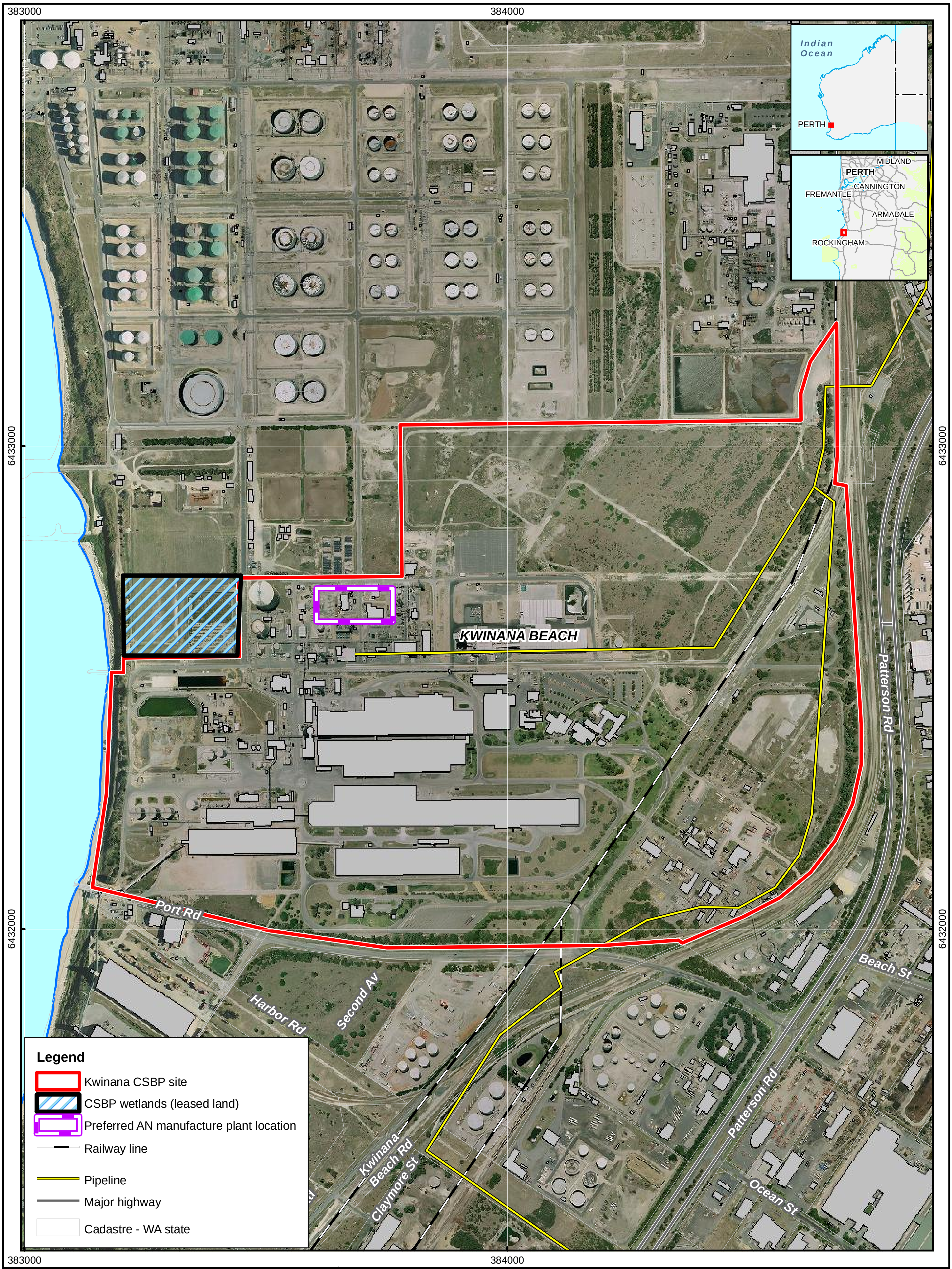

CSBP

PARSONS BRINCKERHOFF

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Revision: B	Date: 23/04/2010
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Source: Landgate (2010) Google Earth (© 2010 DigitalGlobe)	

CSBP

Ammonium Nitrate Production Expansion Project: Phase 2

Site location plan

Figure 1.2

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1.2 THE PROPONENT

The proponent for the proposal is:

CSBP Limited
Kwinana Beach Road
Kwinana 6167.

The key contact is:

Genevieve Mannin
Environment Manager
CSBP Limited
Tel: 08-9411 8143
Fax: 09-9411 8233

E-mail: genevieve.mannin@csbp.com.au

1.3 PURPOSE AND SCOPE OF THIS DOCUMENT

The purpose of this document is to present a description of the principal components of the proposal (including environmental impact assessment, mitigation and management measures) being tendered by CSBP for consideration by the EPA at the level of PER.

1.3.1 Structure of document

This PER is structured as follows:

Chapter 1 – Introduction, proposal description and overview of existing environment.

Chapter 2 – Stakeholder consultation, environmental principles and sustainability.

Chapter 3 – Assessment and management of environmental factors associated with the proposal.

Chapter 4 – Proposed environmental management framework, key management actions and proposed environmental conditions.

In addition, environmental management plans/programs are presented in the following Appendices:

Appendix 1 – Construction Environmental Management Plan (CEMP)

Appendix 2 – Greenhouse Gas Abatement Program – current as of November 2010

Appendix 3 – Environmental Noise Management Plan – current as of August 2010

The reports by specialist consultants on the various technical studies undertaken to support the preparation of his PER are presented in additional Appendices.

2 JUSTIFICATION OF PROPOSAL

2.1 EVALUATION OF ALTERNATIVES

2.1.1 Project location

CSBP has reviewed a number of location options including:

- establishment of new production facilities in the northwest of WA
- expanding the existing ANPF at Kwinana.

CSBP studies demonstrate that the most economical and flexible solution with the lowest environmental impact is the option of expanding existing operations at Kwinana.

The option for establishing a new facility in the northwest of WA is currently not considered viable due to the following factors:

- significantly higher establishment costs
- greater delays associated with development and construction of the project
- duplication of certain ancillary facilities that already exist at Kwinana
- overall higher resultant environmental impacts associated with land acquisition and clearing
- duplication of organisational overheads required to operate a remote site
- organisational difficulties associated with remote sites, including the retention of trained technical personnel
- higher operating costs and duplication of critical spare requirements
- reduced synergies between operating units impacting on the flexibility of switching product mixes to meet customer demands.

The site is located in an existing heavy industrial area as an existing ANPF with the full range of required supporting infrastructure and services. Expansion of the existing ANPF will result in the lowest net environmental footprint, when compared with all other potentially feasible options.

2.1.2 Process technology

This proposal involves expansion of the existing ANPF through construction and operation of new plants, and debottlenecking of production plants.

CSBP has therefore selected technologies, existing and new, broadly within the ambit of those in which CSBP has operational and maintenance experience, and where existing procedures and systems can allow for the ongoing safe and environmentally effective operation of the business.

CSBP considers existing technologies to continue to be the Best Available Technology (BAT), such as the application of selective catalytic reduction (SCR) technology.

A detailed description of the technology used at the ANPF and proposed to be used for new components of the ANPF is presented in Chapter 1, Section 5.3.

2.2 PROJECT JUSTIFICATION

2.2.1 Benefits to Western Australia

The mining and agricultural sectors are significant contributors to the WA economy. The mining sector in WA relies on quality ammonium nitrate product for input into explosives of which CSBP currently supplies in excess of 95 per cent. In addition, there is demand from the agricultural sector for liquid fertilisers such as *Flexi-N* (manufactured at CSBP using the ammonium nitrate solution).

Western Australian demand for ammonium nitrate products is increasing to service the growing mining and agricultural requirements.

CSBP considers that the current and predicted market demand is sufficient to justify the expansion of its existing production capacity. The proposed expansion will offer an alternative to importation of ammonium nitrate from overseas or interstate to meet future market demand in both the agricultural and mining sectors.

Through the proposed addition of another nitric acid ammonium nitrate plant, and the debottlenecking of the three nitric acid ammonium nitrate plants and 2008 prilling plant, CSBP will be able to provide up to a further 360 000 tonnes per annum for other export markets or to service a greater than projected growth in demand for ammonium nitrate in WA.

WA agricultural and mining sectors will be able to rely on the security of supply of a locally produced, high quality ammonium nitrate product, manufactured in a facility that has best available technology in terms of emission controls.

Current local production of ammonium nitrate reduces import requirements with import replacement of $205 million per annum. The project will replace future imports of a similar dollar value, and contribute significantly to the State economy, with capital expenditure of around $450 to $500 million, and new export revenues and employment over the life of the project.

2.2.2 Local benefits

The expansion will result in the employment of 400 people during the construction phase with additional employment (directly and indirectly) required to cover production, maintenance, despatch, sales and distribution of ammonium nitrate from the expanded ANPF.

3 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The proposal was referred to the EPA under section 38 of the EP Act on 28 April 2010. On 10 May 2010, the EPA advised it would formally assess the proposal at the level of PER with an eight-week public review period.

An Environmental Scoping Document (ESD) was prepared for EPA approval of the scope of assessment of the proposal as well as providing an indicative timeline for the assessment process. The ESD was approved by the EPA on 7 September 2010.

The PER is intended to provide the EPA, the public and other Decision Making Authorities (DMAs) with an understanding of the proposal, its potential environmental impacts and the environmental management measures and commitments required to ensure the EPA management objectives for each environmental factor are met.

This PER is subject to an eight-week public review period. At the end of this period, issues raised in written submissions from the public and government agencies are collated and provided to CSBP, who will summarise and respond to the issues raised in the submissions. The EPA will then undertake an assessment of the PER document, submissions and the proponent responses to submissions. The EPA will provide an assessment report to the Minister for the Environment. The EPA assessment report is made publicly available and any person has the right to appeal, within 14 days, against the recommendations of that report or any matters within it. The Minister for the Environment will then, in consultation with other relevant decision making authorities, decide whether or not the proposal should be implemented and, if so, under what conditions.

The process for assessment of a proposal under a PER level of assessment is set out in Figure 1.3.

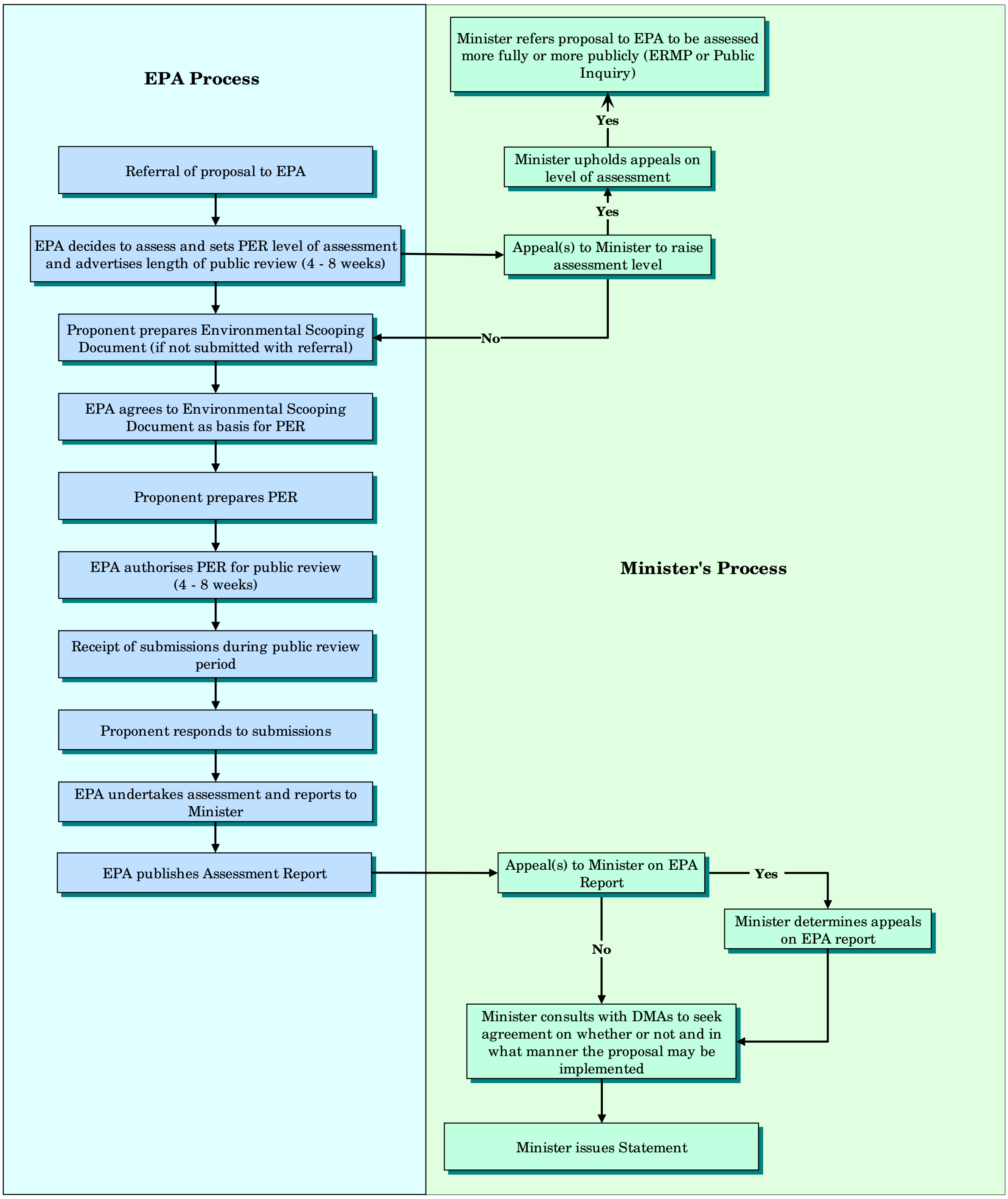


Figure 1.3 Public Environmental Review assessment process

4 LEGISLATIVE FRAMEWORK

4.1 RELEVANT LEGISLATION AND POLICIES

The existing ANPF is subject to a range of licences and regulations applying to industry in WA. In addition to gaining environmental approval from the Minister for the Environment under the EP Act, the proponent is required to comply with other legislation. A summary of the key relevant legislation, regulations or local laws is listed below:

- *Aboriginal Heritage Act 1972*
- *Agriculture and Related Resources Protection Act 1976*
- *Australian Heritage Commission Act 1975*
- *Conservation and Land Management Act 1984*
- *Contaminated Sites Act 2003*
- *Dangerous Goods Safety Act 2004* and Regulations
- *Environmental Protection Act 1986* and relevant Regulations
- *Health Act 1911*
- Kwinana Environmental Protection (Atmospheric Waste) Policy 1992 including 1999 amendment Regulations
- *Local Government Act 1995*
- *Main Roads Act 1930*
- *Occupational Health and Safety Act 1984* and Regulations
- *Rights in Water and Irrigation Act 1914*
- State Environmental (Cockburn Sound) Policy 2005
- *Town Planning and Development Act 1928*
- Town of Kwinana Local Laws (several)
- Town of Kwinana, Town Planning Scheme No. 2
- *Water and Rivers Commission Act 1995*
- *Wildlife Conservation Act 1950.*

The proposed expansion will also be referred to the following decision-making authorities for approvals:

- Department of Environment and Conservation (DEC) for approval under Part V of the EP Act
- Department of Mines and Petroleum (DMP) for assessment of the dangerous goods, public risks and hazard aspects of the proposal under the *Dangerous Goods Safety Act 2004* and Regulations
- Town of Kwinana and Western Australian Planning Commission (WAPC) for relevant development and building approvals.

4.2 NATIONAL CONTROLS FOR AMMONIUM NITRATE (SECURITY RELATED)

The Dangerous Goods Safety (Security Risk Substances) Regulations 2007 were developed to meet the Council of Australian Governments (COAG) agreement of 25 June 2004 related to counter-terrorism measures. This legislation aims to minimise security risk for companies involved with the manufacture, storage, laboratory use and transport of security risk substances, including ammonium nitrate.

The following classes of dangerous goods are covered by Regulations under the *Dangerous Goods Safety Act 2004*:

- Class 1 - Explosives (e.g. gelignite, detonators, fireworks)
- Class 2 - Gases – Flammable, Compressed, Toxic (e.g. LPG, acetylene, natural gas, nitrogen, argon, chlorine, sulphur dioxide, ammonia)
- Class 3 - Flammable liquids (e.g. petrol, kerosene, solvents)
- Class 4 - Flammable solids (e.g. xanthates, calcium carbide, sulphur)
- Class 5 - Oxidising substances (e.g. ammonium nitrate, solid pool chlorine)
- Class 6 - Toxic substances (e.g. sodium cyanide, pesticides)
- Class 8 - Corrosive Substances (e.g. sulphuric acid, caustic soda)
- Class 9 - Miscellaneous Dangerous Goods (e.g. dry ice)

Western Australia has developed dedicated security regulations for so-called Security Risk Substances (SRS) rather than including them in the Class 1 Explosives Regulations. This avoids confusion or inconsistencies between safety and security requirements for ammonium nitrate.

The requirements of the SRS Regulations are additional to the requirements of other dangerous goods safety regulations.

The following substances, other than Class 1 dangerous goods, are classified as SRS in Western Australia:

- solid mixtures containing more than 45 per cent ammonium nitrate
- ammonium nitrate emulsions, suspensions or gels.

The above substances do not include single-phase, homogenous (as opposed to multiphase, heterogeneous mixtures) aqueous solutions of ammonium nitrate as commonly used in fertiliser applications or as hot, concentrated solutions for making ammonium nitrate emulsion explosives.

The only persons that can access SRS are ‘authorised persons', who are defined in the SRS Regulations as those persons who are appropriate licence holders or 'secure employees' of licence holders.

CSBP has met all of the requirements relating to this legislation, and has strict security measures in place at the Kwinana Industrial Complex.

4.3 MAJOR HAZARD FACILITIES IN WESTERN AUSTRALIA

Major hazard facilities (MHF) are facilities such as oil refineries, chemical plants and large fuel and chemical storage sites where large quantities of dangerous goods are manufactured, stored, handled or processed.

Major hazard facilities are currently regulated by the *Dangerous Goods Safety Act 2004*. This Act primarily relates to the safe storage, handling and transport of dangerous goods for related purposes, and includes a number of Regulations and Codes of Practices that apply to CSBP operations, including, but not limited to, the following:

- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007
- Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007
- Dangerous Goods Safety (Security Risk Substances) Regulations 2007
- Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007
- Safe Storage of Solid Ammonium Nitrate Code of Practice 2008
- Storage and Handling of Dangerous Goods Code of Practice 2008
- Petroleum Pipelines Regulations 1970.

The DMP administers the *Dangerous Goods Safety Act 2004* and associated Regulations, and also oversees the implementation of the Control of Major Hazard Facilities National Standard [NOHSC:1014 (2002)]. This Standard involves hazard identification, assessment and control of risks, the generation of safety reports and emergency planning.

CSBP participation in the emergency response planning within the KIA and, consequently, compliance to the emergency planning requirements of the Standard is discussed in more detail in Sections 6.10.1 and 6.10.2.

5 PROPOSAL DESCRIPTION

5.1 EXISTING FACILITY

The existing ANPF at Kwinana consists of the following components:

- two nitric acid plants
- nitric acid storage tanks
- two ammonium nitrate solution plants
- ammonium nitrate storage tanks
- 2008 ammonium nitrate prilling plant (original prilling plant decommissioned in February 2009)
- packaging facility
- combined bulk and bagged ammonium nitrate solids storage facility
- despatch facility.

The location of these components is shown in Figure 1.4.

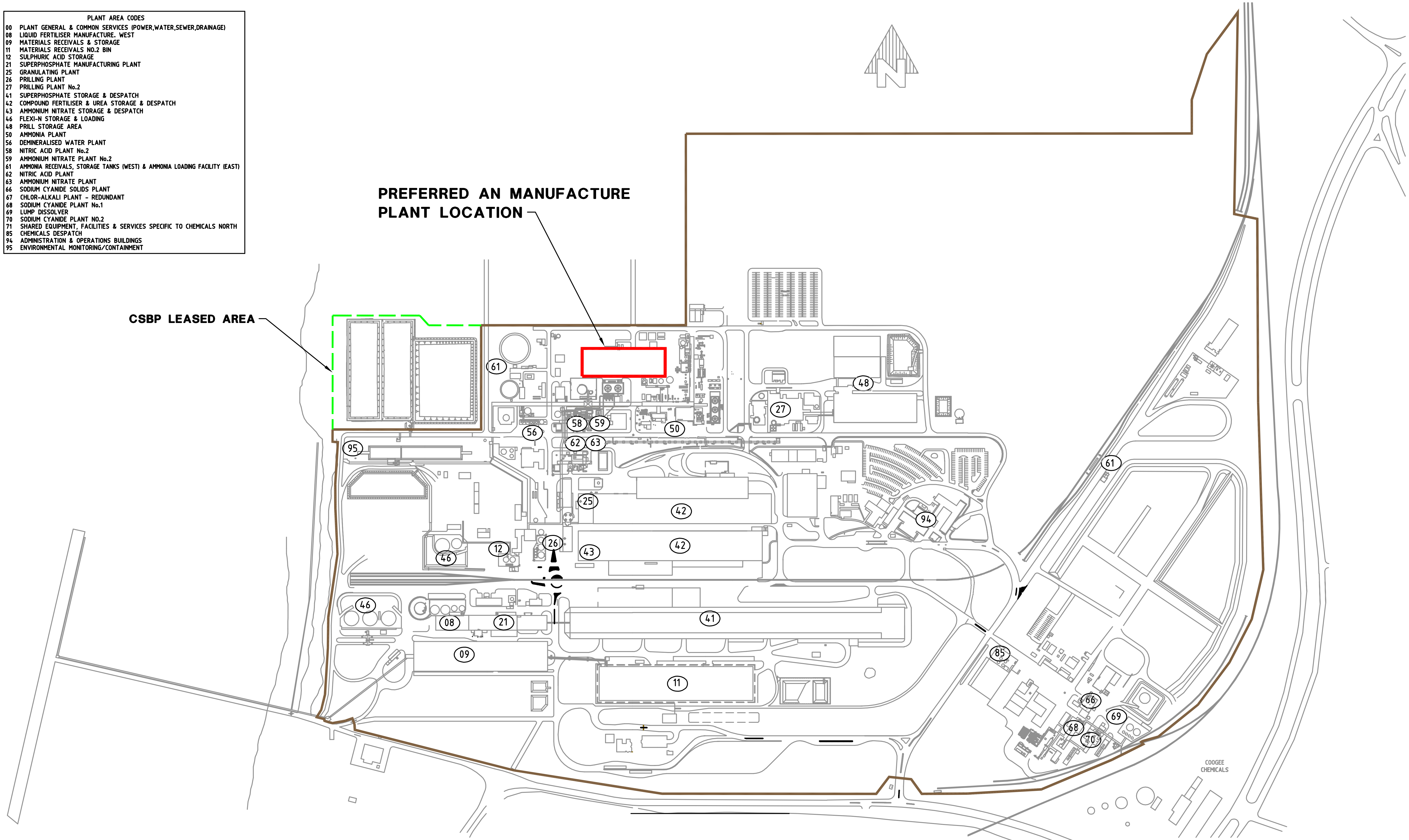
Table 1.1 presents key characteristics of the existing CSBP ANPF.

Table 1.1 Key characteristics of the existing ANPF

Characteristic	Existing Facility
Location	Kwinana Beach Road – Kwinana – KIA
CSBP site area	138 ha
Project life	20-30 years
Plant operating hours	24 hour/day operation, 365 days per year except for maintenance shutdowns
Plant commissioning	1996 – nitric acid plant ammonium nitrate plant 2007 – second nitric acid ammonium nitrate plant and 2008 prilling plant
Plant components	Two nitric acid plants Nitric acid storage tanks: 2000 tonnes total capacity Two ammonium nitrate solution plants Ammonium nitrate (90% solution) storage tank of 305 m^3 capacity Ammonium nitrate (70-90% solution) storage tank of 730 m^3 capacity 2008 prilling plant Ammonium nitrate bag packaging facility Ammonium nitrate solids storage facility (Dangerous Goods Licence permits storage up to 27 000 t)
Production	Total nitric acid production — 400 000 tpa, as feedstock for: Total ammonium nitrate solution — 520 000 tpa, as feedstock for: Total prilled ammonium nitrate — 420 000 tpa
Inputs	Ammonia, oxygen (air), and water
Outputs	Ammonium nitrate solution and prill, plus air/water emissions
Air emissions	Nitrogen oxides Ammonium nitrate particulate Ammonia
Greenhouse gas emissions	925 688 tpa of net CO_2-e
Liquid effluent discharges (from CSBP Kwinana Industrial Complex)	Approx 2 ML/d effluent to the SDOOL
Noise	Within Environmental Protection (Noise) Regulations 1997
Net power generation	4 MW
Shipping	15 ammonium nitrate shipments per year 6 ammonia imports per year

PLANT AREA CODES

00	PLANT GENERAL & COMMON SERVICES (POWER,WATER,SEWER,DRAINAGE)
08	LIQUID FERTILISER MANUFACTURE. WEST
09	MATERIALS RECEIVALS & STORAGE
11	MATERIALS RECEIVALS NO.2 BIN
12	SULPHURIC ACID STORAGE
21	SUPERPHOSPHATE MANUFACTURING PLANT
25	GRANULATING PLANT
26	PRILLING PLANT
27	PRILLING PLANT No.2
41	SUPERPHOSPHATE STORAGE & DESPATCH
42	COMPOUND FERTILISER & UREA STORAGE & DESPATCH
43	AMMONIUM NITRATE STORAGE & DESPATCH
46	FLEXI-N STORAGE & LOADING
48	PRILL STORAGE AREA
50	AMMONIA PLANT
56	DEMINERALISED WATER PLANT
58	NITRIC ACID PLANT No.2
59	AMMONIUM NITRATE PLANT No.2
61	AMMONIA RECEIVALS, STORAGE TANKS (WEST) & AMMONIA LOADING FACILITY (EAST)
62	NITRIC ACID PLANT
63	AMMONIUM NITRATE PLANT
66	SODIUM CYANIDE SOLIDS PLANT
67	CHLOR-ALKALI PLANT - REDUNDANT
68	SODIUM CYANIDE PLANT No.1
69	LUMP DISSOLVER
70	SODIUM CYANIDE PLANT NO.2
71	SHARED EQUIPMENT, FACILITIES & SERVICES SPECIFIC TO CHEMICALS NORTH
85	CHEMICALS DESPATCH
94	ADMINISTRATION & OPERATIONS BUILDINGS
95	ENVIRONMENTAL MONITORING/CONTAINMENT



TOTAL SITE AREA = 136.4ha APPROX.

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	B	20.4.10	BOUNDARY FENCE AND DRAWING TITLE UPDATED	FTL		
	A	18.3.10	ISSUED FOR INFORMATION	FTL		

CHKD.	NAME: SIGN:	DATE:
CSBP ENGR.	NAME: SIGN:	DATE:
CSBP APPD.	NAME: SIGN:	DATE:
ORIGINAL APPROVAL		

CSBP Limited

A.B.N. 81 008 668 371

KWINANA WORKS

AMMONIUM NITRATE PRODUCTION EXPANSION PROJECT: PHASE 2

LOCATION - FIGURE 4

CAD DRAWING
DO NOT ALTER MANUALLY

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5.2 PROPOSED CHANGES TO THE ANPF

In order to implement the proposal, CSBP proposes to undertake the following changes to the existing ANPF:

1. Debottlenecking of existing nitric acid ammonium nitrate plants (by 20 per cent) and construction of an additional nitric acid ammonium nitrate plant, which will then be debottlenecked (by 20 per cent), for a total nitric acid production capacity of 720 000 tonnes per annum as feedstock for a total ammonium nitrate solution production capacity of 936 000 tonnes per annum.
2. Debottlenecking of the 2008 prilling plant (by 100 per cent, or two-fold).
3. Construction of an additional 3500 tonne 63 per cent nitric acid solution tank.
4. Construction of an additional 305 m^3 ammonium nitrate solution tank.
5. Construction of an auxiliary boiler.
6. Construction of additional bagged ammonium nitrate storage (within existing approval of 27 000 tonnes).
7. Increased ammonia imports (up to 25 shipments per year) via Kwinana Bulk Jetty.
8. Upgrade of existing ammonium nitrate solid and solution despatch facilities.
9. Upgrade of existing and construction of new utilities and supporting infrastructure to support the expansion.

Construction of the third nitric acid ammonium nitrate plant is planned to be completed before debottlenecking activities are undertaken on the nitric acid ammonium nitrate plants. Debottlenecking of the nitric acid ammonium nitrate plants will occur as required to meet increased demand for product. The 2008 prilling plant will be debottlenecked to enable increased ammonium nitrate production capacity.

There will be no increase in the capacity of ammonia production on site and current storage capacity will not need to be increased. However, there will be an increase in ammonia shipments to the CSBP site as throughput is increased. The proposal will result in a maximum of 25 shipments of ammonia per year. It is likely that around 14 shipments per year will be needed under normal operating circumstances and the higher rates will primarily be circumstances that result in the ammonia plant being shut down.

This proposal encompasses the expected maximum production rates of ammonium nitrate on the CSBP site.

The new ammonium nitrate production infrastructure will be located within the expansion envelope shown on Figure 1.4. The exact location of individual expansion components within the expansion envelope is still to be confirmed and this PER considers the highest impact option for factors which are location-dependent, such as noise.

All additional infrastructure for the proposed expansion will be located within the existing CSBP Kwinana Industrial Complex and there will be no additional land acquisition or disturbance required and no resultant impact on any existing natural flora or fauna habitats as the area has been previously cleared.

Table 1.2 provides a summary of the proposed key characteristics of the ANPF following the expansion

Table 1.2 Key characteristics of the proposed ANPF

Characteristic	Expanded Facility
Location	Kwinana Beach Road – Kwinana – KIA
CSBP site area	138 ha
Project life	20-30 years
Plant operating hours	24 hour/day operation, 365 days per year except for maintenance shutdowns
Plant commissioning	2014 – third nitric acid ammonium nitrate plant and debottlenecked 2008 prill plant
Plant components	Three nitric acid plants Nitric acid storage tanks of approximately 5500 tonne capacity Three ammonium nitrate solution plants Two ammonium nitrate (90% solution) storage tanks of approximately 610 m^3 total capacity Ammonium nitrate (70-90% solution) storage tank of 730 m^3 capacity 2008 prilling plant (debottlenecked) Ammonium nitrate bag packaging facility Ammonium nitrate solids storage facility (Dangerous Goods Licence permits storage up to 27 000 t) Auxiliary boiler
Production	Total nitric acid production — 720 000 tpa, as feedstock for: Total ammonium nitrate solution production — 936 000 tpa, as feedstock for: Total prilled ammonium nitrate — 780 000 tpa
Inputs	Ammonia, oxygen (air), and water
Outputs	Ammonium nitrate solution and prill, plus air/water emissions
Air emissions	Nitrogen oxides Ammonium nitrate particulate Ammonia
Greenhouse gas emissions	1 110 000 tpa of net CO_2-e
Liquid effluent discharges (from CSBP Kwinana Industrial Complex)	Approx. 2.4 ML/day effluent to the SDOOL
Noise	Within Environmental Protection (Noise) Regulations 1997 as proposed to be amended.
Net power generation	6 MW
Shipping	maximum 35 ammonium nitrate shipments per year maximum 25 ammonia imports per year

Table 1.3 provides a summary of the proposed key characteristics of the ANPF following the expansion, compared with the key characteristics of the existing ANPF.

Table 1.3 Key characteristics of the existing and proposed ANPF

Characteristic	Existing Facility	Expanded Facility
Location	Kwinana Beach Road – Kwinana – KIA	
CSBP site area	138 ha	
Project life	20-30 years	
Plant operating hours	24 hour/day operation, 365 days per year except for maintenance shutdowns	
Plant commissioning	1996 – nitric acid ammonium nitrate plant 2007 – second nitric acid ammonium nitrate plant and 2008 prill plant	2014 – third nitric acid ammonium nitrate plant and debottlenecked 2008 prill plant
Plant components	Two nitric acid plants Nitric acid storage tanks: 2000 tonnes total capacity Two ammonium nitrate solution plants Ammonium nitrate (90% solution) storage tank of 305 m^3 capacity Ammonium nitrate (70-90% solution) storage tank of 730 m^3 capacity 2008 prilling plant Ammonium nitrate bag packaging facility Ammonium nitrate solids storage facility (Dangerous Goods Licence permits storage up to 27 000 t)	Three nitric acid plants Nitric acid storage tanks of approximately 5500 tonne capacity Three ammonium nitrate solution plants Two ammonium nitrate (90% solution) storage tanks of approximately 610 m^3 total capacity Ammonium nitrate (70-90% solution) storage tank of 730 m^3 capacity 2008 prilling plant (debottlenecked) Ammonium nitrate bag packaging facility Ammonium nitrate solids storage facility (Dangerous Goods Licence permits storage up to 27 000 t) Auxiliary boiler
Production	Total nitric acid production — 400 000 tpa, as feedstock for: Total ammonium nitrate solution production — 520 000 tpa, as feedstock for: Total prilled ammonium nitrate — 420 000 tpa	Total nitric acid production — 720 000 tpa, as feedstock for: Total ammonium nitrate solution production — 936 000 tpa, as feedstock for: Total prilled ammonium nitrate — 780 000 tpa
Inputs	Ammonia, oxygen (air), and water	Ammonia, oxygen (air), and water
Outputs	Ammonium nitrate solution and prill, plus air/water emissions	Ammonium nitrate solution and prill, plus air/water emissions
Air emissions	Nitrogen oxides Ammonium nitrate particulate Ammonia	Nitrogen oxides Ammonium nitrate particulate Ammonia
Greenhouse gas emissions	925 688 tpa of net CO_2-e	1 110 000 tpa of net CO_2-e
Liquid effluent discharges (from CSBP Kwinana Industrial Complex)	Approx 2 ML/d effluent to the SDOOL	Approx. 2.4 ML/day effluent to the SDOOL
Noise	Within Environmental Protection (Noise) Regulations 1997 as proposed to be amended.	Within Environmental Protection (Noise) Regulations 1997 as proposed to be amended.
Net power generation	4 MW	6 MW
Shipping	15 ammonium nitrate shipments per year 6 ammonia imports per year	maximum 35 ammonium nitrate shipments per year maximum 25 ammonia imports per year

5.3 PROCESS DESCRIPTIONS

The following sections describe the process undertaken to produce the ammonium nitrate products.

5.3.1 Nitric acid ammonium nitrate production

The nitric acid ammonium nitrate plant process has been separated into the nitric acid production aspect and the ammonium nitrate solution production aspect to clearly explain the process undertaken to produce ammonium nitrate.

Nitric acid production

The nitric acid plant uses ammonia and air as raw materials to produce nitric acid ($NH_3 + 2O_2 \rightarrow HNO_3 + H_2O$).

Liquid ammonia is vaporised in an ammonia evaporator and superheated under pressure. The pressure of the ammonia is reduced prior to mixing with processed clean air. The flow rate of the process air to the ammonia air mixer is measured and used as an input to determine the flow rate of ammonia into the mixer.

The ammonia/air mixture is fed into the ammonia burner where the mixture is reacted catalytically over platinum/rhodium gauzes lying across the flow in the burner. The reaction product is a mixture of oxides of nitrogen.

After leaving the burner, the reaction products are passed through the waste heat recovery boiler, the tail gas heater, the primary air heater, the economiser and the gas cooler condenser and separator. The mixture is cooled to approximately 60ºC and enters the absorption column where it is absorbed counter-currently in water, resulting in production of nitric acid solution with a concentration of approximately 63 per cent w/w. The acid flows out from the bottom of the tower into storage tanks.

The reactions that produce nitric acid are strongly exothermic and much of this heat is used to produce steam to drive turbines and compressors within the plant and to generate electricity for use within the plant and elsewhere on the CSBP site (see Section 5.3.4).

At Kwinana, 99.9 per cent of the nitric acid produced is converted into ammonium nitrate.

Ammonium nitrate production

The ammonium nitrate plant uses liquid nitric acid and gaseous ammonia as raw materials to produce ammonium nitrate ($HNO_3 + NH_3 \rightarrow NH_4NO_3$).

The nitric acid and ammonia react in the pipe reactor and flow into the reactor separator/demister to produce ammonium nitrate solution (NH_4NO_3). A significant portion of the water in the nitric acid solution is evaporated by the reaction heat and this water is separated out of the ammonium nitrate solution (approximately 96 per cent w/w) as process steam for use within the plant. The ammonium nitrate solution flows under gravity into an ammonium nitrate pumping tank.

A portion of this solution is mixed with water to produce the 70 to 90 per cent ammonium nitrate solution for the production of *Flexi-N* liquid fertiliser, as required. The water used for the *Flexi-N* solution is primarily process condensate, which has a higher nitrogen content than other wastewaters in the process.

In a separate operation, ammonium nitrate solution is diluted to 90 per cent and sold as explosive-grade ammonium nitrate.

5.3.2 Ammonium nitrate prill

The concentrated ammonium nitrate solution is then formed into solid prill (small, round granules) by prilling (spraying) the molten solution into a large void tower. The process of prill manufacture involves liquid ammonium nitrate and the following additives:

- nitric acid
- ammonia
- drying agent
- coating agent
- heat.

Ammonia is added to the mixture to adjust the pH of the ammonium nitrate solution. Ammonium nitrate solution, nitric acid and a drying agent are mixed in a melt tank to ensure homogeneity, and the combined solution is sent to the prilling tower.

At the top of the prilling tower, the ammonium nitrate solution is passed through small holes to create droplets of the solution. As the droplets fall, the cool air in the tower solidifies the solution into prill. The prill is then dried, cooled, screened, coated and weighed. Out of specification prill (too large or too small) are directed to the ammonium nitrate recycle system. Prill is then conveyed to the storage area for subsequent despatch.

5.3.3 Ammonium nitrate despatch

After manufacture, the prill is stored at the CSBP Kwinana Industrial Complex in dedicated licensed storage and is then despatched by road direct to mine sites or to explosives manufacturers. It is transported via truck in nominal 1.2 tonne bulka bags or in bulk.

Ammonium nitrate solution product is stored in heated tanks and transported mainly to explosives formulators in purpose-built tankers/ISOtainers.

The 70 to 90 per cent ammonium nitrate solution is used as an active component in liquid fertiliser formulated with urea (*Flexi N).* Over 146 000 tonnes per annum is sold and distributed to agricultural markets in WA.

5.3.4 Heat as a by-product

Several of the chemical reactions used in the processes described above are exothermic (they emit energy in the form of heat). Significant quantities of heat are generated during the manufacturing process and this heat can be recovered and turned into energy (electricity).

Heat recovered from these processes currently generates approximately 6 MW (megawatt) of electricity. Of this, 2 MW is utilised within the ANPF, leaving the remainder for use elsewhere within the CSBP Kwinana Industrial Complex. It is anticipated that with the addition of another nitric acid ammonium nitrate plants approximately 8 MW of electricity could be generated, with 6 MW available for use elsewhere within the CSBP Kwinana Industrial Complex.

A process flow diagram illustrating the steps involved in the manufacture and distribution of ammonium nitrate is presented as Figure 1.5.

5.4 HOURS OF OPERATION AND WORKFORCE

The expanded ANPF will operate 24 hours per day, 365 days per year except for maintenance shutdowns as is the case for the operating hours of the current ANPF.

CSBP expects additional personnel will be required (directly and indirectly) to cover production, maintenance, despatch, sales and distribution of ammonium nitrate from the expanded ANPF.

5.5 CONSTRUCTION WORKFORCE

The expansion will result in the employment of approximately 400 people during the construction phase.

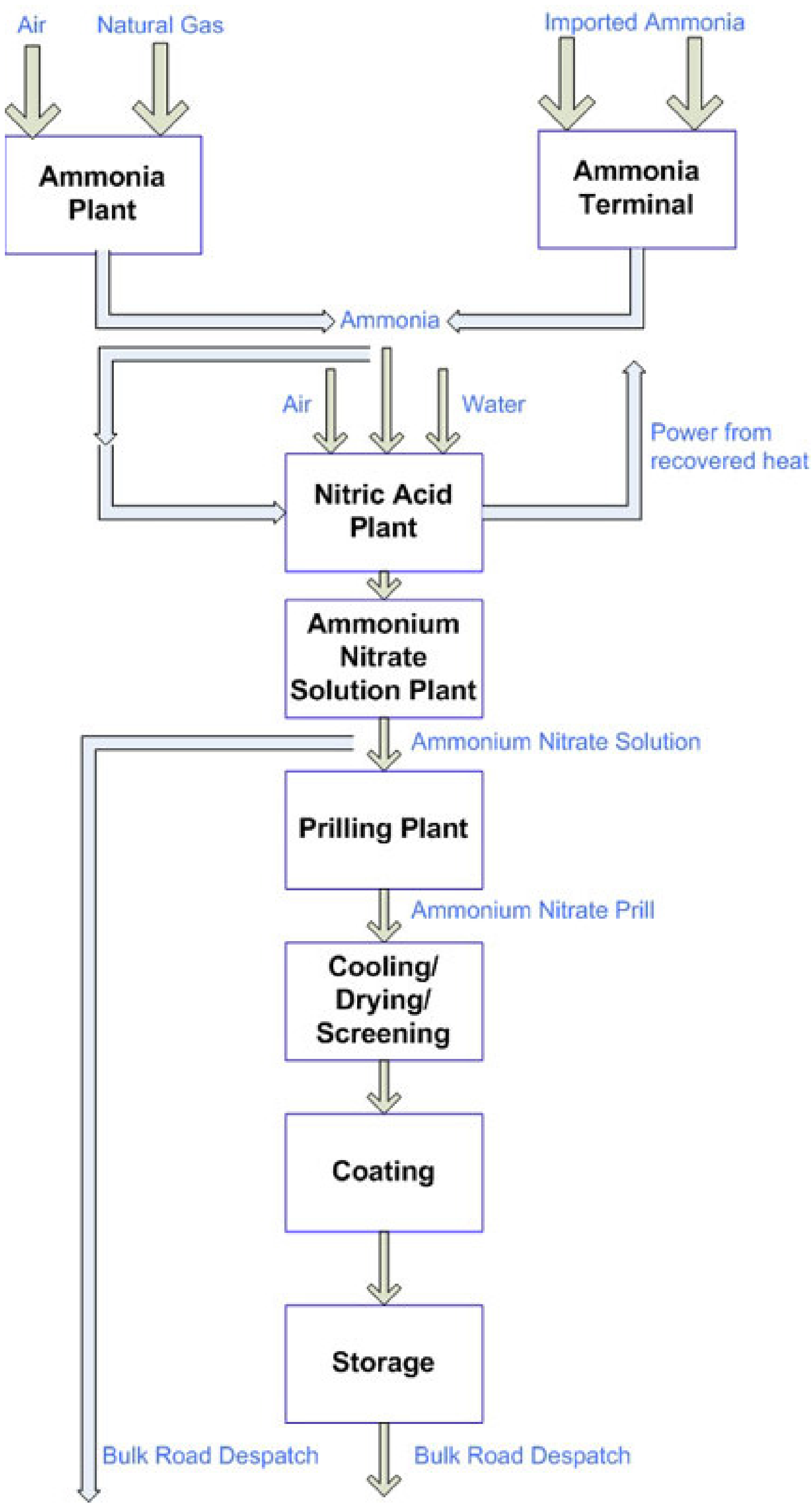


Figure 1.5 Manufacture of ammonium nitrate

6 OVERVIEW OF EXISTING ENVIRONMENT

6.1 LAND USE AND ZONING

The land on which the proposed expansion is sited is zoned 'Industrial' under the Town of Kwinana Town Planning Scheme No. 1 and the Metropolitan Regional Scheme (MRS), and is surrounded by 'Industrial' zoned land to the north, south and east, with Cockburn Sound to the west. Further to the east is a one kilometre wide parks and recreation reserve which preserves an attractive landscape buffer between the KIA and 'Urban' zoned land at Medina.

The nearest major residential areas to the ANPF are Medina and Calista, located approximately three kilometres inland to the east. The town of Rockingham is screened from the industrial strip on the coastal plain by a ridge of well-vegetated dunes. Other nearby residential areas includes Orelia, Parmelia, Leda and North Rockingham.

The existing major industrial operations in the vicinity of the site are listed below:

- BP Refinery (Kwinana) Pty Ltd (Petroleum products)
- BHP Billiton Nickel West Kwinana (Nickel refining)
- Coogee Chemicals Pty Ltd (Chemical manufacture and storage)
- Gull Petroleum (Petroleum storage)
- HIsmelt (Pig iron plant)
- BOC Gases Pty Ltd (Industrial gases)
- Co-operative Bulk Handling Ltd (Grain storage and ship loading)
- Verve (Kwinana Power Station)
- Kleenheat Gas Kwinana Production Facility (LPG)
- Alcoa World Alumina Australia (Alumina refinery)
- Tiwest Joint Venture (Titanium dioxide pigment manufacture)
- Nufarm-Coogee Pty Ltd (Chlorine, caustic soda, sodium hypochlorite and hydrochloric acid)
- Nufarm Australia Limited (Agricultural chemicals)
- Edison Mission Energy (Electrical and thermal energy Cogeneration Plant)
- Summit Fertilisers (Fertiliser manufacture and import)
- Superfert (Fertiliser manufacture and import)
- United Farmers Cooperative (Fertiliser and sulphate storage).

The western boundary of the site is located adjacent to Cockburn Sound. The Cockburn Sound Environmental Study (Department of Conservation and Environment 1979) and the State of Cockburn Sound (Cockburn Sound Management Council 2001) recognised Cockburn Sound, Kwinana Beach and adjacent Wells Park as an important recreational resource for residents in the Kwinana area. Accordingly, the Environmental Protection (Cockburn Sound) Policy 2005 (EPA 2005a) and an Environmental Management Plan for Cockburn Sound and its catchment (Cockburn Sound Management Council 2005) have been prepared to ensure that the attributes of the sound are protected and enhanced in the future.

6.2 LANDSCAPE

The existing ANPF is located within the CSBP Kwinana Industrial Complex (Figure 1.2), with BP Kwinana to the north and a railway corridor to the east. While the generally flat landform retains little of its original vegetation, much of the eye-level visual impact of industrial development has been ameliorated by extensive screen planting, particularly west of the railway reserve.

The site is screened from Patterson Road and, to a lesser extent, from Kwinana Beach Road. Due to the scale of industrial surroundings and the 'tunnel vision' effect of Patterson Road caused by generally uninterrupted traffic flow and established verge and median screen planting, the perception of visibility of the site is minimal. The CSBP site is visible from Kwinana Beach. The CSBP site is not visible from residential areas with the exception of the 2008 prilling plants' tower, the decommissioned prilling plant tower and columns in the ammonia and nitric acid plants.

6.3 CLIMATE

The climate of Kwinana, as for the entire Perth metropolitan area, is characterised by a Mediterranean climate with mild wet winters and hot dry summers. Summer temperatures between December and March average 28°C during the day and 18°C at night. The winter months in Perth are from June to August and are mild, with an average temperature of 18°C during the day, and 11°C at night. Average annual rainfall is approximately 750 mm with the wettest month, on average, being June (Bureau of Meteorology 2010).

Meteorological data is an important factor in air quality and noise assessments. The data used for the assessment of air quality were collected by the DEC at Hope Valley during the 1996 and 1997 calendar years. Hope Valley is located approximately 4 km north northeast of the CSBP site and is considered to be generally representative of the meteorology of the area.

Annual wind-roses derived from the 1996 and 1997 datasets are presented in Figure 1.6. Each wind-rose illustrates the strong influence of south-southwesterly and easterly winds on the meteorological conditions throughout the year. Moderate to strong south-southwesterly winds of between 4.5 and 9.0 m/s are common, as are easterly winds of between 1.5 and 4.5 m/s.

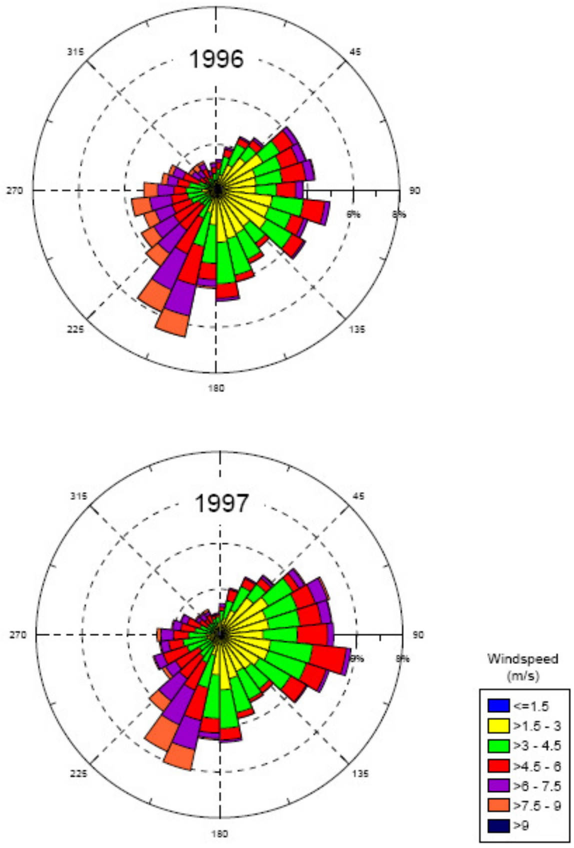


Figure 1.6 Annual wind-roses for Hope Valley, 1996 and 1997

6.4 VEGETATION AND FAUNA

No remnant vegetation is present within the area of the proposed expansion (Figure 1.2).

6.5 LANDFORMS AND SOILS

The site is located towards the northern end of the Becher-Rockingham beach ridge plain. It straddles the boundary between the Quindalup soil unit, which consists of beach ridges and unconsolidated calcareous sand, and the Cottesloe soil unit, which consists of shallow, yellow-brown sands and exposed limestone (Kinhill Stearns 1986).

6.6 GEOLOGY AND HYDROGEOLOGY

The CSBP Kwinana Industrial Complex is located in the Coastal Belt subdivision of the Swan Coastal Plain in the Quindalup Dunes, which is a relic foredune plain of the Holocene period (Davidson 1995, Gozzard 1983). The geological profile of the site is typical of the coastal deposits found in the area and consists of Safety Bay Sand (recent) unconformably overlying Tamala Limestone, and the Leederville Formation (Pinjar Member) (Davidson 1995).

The Safety Bay Sands are unconsolidated and well compacted with permeability in the order of 10 to 20 m/d (Barnes & Whincup 1981). The Tamala Limestone is the most productive and widely used aquifer in the Kwinana area with permeabilities in the order of 500 to 1500 m/d.

The Safety Bay Sand and the Tamala Limestone Formations contain unconfined aquifers (Dames & Moore 1990) that are considered to form a single (superficial) aquifer system at a regional level. The direction of groundwater flow is generally to the northwest under a hydraulic gradient of approximately 1 in 2500 (Dames & Moore 1990). Fresh groundwater overlies the saline marine water in the aquifer.

Groundwater flow through the Safety Bay Sand is slow at around 20 m/yr (Cockburn Sound Management Council 2001). Groundwater flow through the Tamala Limestone is highly variable and ranges between 200 and 2000 m/yr (Davidson 1995).

The Superficial Aquifer is underlain by two major confined aquifers:

- the Leederville Formation
- the deeper Yarragadee Formation.

The Leederville Formation aquifer consists of interbedded sandstone, siltstone and shale units. The sand beds are frequently silty and groundwater quality is generally brackish, although local areas of fresh water do occur. Groundwater enters the Leederville Formation from downward leakage through the superficial formations and moves westward to discharge at sea (Sinclair Knight Merz 2002).

The Yarragadee Formation is separated from the Leederville Formation aquifer by the South Perth Shale, a confining layer, and is a multi-layered aquifer consisting of interbedded sandstone, siltstone and shale. The aquifer contains a large resource of brackish water (Sinclair Knight Merz 2002).

6.7 SURFACE HYDROLOGY AND WETLANDS

The CSBP site does not contain any natural surface water or wetlands. Stormwater is collected on site and runoff is directed to the CSBP liquid effluent system and subsequently to the Sepia Depression Ocean Outlet Landline (SDOOL), via a CSBP constructed nutrient-stripping wetland.

CSBP has constructed the nutrient stripping wetland on land leased from the BP Refinery (leased area in Figure 1.2) to reduce the amount of nutrients in wastewater before disposal. The wetland has an area of about 4 ha, varies in depth between 1 to 2 m and is lined with heavy-duty High Density Poly Ethylene (HDPE) plastic. The wetland is planted with sedges and incorporates a number of processes aimed at reducing the level of nitrogen in the CSBP effluent stream. Other benefits of the wetland include lowering the total suspended particulates (TSPs), and decreasing water turbidity in the wastewater.

The nutrient-stripping wetland is described in Chapter 3 Section 7 Marine environment.

6.8 MARINE ENVIRONMENT

The CSBP Kwinana Industrial Complex is located adjacent to Cockburn Sound and approximately 6 km from Point Peron, where the SDOOL discharges into the Sepia Depression (Figure 1.7).

The Sepia Depression is a natural channel which is approximately 5 km long and 20 m deep. Garden Island separates the Sepia Depression from Cockburn Sound (Figure 1.7). The Sepia Depression is bounded by a sand bank on its western side and by a reef on its eastern side, which acts as a physical barrier to oceanic swells.

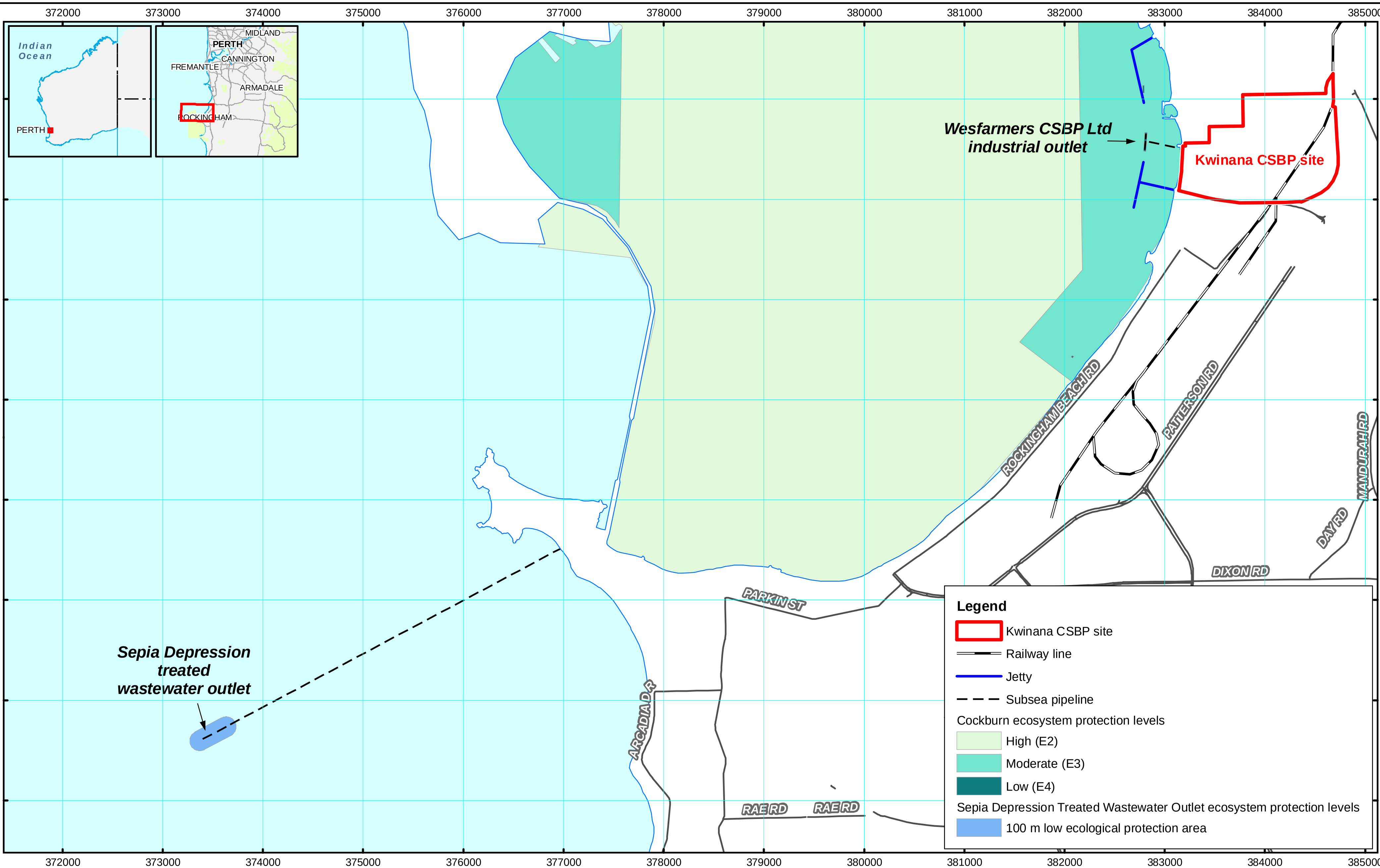
Under normal operating conditions, wastewater from CSBP operations is discharged to the Sepia Depression via the SDOOL. The SDOOL is governed by the Ministerial Conditions of Approval for the Kwinana Wastewater Recycling Plant (KWRP) Project (Ministerial Statement No. 665). The Water Corporation can only accept and convey effluent to Sepia Depression from industry partners where their toxicant loads conform to those permitted to be discharged to Cockburn Sound by their individual Part V EP Act licences (Water Corporation 2005).

Cockburn Sound is 16 km long and 9 km wide, with a 17 m to 22 m deep central basin (Cockburn Sound Management Council 2001). Garden Island extends along almost the entire western side of the Sound, providing shelter from ocean swells. Shallow waters are located at the southern and northern entrances to the Sound. The depth of Cockburn Sound and its degree of shelter from ocean swell make it is also the most intensively used marine embayment in Western Australia.

CSBP has an ocean outfall pipeline that discharges into Cockburn Sound (Figure 1.7); however, discharges to Cockburn Sound only occur during emergency conditions such as when other wastewater disposal measures are not operational or during extreme stormwater events. If wastewater is to be discharged into Cockburn Sound, the discharge must meet appropriate discharge requirements in the CSBP EP Act Licence conditions. Associated documents include:

- Environmental Protection (Cockburn Sound) Policy 2005 (EPA 2005a)
- Environmental Quality Criteria Reference Document For Cockburn Sound (2003 - 2004) (EPA 2005b)
- Manual of Standard Operating Procedures for Environmental Monitoring against the Cockburn Sound Environmental Quality Criteria (2004) (EPA 2005c)
- Environmental Management Plan for Cockburn Sound and its Catchment (Cockburn Sound Management Council 2005).

The CSBP Cockburn Sound diffuser is located within the Moderate Ecological Protection Area of Cockburn Sound. A Low Ecological Protection Area immediately surrounds the diffuser and has dimensions of a horizontal distance of 9.0 m (to the inshore direction from the diffuser) and 16 m (to the offshore direction from the diffuser), and extending 12.5 m beyond each end of the diffuser. The discharge of wastewater from the CSBP site is controlled by EP Act Licence L6107/1967 in accordance with Part V (Control of Pollution) of the EP Act. Discharges to Cockburn Sound resulting from the proposal will also be controlled within the provisions of the current licence, and will consequently not be discussed further in this document.



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CSBP

Ammonium Nitrate Production Expansion Project: Phase 2

Cockburn Sound industrial outlets
Figure 1.7

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6.9 ABORIGINAL AND EUROPEAN HERITAGE

A search of Aboriginal heritage sites using the online Aboriginal Heritage Inquiry System (http://www.dia.wa.gov.au/AHIS/) showed that no previously recorded Aboriginal sites are listed as being located within or overlapping the CSBP site.

Sinclair Knight Merz (2002) reported that McDonald, Hales and Associates undertook a heritage survey of the KIA in 1993, and did not discover any archaeological sites. The ethnographic survey involved five Aboriginal consultants and a number of meetings with a local Aboriginal community organisation and identified two ethnographic sites, a campsite and a mythological site (a spring), in the vicinity of James Point in the undeveloped coastal fringe of the 1993 study area. The CSBP Kwinana Industrial Complex directly affects neither of these sites.

A search using the Heritage Council of WA Places Database search tool, maintained by the Heritage Council of WA, and using the Australian Heritage Database search tool, maintained by the Department of Environment, Water, Heritage and the Arts (federal) did not identify any sites of interest within the vicinity of the CSBP site.

6.10 SOCIAL ENVIRONMENT

The nearest major residential areas to the CSBP Kwinana Industrial Complex are Medina and Calista, located approximately three kilometres to the east, and the nearest Public Open Space is located one kilometre south at Wells Park (Figure 1.8).

The business and commercial areas of the Kwinana town centre are screened from the industrial strip on the coastal plain by a ridge of well-vegetated dunes. Other nearby residential areas includes Orelia, Parmelia, Leda and North Rockingham.

As noted previously, the CSBP Kwinana Industrial Complex is located within the KIA which was established by the WA Government to serve as a strategic industrial area for the Perth Metropolitan Region. Consequently, the KIA has been the subject of many strategic planning studies over the years with the aim of facilitating suitable industrial development. A buffer zone has been established around the KIA to accommodate risk, noise and air emissions (Figure 1.9).

CSBP is a full member of the Kwinana Industries Council (KIC). The KIC was founded in 1991 to:

- promote a positive image of Kwinana industries
- work towards the long-term viability of Kwinana industry
- coordinate a range of intra-industry activities including water quality, air quality, monitoring and emergency management
- highlight the contribution Kwinana industry makes to community
- liaise effectively with local communities, government and government agencies.

As a part of the KIC, CSBP is involved with emergency response planning within the KIA and is involved with Kwinana Industries Mutual Aid (KIMA) and Kwinana Industries Public Safety Group (KIPS). These two groups are discussed in the following sections.

6.10.1 Kwinana Industries Mutual Aid

CSBP is a full member of KIMA and the overarching KIPS. KIMA ensures that adjacent sites receive early warning of any emergencies that may impact upon their site.

KIMA, administered by the KIC, is a working group of technical specialists from within industries in the KIA who share emergency response expertise and resources in case of a major emergency. KIMA members meet bimonthly and are directly involved in the maintenance and continual improvement of the KIMA Plan and Resource Manual.

Full members of KIMA are those companies that are subject to the current Dangerous Goods Safety (Storage and Handling) Regulations 2007. The member companies also meet in a policy/liaison forum as the KIPS, which in turn hosts a public forum called KIPS Liaison Group (see Section 6.10.2).

The member company concerned initially attends to all incidents within their site, using in-house expertise and emergency response equipment available at or near the site. All member companies hold sufficient equipment and have trained emergency response personnel to cope with foreseeable incidents that may occur on their site. The KIMA Plan is activated when the management of an incident is beyond the capability of the Member Company concerned or when the incident will affect other industries.

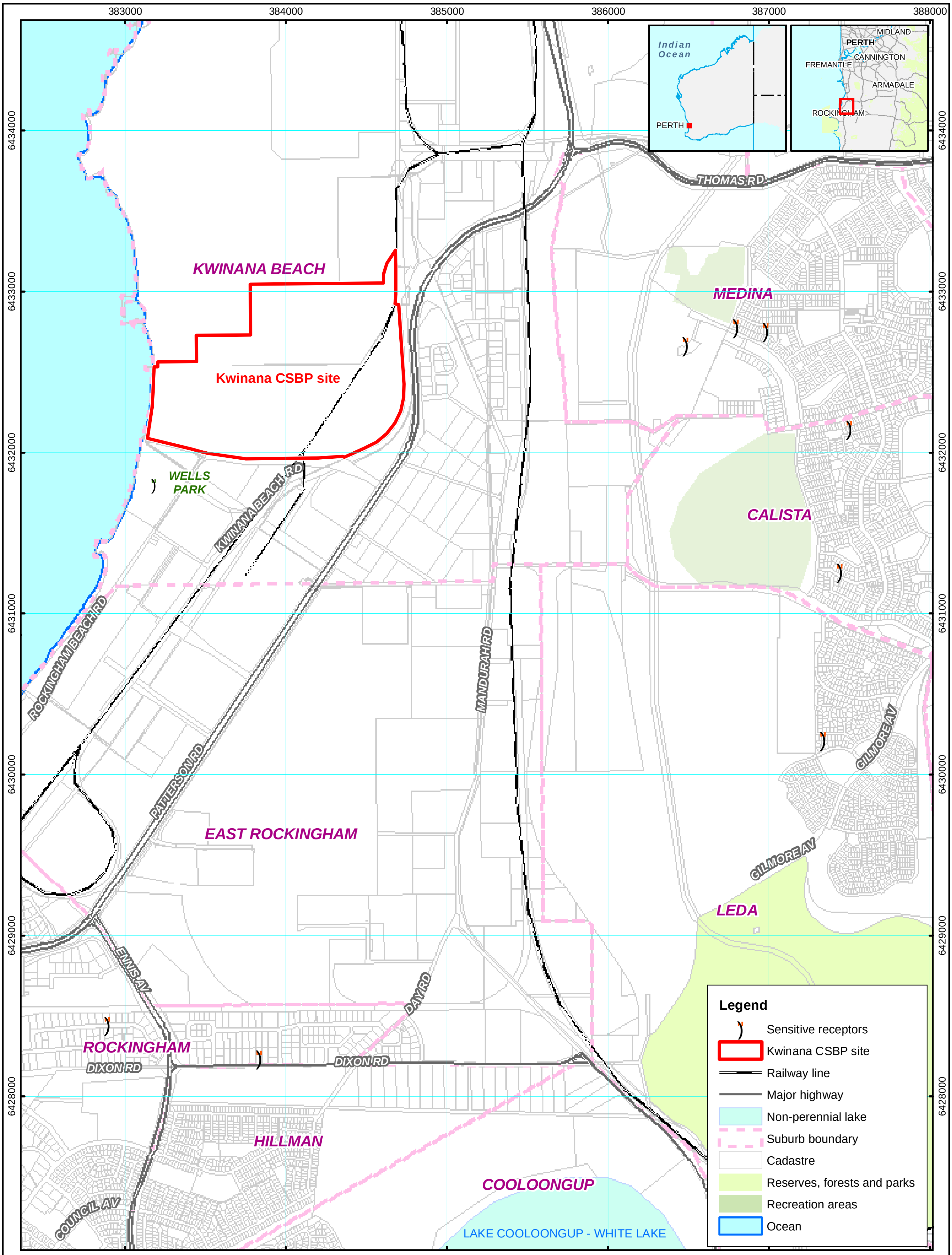
6.10.2 Kwinana Industries Public Safety Group

KIPS is a mutual-aid group that is focussed on joint industry emergency response and public safety, with the aim of providing a cooperative approach on issues relating to community and employee safety and the environment.

KIPS was set up through the KIC in conjunction with a range of key stakeholders including:

- Fire and Emergency Services Authority (FESA)
- WA Police Service (WAPS)
- State Government regulatory authorities
- Local Councils
- Community representatives.

KIPS was designed to address the need for a cooperative and effective approach to managing public safety in the KIA, as well as providing a mechanism for companies to meet their own obligations under the requirements of both the WA *Occupational Safety and Health Act 1984* and the requirements of the National Standard for the Control of Major Hazard Facilities [NOHSC:1014(2002)].



CSBP

PARSONS BRINCKERHOFF

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CSBP

Ammonium Nitrate Production Expansion Project: Phase 2

Nearest sensitive receptors
Figure 1.8

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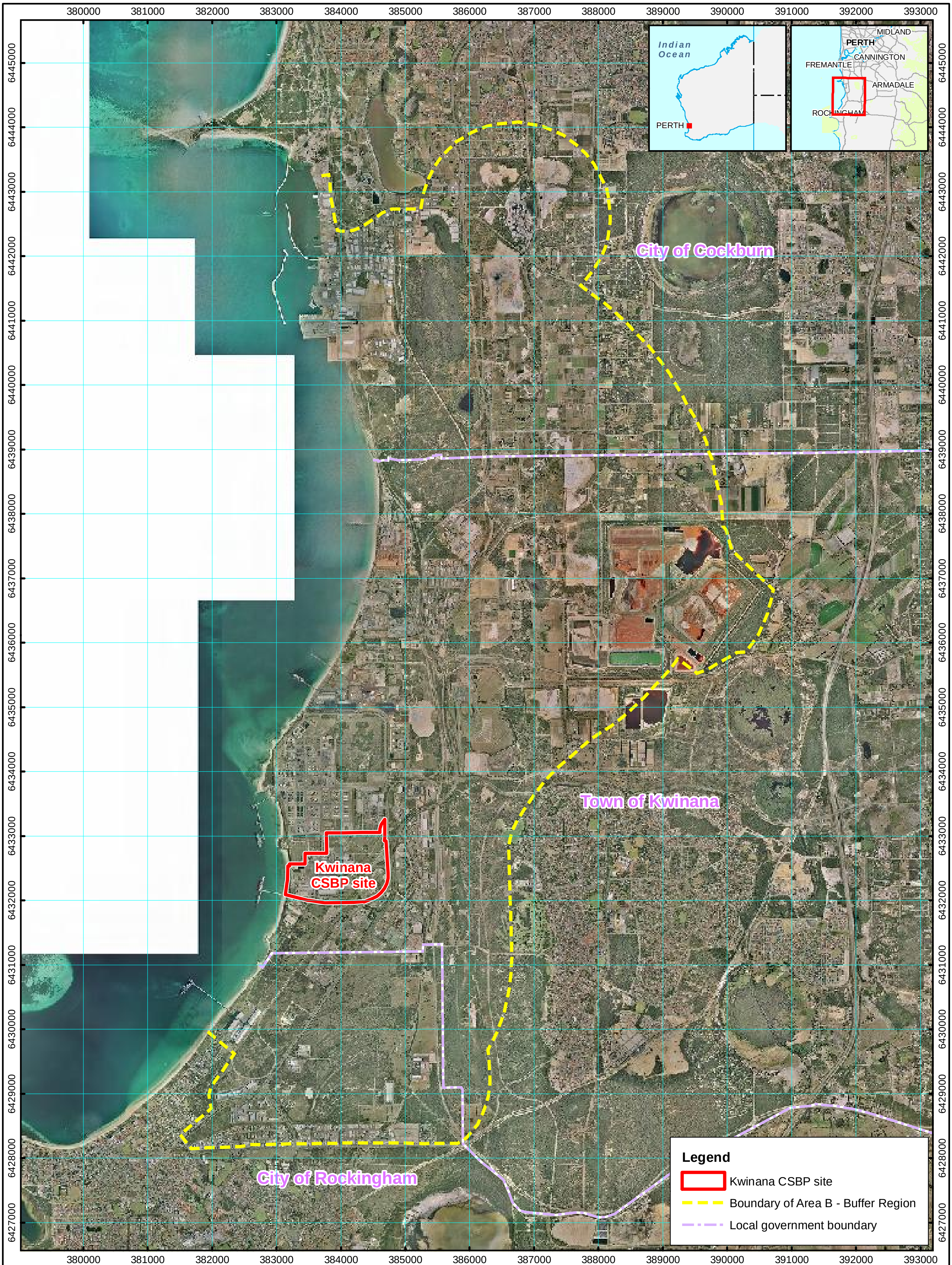

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CSBP

Ammonium Nitrate Production Expansion Project: Phase 2

Kwinana Industrial Area Buffer Zone
Figure 1.9

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Chapter 2 Consultation, environmental principles and sustainability

1 STAKEHOLDER CONSULTATION

1.1 CONSULTATION STRATEGY

CSBP recognises that a high degree of stakeholder participation in the consultation process will have significant benefits including:

- clearer information for the community resulting in more informed decision making
- reduction in delays due to a lack of or inaccurate information
- avoidance of misconceptions and confusion
- allowing CSBP to accommodate community expectations in the project design where feasible.

As part of its consultation process, CSBP is engaging a variety of stakeholders, including the Kwinana Industries Council Community and Industries Forum (CIF) and hosting an information session at its Kwinana site as the project develops. The opportunity to attend this information session will be widely advertised to ensure interest groups outside the Kwinana region with an interest in the issues are made aware of the proposal.

Public consultation will occur as part of this environmental impact assessment process as specific stakeholders are identified and relationships established throughout the detailed development of the project. Public consultation opportunities will be advertised in local press and through the CSBP website. As a long-term participant in the development of the Kwinana Industrial Area (KIA), CSBP has a good knowledge of the interested stakeholders and issues of concern to the community. A major contribution to this knowledge has come from involvement in the approval processes associated with the original nitric acid ammonium nitrate plant and the first phase of expansion in 2005.

1.2 CONSULTATION WITH DECISION MAKING AUTHORITIES

During February and March 2010, CSBP commenced consultation with the Chairman of the Environmental Protection Authority (EPA), key staff from the Department of Environment and Conservation (DEC), Department of Minerals and Petroleum (DMP), Town of Kwinana and City of Rockingham.

1.3 PUBLIC INFORMATION SESSION

After release of this Public Environmental Review (PER) document, CSBP will present the proposal at a public information session specifically convened for the purpose of providing the community and other stakeholders with information to enable the public submissions to the EPA to be well informed.

CSBP will publicise this session in the local community newspaper and through mail invitations to members of the local community, focus groups, local government, industrial neighbours and Decision-Making Authorities (DMAs).

The public information session for the previous expansion proposed in 2005 was attended by representatives from the local community, CSBP industrial neighbours, local government and the local media. The main issues raised at the session in 2005 have been addressed in this PER document:

- what air emissions will occur from this expansion?
- what effluent discharges will occur from this expansion?
- has CSBP addressed the risk aspect of this expansion?
- has CSBP considered the noise impact of this expansion?
- will traffic increase as a result of this expansion?

1.4 KWINANA COMMUNITIES AND INDUSTRIES FORUM

In April 2010, CSBP presented the proposal at a CIF meeting where no specific concerns were raised by those present. CSBP anticipates that further presentations to CIF will be made during the approvals process and as significant milestones in the project are reached.

2 PRINCIPLES OF ENVIRONMENTAL PROTECTION

2.1 THE PRECAUTIONARY PRINCIPLE

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by:

- careful evaluation to avoid, where practicable, serious or irreversible damage to the environment
- an assessment of the risk-weighted consequences of various options.

CSBP has commissioned various specialist consultants to facilitate the design/location of the proposal to ensure potential environmental impacts of the proposal are understood. This will enable appropriate management measures to be adopted to minimise significant impacts, thereby mitigating the risk of harm to the environment. The proposal is an expansion of an existing facility, using similar technology, such that a high degree of scientific certainty is available upon which to consider the potential for impact.

2.2 INTERGENERATIONAL EQUITY

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

CSBP integrates the principles of sustainable development into all aspects of its operations to contribute to sustainable development in Australia. These principles ensure that CSBP operations deliver more value with less impact. Integration of these sustainable development principles ensures the environment in which CSBP operates is maintained and, where possible, enhanced for future generations.

For example, CSBP will ensure that the proposal will be constructed, operated and closed in an environmentally and socially responsible manner that will not leave a negative legacy. CSBP will use natural resources wisely to ensure the maintenance of natural capital and follow EPA Guidance Statement No. 12 (EPA 2002).

Long term environmental monitoring facilitates the understanding of the immediate environment and allows CSBP to be able to react to and action measures to remediate, if necessary, an aspect of the plant to ensure intergenerational equity is maintained.

2.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

Conservation of biological diversity and ecological integrity should be a fundamental consideration.

The site for the proposal is located in a previously cleared area within the KIA enabling avoidance of the impacts on biological diversity and ecological integrity that might otherwise occur on a greenfields site.

2.4 IMPROVED VALUATION, PRICING AND INCENTIVE MECHANISMS

Environmental factors should be included in the valuation of assets and services.

The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.

The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.

The design and costing of the proposal will take into account the cost of waste management. Environmental management of the proposal will be undertaken in the most cost-effective way to maximise benefits or minimise costs, to develop solutions and responses to environmental problems.

CSBP is currently responsible for all its emissions and waste at the Ammonium Nitrate Production Facility (ANPF); this will continue for the proposed expansion. As the proposal is an expansion of the existing ANPF at Kwinana, some existing infrastructure can be utilised. This reduces the environment cost that would occur if the proposal was located elsewhere (for example in the north-west of Western Australia), which would require all infrastructure to be established. Duplication of some facilities will be unnecessary if the proposal is implemented on the CSBP site within the KIA.

2.5 WASTE MINIMISATION

All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.

CSBP currently operates its Kwinana Industrial Complex utilising applicable waste minimisation measures through the use of the waste minimisation hierarchy, as follows:

- avoid
- reuse
- recycle
- recover energy
- treat
- contain
- dispose.

CSBP also manages:

- offsite discharge of stormwater
- noise emissions
- emissions to air, such as dust.

3 SUSTAINABILITY

The United Nations Industrial Development Organisation (UNIDO) defines sustainable industrial development as:

"…a pattern of development that balances a country's concerns for competitiveness, social development and environmental soundness either absolutely or comparatively."

According to the UNIDO (1998), such development accomplishes three things:

1. *Encourages a competitive economy, with industry producing for the domestic as well as the export market.*
2. *Increases productive employment, with industry bringing long-term employment and increased prosperity.*
3. *Protects the environment, with industry efficiently utilising non-renewable resources, conserving renewable resources and remaining within the functional limits of the ecosystem.*

The first comprehensive policy relating to ecologically sustainable development in Australia was the National Strategy for Ecologically Sustainable Development (NSESD) (Environment Australia 1992). The Commonwealth and all States and Territories in Australia adopted the NSESD in 1992.

In 2003, the WA government released *Hope for the Future: the Western Australian State Sustainability Strategy* (Government of Western Australia 2003). This Strategy outlined the WA government approach to eco-efficiency and industrial ecology. Specifically, the Strategy states:

"Industrial ecology involves better planning, design and management of industrial activity, so that material, energy and water is not wasted and industrial opportunities are maximised. Industrial ecology requires a completely different approach to industrial development, where industrial facilities are planned, designed and managed to mimic ecological processes."

Subsequent to the release of the Western Australian State Sustainability Strategy, the EPA published a revised Position Statement *Towards Sustainability* (EPA 2004) which aims to describe appropriate approaches to this complex and evolving subject in WA, where mining, petroleum and agriculture are mainstays of our economy and underpin the standard of living generally enjoyed by Western Australians. The EPA Position Statement contains a useful provisional checklist of questions to be considered when considering proposals. The checklist and CSBP responses are presented in Table 2.1.

Table 2.1 Sustainability checklist for the proposed ANPF expansion

Question	Proposal
Does the proposal deplete non-renewable resources significantly?	No
Does the proposal deplete assimilative capacity significantly?	No
Does the proposal use natural resources responsibly?	Yes
Does the proposal satisfactorily restore any disturbed land?	N/A
Does the proposal follow the waste hierarchy and manage satisfactorily any waste produced?	Yes
Does the proposal incorporate best practice in water and energy efficiency?	Yes
Does the proposal make good use of best practice to prevent pollution?	Yes
Does the proposal increase use of non-renewable transport fuels?	Yes
Does the proposal use energy efficient technologies?	Yes
Does the proposal result in net improvements in biodiversity?	No
Does the proposal increase greenhouse gas emissions?	Yes
Does the proposal involve acceptable levels of risk?	Yes
Does the proposal have a secure foundation of scientific understanding of its impacts?	Yes
Does the proposal minimise the ecological footprint?	Yes
Does the proposal avoid or minimise adverse impacts and promote beneficial impacts on the surrounding community?	Yes
Does the proposal produce sustainable net economic benefits?	Yes
Does the proposal produce sustainable net social benefits?	Yes
Does the proposal add to heritage protection and provide a sense of place?	No
Does the proposal produce net environmental benefits?	Yes[1]
Does the proposal contribute to a more equitable and just society?	Yes
Does the proposal interact positively with other likely developments?	Yes
Does the proposal provide new opportunities (social, economic or environmental)?	Yes

1. The net environmental benefits are gained as the proposal allows for local production rather than importing of goods internationally.

CSBP, as an important part of the State industrial base, plays a key role in supporting the mining and agricultural industries, and this proposal has large benefits for both sectors. Whilst the natural gas used to produce ammonia can be considered to be a non-renewable resource, the EPA Position Statement (EPA 2004) considers that these resources need to be used efficiently and without at-source environmental harm; a view CSBP supports.

With regard to the environmental impact of this proposal, CSBP is of the view that the management strategies proposed will protect the Kwinana/ Rockingham environment from adverse environmental impacts; ensuring the environmental impact is within relevant standards, and that CSBP has systems in place to ensure ongoing performance.

With respect to water resources, in 2005 CSBP was awarded the State Environment Award for Water Management and Conservation by the Premier's Water Foundation. This award was recognition of the CSBP commitment to source diversity, source monitoring and protection, recycling, and using water of a quality appropriate for the planned use. CSBP will maintain these commitments into the future.

CSBP has also been heavily involved in the Kwinana Industries Synergies Project since its inception. The *Hope for the Future: the Western Australian State Sustainability Strategy* (Government of Western Australia 2003) describes the Kwinana Synergies Project – Industry Sustainability Innovation as one of the best examples in the world of industrial ecology. For the past fifteen years the Kwinana Industries Synergies Project (or its preceding component parts) has been working with industry and the community in Kwinana to create collaborative arrangements to:

- convert wastes into value added products
- reduce generation of wastes
- reduce greenhouse gases by improved energy efficiencies
- reduce freshwater usage, reuse treated wastewater
- reduce effluent discharges into Cockburn Sound.

CSBP regards its water management activity as one of continual improvement, to both protect the resource and ensure greater value and efficiency is gained from the use of the resource.

The proposal will deliver significant benefits to the State by way of employment, economic activity, security of supply for resource inputs and import replacement with potential export income. CSBP is committed to delivering these benefits, whilst ensuring the protection of the environment and the States' resources.

CSBP remains committed to working in relevant forums to develop the concept of sustainability and its varied meanings and implications for Western Australia, whilst recognising this is a very broad and ongoing discussion.

Chapter 3 Assessment and management of environmental factors

This Chapter sets out a description and the existing environment for each environmental factor associated with the proposal, a description of the potential impacts of the proposal on the factor, and how the impacts are proposed to be managed, including specific environmental management actions.

The environmental factors associated with the proposal are:

- construction environmental impacts
- air quality (emissions of oxides of nitrogen, particulates and ammonia)
- greenhouse gas emissions
- marine environment (wastewater disposal)
- water resources
- solid waste
- noise
- public risk
- traffic and shipping
- visual amenity and light overspill.

Included in the above factors are other air emissions and contamination for information.

Each of these factors is discussed in detail in the following Sections 1 through 14.

1 CONSTRUCTION ENVIRONMENTAL IMPACTS

1.1 GENERAL

CSBP has an Environmental Management System (EMS) in place consistent with the international standard ISO 14001, to assist in the management of environmental compliance, supported by a comprehensive set of environmental management procedures. CSBP considers that most of the environmental issues with respect to the construction of the expanded Ammonium Nitrate Production Facility (ANPF) will be routinely addressed via these mechanisms. Nevertheless, CSBP recognises that there may be some environmental impacts specific to the construction phase of the expansion not addressed by the existing EMS and related procedures. These impacts are discussed in Section 1.2.

1.2 KEY ENVIRONMENTAL IMPACTS DURING CONSTRUCTION

CSBP has prepared a Construction Environmental Management Plan (CEMP) for the construction phase of the expansion (Appendix 1).

The CEMP addresses management of:

- construction waste
- erosion and sediment control
- construction noise
- construction dust
- fire prevention
- cultural heritage.

In addressing each of the above factors, the CEMP sets out the environmental risks, the environmental management objectives, management actions, monitoring and reporting requirements and contingency provisions applicable to their management.

CSBP and contractors undertaking any construction work related to the proposed expansion will implement the CEMP during that phase of the expansion.

1.2.1 Construction waste

As the CSBP Kwinana Industrial Complex has extensive infrastructure in place, it is possible that prior to construction of the various components of the new plant, some existing infrastructure will have to be removed. Soil and fill may also need to be excavated and removed to enable new foundations to be installed. Both these activities will result in the generation of materials that will need to be disposed of. The construction process may also generate general refuse such as building rubbish, packaging materials and waste oil.

The CEMP sets out the detailed management actions designed to eliminate any risks of environmental impacts from the generation of solid and liquid waste by the construction process.

1.2.2 Erosion and sediment control

Ground disturbance can cause soil loss or degradation if erosion of soil occurs. Erosion of soil could also cause impacts such as dust emissions during windy conditions and sedimentation from stormwater runoff.

To minimise any potential for soil loss or degradation and to prevent any adverse impacts on water quality during construction of the Proposal, management such as minimising ground disturbance, reducing exposure of soil, utilising soil erosion berms/barriers, drains and sediment barriers and maintaining appropriate stormwater drainage will be undertaken.

The CEMP sets out the detailed management actions designed to eliminate any risks of erosion causing environmental impacts during the construction process.

1.2.3 Construction noise

Noise generated during the construction period may be related to pile driving and the use of construction equipment.

Construction activities will be carried out in accordance with the Environmental Protection (Noise) Regulations 1997 and the control of noise practices set out in the Australian Standard 2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolitions Sites*".

Construction activities will only be undertaken between 7 am and 7 pm on Monday to Saturdays. If construction activities are to be undertaken outside of these hours, CSBP will comply with the requirements of the Environmental Protection (Noise) Regulations 1997, *Construction out of Hours*.

CSBP will ensure that the equipment used for construction has adequate operational noise control measures fitted and all equipment is well maintained.

The CEMP sets out the detailed management actions designed to eliminate any risks of construction noise impacts outside the provisions of the Environmental Protection (Noise) Regulations 1997.

1.2.4 Construction dust

During construction, some dust may be generated; however, as construction will occur within the ANPF, dust generated during the construction activities is not expected to have a significant impact on the environment surrounding the industrial complex. Dust will be visually monitored during construction and dust minimisation methods will be implemented if dust is identified to be an issue.

The CEMP sets out the detailed management actions designed to eliminate any risks of dust causing environmental impacts during the construction process.

1.2.5 Fire prevention

The construction and operation of the proposal presents a minimal fire risk to the surrounding area. However, were an uncontrolled fire event to occur, it could affect surrounding industries.

To prevent uncontrolled fires during construction that could impact the CSBP Kwinana Industrial Complex and surrounding industries, suitable control measures will be implemented that include:

- prevention strategy
- local control measures
- emergency escapes from elevated areas
- emergency response.

The CEMP sets out the detailed management actions designed to eliminate any risks of fire causing environmental impacts during the construction process.

1.2.6 Cultural heritage

There have been no cultural heritage sites recorded on the CSBP Kwinana Industrial Complex and, as the proposal is being constructed on previously disturbed land, it is unlikely that any new cultural heritage sites will be found. However, the following management is in place in the unlikely event that a culturally significant area is discovered on the site during construction of the proposal.

To protect aboriginal sites, artefacts and areas of cultural significance from uncontrolled access and damage, management measures such as appropriate induction concerning cultural heritage issues and restricted access areas, and procedures for reporting a new find will be undertaken.

The CEMP sets out the detailed management actions designed to minimise the risk of damage to culturally significant sites, in the event one is discovered during the construction process.

1.3 MANAGEMENT COMMITMENTS

The CEMP for the proposal details the management measures to be undertaken during construction works (Appendix 1).

CSBP will implement the CEMP throughout the construction phase of the expansion.

2 AIR QUALITY – OXIDES OF NITROGEN

2.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for air quality (oxides of nitrogen) is:

- to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).

2.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

In June 1998, the National Environment Protection Council (NEPC) set uniform standards for ambient air quality to allow for the adequate protection of human health and well being. The National Environmental Protection (Ambient Air Quality) Measure (NEPM) defined ambient air quality standards for criteria pollutants, including NO_2, and Particulate Matter (PM) (NEPC 2003). The Western Australian State Government has adopted the NEPM standards for ambient air quality as part of the *State Environmental (Ambient Air) Policy 2009* (EPA 2009b). The NEPM standards for NO_2 and PM have subsequently been applied in this air quality assessment (for PM - see Section 3 of this Chapter).

Table 3.1 outlines the criteria for NO_2.

Table 3.1 Ambient air quality criteria - NO_2

Compound	Averaging Period	Concentration (µg/m^3)	Goal[a]	Source
NO_2	1-hour	246	Not to be exceeded more than 1 day per year	NEPC NEPM
	Annual	62	NA	

a. from July 2008

2.3 DESCRIPTION OF FACTOR

NOx is an abbreviation for a family of chemical compounds (oxides of nitrogen), which are commonly present in the atmosphere from either natural or anthropogenic (human) sources. NOx is comprised of:

- nitric oxide (NO)
- dinitrogen dioxide (N_2O_2)
- dinitrogen trioxide (N_2O_3)
- nitrogen dioxide (NO_2)
- dinitrogen tetroxide (N_2O_4)
- dinitrogen pentoxide (N_2O_5).

Of these compounds, NO_2 is regulated as it is the most prevalent form of NOx in the atmosphere that is generated by anthropogenic (human) activities.

NO_2 is not only an important air pollutant but also reacts in the atmosphere to form ozone in the lower levels of the atmosphere. The concentration of ozone in the atmosphere is typically used as an indicator of the total amount of photochemical smog, as it usually constitutes about 85 per cent of the total photochemical smog concentration (EPA 2007).

The following sections describe the current modelled emissions from the ANPF and the technology currently used on site to reduce NOx emissions to the atmosphere.

2.3.1 Existing emissions of NOx

Ammonium Nitrate Production Facility NOx licence conditions

CSBP air emissions are managed in accordance with conditions contained in EP Act Licence L6107/1967 issued by the DEC.

Specifically, the Licence limits the hourly emission of NOx from each nitric acid plant under normal operations to a maximum of 0.41 g/m^3. During start-up, a half hourly average concentration of 2.0 g/m^3 must not be exceeded. The licence conditions also specify that the two existing nitric acid plants cannot be started at the same time. CSBP maintains a minimum of one hour between the start-up of each of the plants in order to comply.

NOx emission sources

NOx is produced on site to make nitric acid. The nitric acid process involves production of NOx via oxidation of ammonia with air over platinum/rhodium gauzes as catalysts. The NOx is then passed through the absorber tower where it is absorbed in water to create nitric acid (HNO_3).

NOx abatement technology

Unabsorbed NOx from the nitric acid process is discharged to atmosphere via the nitric acid plant stack. Before being discharged to atmosphere, the tail gas NOx content is reduced in a selective catalytic reactor (SCR), regarded as Best Available Technology (BAT) (EIPPCB 2007). In the SCR, the NOx is reduced to N_2 via reaction with small quantities of ammonia to reduce the concentration of NOx in the tail gas by up to 80 per cent. The treated tail gas is then discharged to atmosphere through a stack mounted alongside the absorber tower.

NOx concentrations from the SCR are measured continuously by analysers located immediately upstream of the tail gas expander following the SCR and configured to alarm on high NOx concentrations, and trip the plant on elevated NOx concentrations detected for a period of greater than five minutes. Alarms are also configured to detect possible faults with the NOx analyser and detect low ammonia flow to the SCR. The SCR catalyst performance is monitored continuously with alarms and trips when not operating at optimum activity. Shutdown of the SCR leads to a plant shut down on high NOx concentration.

Elevated emissions of NOx occur during the start-up process as the tail gas is heated to the operating temperature required for effective performance of the SCR catalyst (around 200ºC). This process takes approximately 30 minutes, after which time NOx emissions decrease. Shutdown of nitric acid plants can also lead to short-term elevated NOx emissions. The existing nitric acid plant start-up and shutdown conditions occur on average once to twice a month (i.e. less than 1 per cent of the time).

Best practice for pollutants

NOx (along with PM and ammonia) is considered "Common Pollutants[1]" within the definitions set out in EPA Guidance No. 55 *Implementing Best Practice in proposals submitted to the Environmental Impact Assessment process* (EPA 2003). The guidance provides that control for Common Pollutants should be through "Best Practicable Measures". Best Practicable Measures are described in the guidance as follows:

> *"For the general case, Best Practicable Measures should be applied to the management of environmental issues. Best Practicable Measures incorporates technology and environmental management procedures which are practicable, having regard to, among other things, local conditions and circumstances, including costs, and to the current state of technical knowledge, including the availability of reliable, proven technology.*
>
> *Best practice involves the prevention of environmental impact, or, if this is not practicable, minimising the environmental impact, and also minimising the risk of environmental impact, through the incorporation of Best Practicable Measures. No significant residual impact should accrue as a result of a proposal."*

CSBP considers that the technologies employed in the ANPF conform to Best Practicable Measures in that:

- they are practicable
- they have regard to local conditions and circumstances in that:
  - the levels at sensitive receptors resulting from the proposal will not cause significant environmental impact
  - they are cost effective.
- they involve reliable proven modern technology
- there will be no significant residual impact.

Ambient air quality - NOx

The DEC has conducted ambient air quality monitoring of NO_2 concentrations within the Kwinana region. Monitoring has been conducted at stations located at Hope Valley (ceasing in April 2008 when the station was decommissioned) and North Rockingham. Both of these stations are (or were) located within approximately five kilometres of the ANPF (Figure 1.8). The NO_2 concentrations are collected by the DEC in compliance with the required monitoring under the NEPM (NEPC 2003) and the data are made available in the annual DEC air monitoring reports.

[1] These pollutants are common, ubiquitous or widespread in occurrence (EPA 2003)

As noted in the 2008 Western Australian Annual Air Monitoring Report (DEC 2009), the NEPM NO_2 1-hour standard of 246 µm/m^3 has not been exceeded at either the Hope Valley or North Rockingham monitoring stations over the ten year period between 1999 and 2008; the annual standard of 62 µm/m^3 was not exceeded in the 2008 reporting period. The highest maximum 1-hour and annual NO_2 concentrations monitored at Hope Valley and North Rockingham are presented in Table 3.2.

Table 3.2 Summary of ambient NO_2 concentrations measured near Kwinana

Monitoring Station	Hope Valley			North Rockingham		
	ppm	µg/m^3	%NEPM[a]	ppm	µg/m^3	%NEPM[a]
1-hour Average						
Max. between 1999 and 2008	0.084[b]	173	70%	0.055[c]	113	46%
Annual Average						
2008	0.009	18	30%	0.013	27	43%

a. 1 hour NO_2 NEPM = 0.12 ppm = 246 µg/m^3; Annual NO_2 NEPM = 0.03 ppm = 62 µg/m^3.
b. As recorded in 2007.
c. As recorded in 2004.

Table 3.2 shows that at the two monitoring locations, the air emissions are consistently below the NEPM emission criteria. This indicates that the emissions from the Kwinana Industrial Area (KIA) are not likely to be 'significantly contributing' to unacceptable air quality regionally.

To assess the cumulative impacts of the current proposal on ambient NO_2 concentrations at each site, the maximum 1-hour and annual averaged NO_2 concentrations monitored between 1999 and 2008 have been used, as detailed in Table 3.2.

2.3.2 Modelling of baseline and expansion NOx emissions

The following sections describe the modelling methodology utilised for modelling of air emissions (both baseline and expanded scenarios), the specific methodology for the calculation of NO_2 from predicted NOx emissions and the actual baseline emissions for NOx and NO_2.

Modelling methodology of emission scenarios

The following methodology applies for the modelling of baseline and expanded facility NOx emissions as well as for the PM and ammonia emissions as described in Sections 3 and 4 of this chapter, respectively.

Point sources of NOx from activities managed under EP Act Licence L6107/1967 have been considered in the baseline and expansion NOx emission scenarios. These sources include the nitric acid plants which form part of the ANPF, and ammonia plant emission sources which are not part of the ANPF and therefore will not change as a result of this proposal.

ENVIRON Australia Pty Ltd (ENVIRON) undertook an Air Dispersion Modelling Study for the proposal (ENVIRON 2010). Gaussian dispersion models, Dispmod (Version 2005) and Industrial Source Complex 3 (ISC3) (Version 5.1.0), were both used to predict air quality impacts for the emission scenarios investigated. These two models have been chosen in order to ensure the modelling results account for coastal dispersion influences (Dispmod) and building wake effects (ISC3). This report is located in Appendix 4.

Previous modelling carried out by ENVIRON (2008) for CSBP indicated that the worst case scenario predicted that impacts varied depending on source characteristics (i.e. stack height) and that no one model generated the most conservative results. As such, the air quality assessment for this proposal also utilised both the Dispmod and ISC3 air dispersion models in order to predict NO_2, $PM_{2.5}$ and ammonia ground level concentrations (GLCs).

In addition, ISC3 was run using both urban and rural wind profile exponents. Both the urban and rural wind profile exponents were run in order to determine the most conservative setting.

Air quality impacts have been assessed under emission scenarios for the following operating conditions:

- normal operations
- nitric acid plant start-up (for NOx emissions)
- nitric acid plant shutdown (for NOx emissions).

Shutdown events in the nitric acid plant are equivalent to upset operating conditions as the highest amount of NOx is emitted during this time.

Conversion of NOx to NO_2 in the dispersion plume

NO_2 concentrations have been calculated from the predicted NOx concentrations. The final NO_2 concentration is a combination of the NOx emitted as NO_2 from the source stacks and the amount of NOx that is converted to NO_2 by oxidation of the plume after release.

There are several methods used to estimate the final ratio of NO_2 to NOx. For this proposal, the method used was the Ambient Ratio Method (ARM). ARM is considered to be the most accurate method whilst being conservative (actual NO_2 concentrations are likely to be less than those predicted by the modelling) and is consistent with previous air quality studies carried out by ENVIRON for CSBP operations (ENVIRON 2008) and other analyses conducted in the Kwinana region. This method typically relies on at least one year of ambient monitoring data and assumes the final plume NO_2 to NOx ratio will be equal to the existing ambient NO_2 to NOx ratio (ENVIRON 2010).

Modelled baseline emissions

Table 3.3 presents a summary of the maximum predicted baseline GLCs for NOx emissions under normal, start-up and shutdown operational conditions. The concentrations highlighted in bold represent the highest offsite GLC predicted by the alternative models applied.

Table 3.3 Summary of maximum predicted (baseline) GLCs - NOx

Compound	Averaging Period	Maximum Predicted Offsite GLCs (µg/m³)[a]		
		Dispmod	ISC3	
			Rural Setting	Urban Setting
Normal Operations				
NOx	1-hour	50	55	**100**
	Annual	0.7	2.0	**3.4**
NO_2	1-hour	29	31	**55**
	1-hour Guideline[b]	*246*	*246*	*246*
	% 1-hour Guideline	12%	13%	**22%**
	Annual	0.4	1.2	**2.0**
	Annual Guideline[c]	*62*	*62*	*62*
	% Annual Guideline	0.7%	1.9%	**3.2%**
Start-up operations				
NOx	1-hour	**403**	257	300
NO_2	1-hour	**176**	127	143
	1-hour Guideline[b]	*246*	*246*	*246*
	% 1-hour Guideline	**72%**	51%	58%
Shutdown operations				
NOx	1-hour	**302**	279	260
NO_2	1-hour	**143**	135	128
	1-hour Guideline[b]	*246*	*246*	*246*
	% 1-hour Guideline	**58%**	55%	52%

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. 1-hour NEPM air quality criterion as per Table 3.1
c. Annual NEPM air quality criterion as per Table 3.1

The maximum predicted (offsite) 1-hour average NO_2 GLC during normal operations as predicted by ISC3 (urban setting) is 55 µg/m^3. This concentration comfortably complies with the 1-hour average NEPM criterion for NO_2 of 246 µg/m^3. Contours of the maximum predicted 1-hour average NO_2 GLCs, as illustrated in Figure 3.1, show that areas of peak concentrations are predicted to occur in small localised areas across the model domain.

The highest (offsite) annual average NO_2 GLC complies with the annual average NO_2 NEPM criterion of 62 µg/m^3 and is predicted to occur immediately to the north and west of the CSBP site boundary, as illustrated in Figure 3.2.

The maximum predicted (offsite) 1-hour average NO_2 GLC during start-up operations as predicted by Dispmod is 176 µg/m^3 and complies with the 1-hour average NEPM criterion for NO_2 of 246 µg/m^3. The maximum predicted offsite 1-hour average NO_2 concentrations are predicted to occur along the western boundary of the site, as illustrated in Figure 3.3.

The maximum predicted (offsite) 1-hour average NO_2 GLC during shutdown operations as predicted by Dispmod is 143 µg/m^3 and complies with the 1-hour average NEPM criterion for NO_2 of 246 µg/m^3. The maximum predicted offsite 1-hour average NO_2 concentrations are predicted to occur along the western boundary of the site, as illustrated in Figure 3.4.

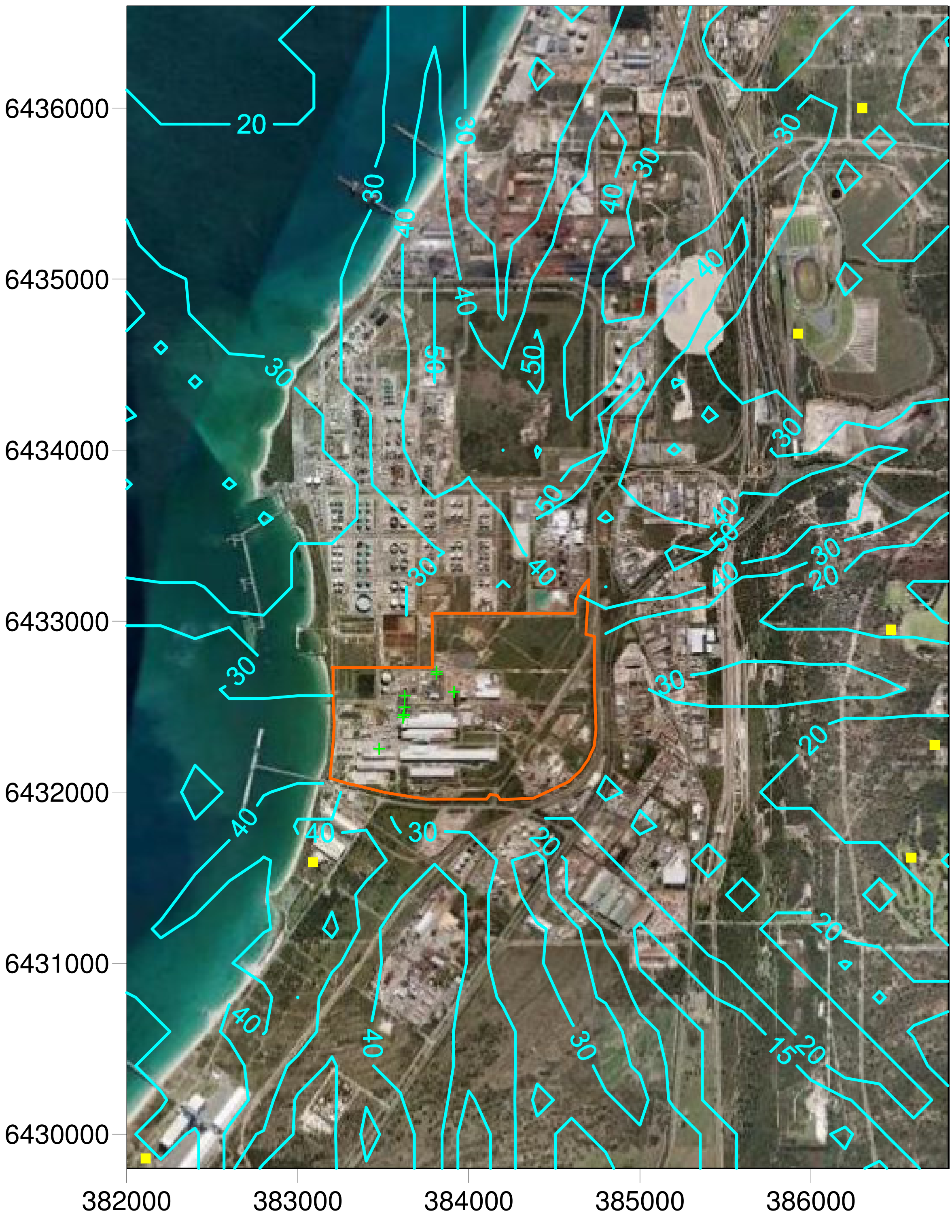


Figure 3.1 Maximum predicted 1-hour NO_2 (baseline) GLCs – normal operations (ISC3 – urban)

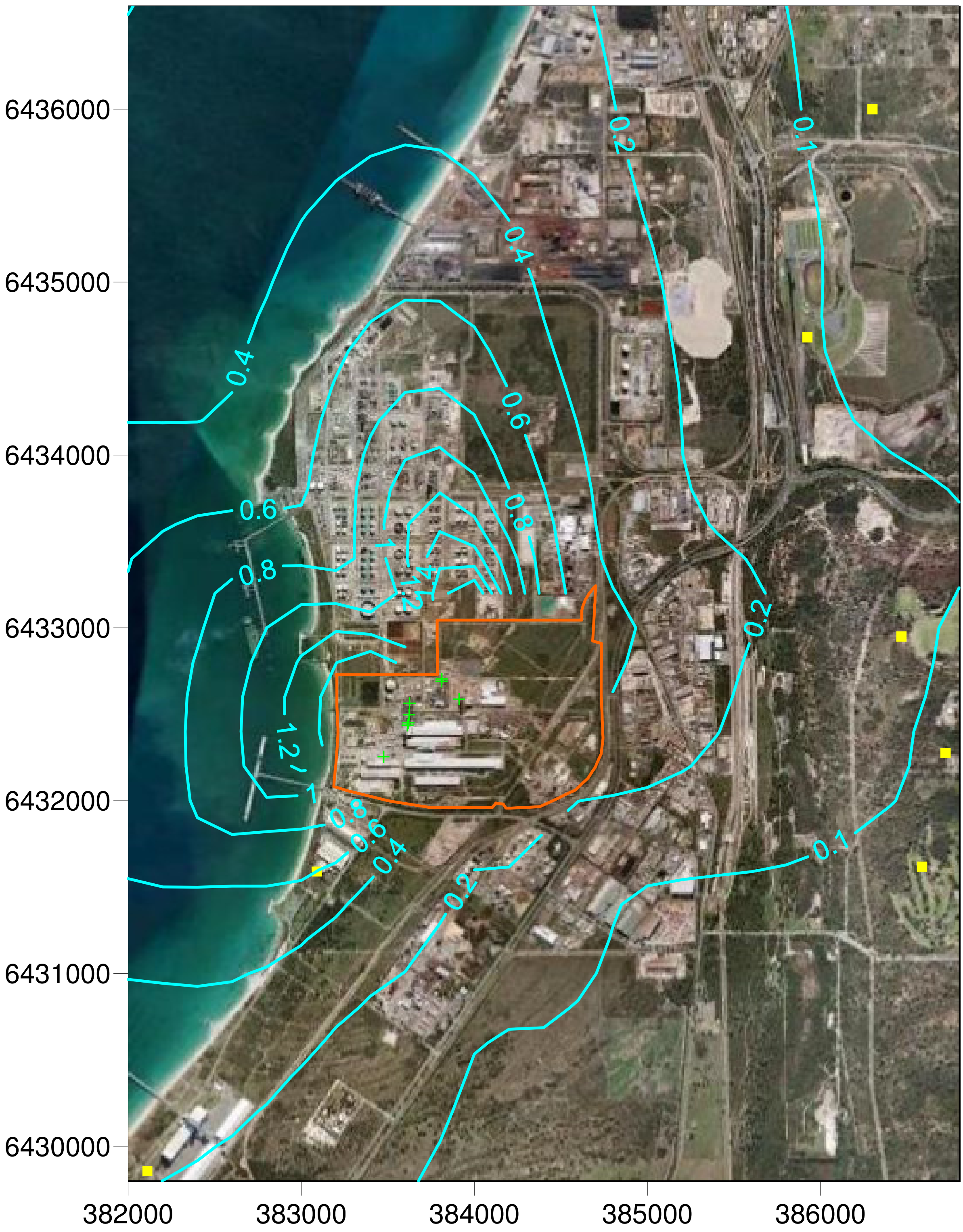


Figure 3.2 Predicted annual average NO_2 (baseline) GLCs – normal operations (ISC3 – urban)

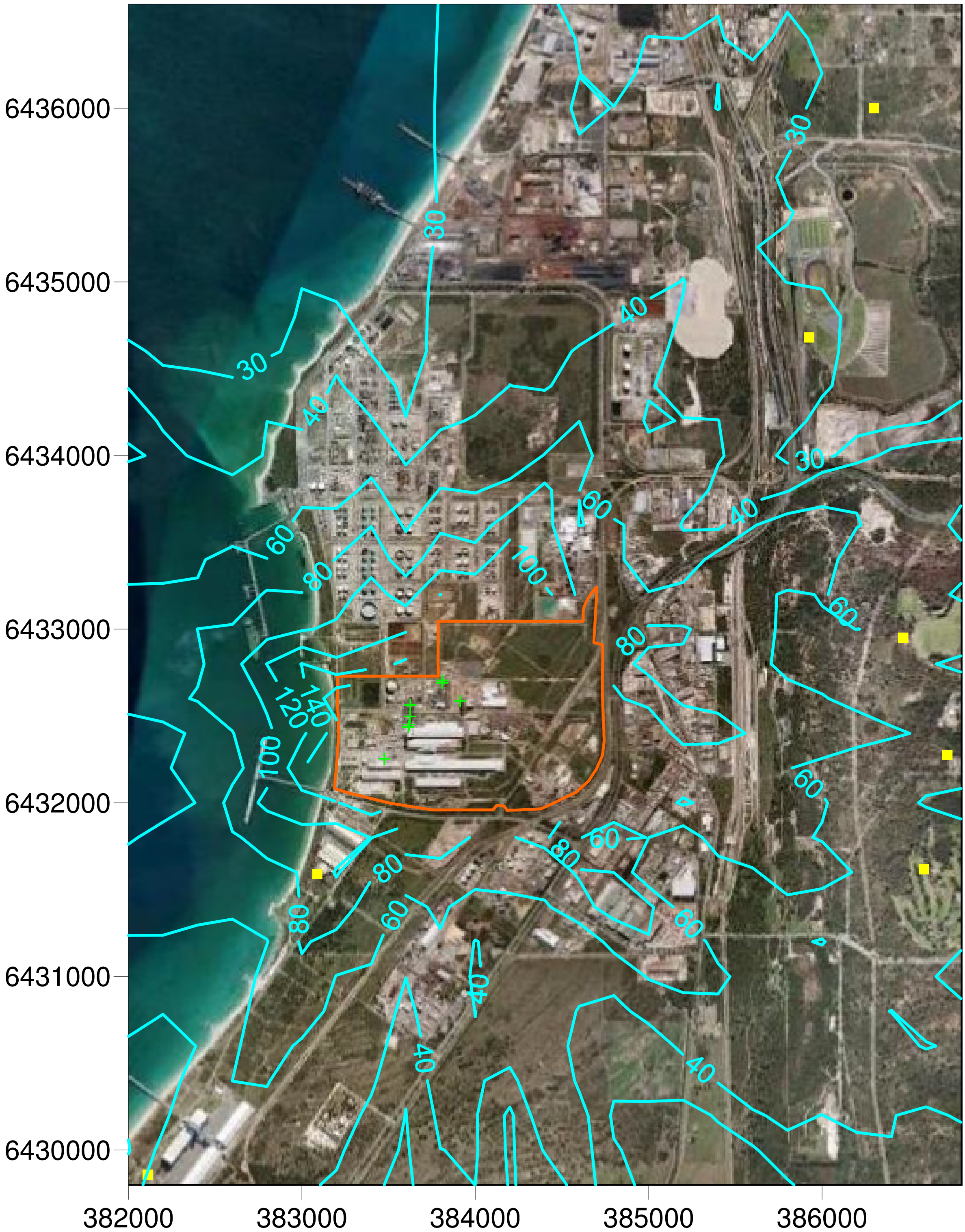


Figure 3.3 Maximum predicted 1-hour NO_2 (baseline) GLCs – start-up operations (Dispmod)

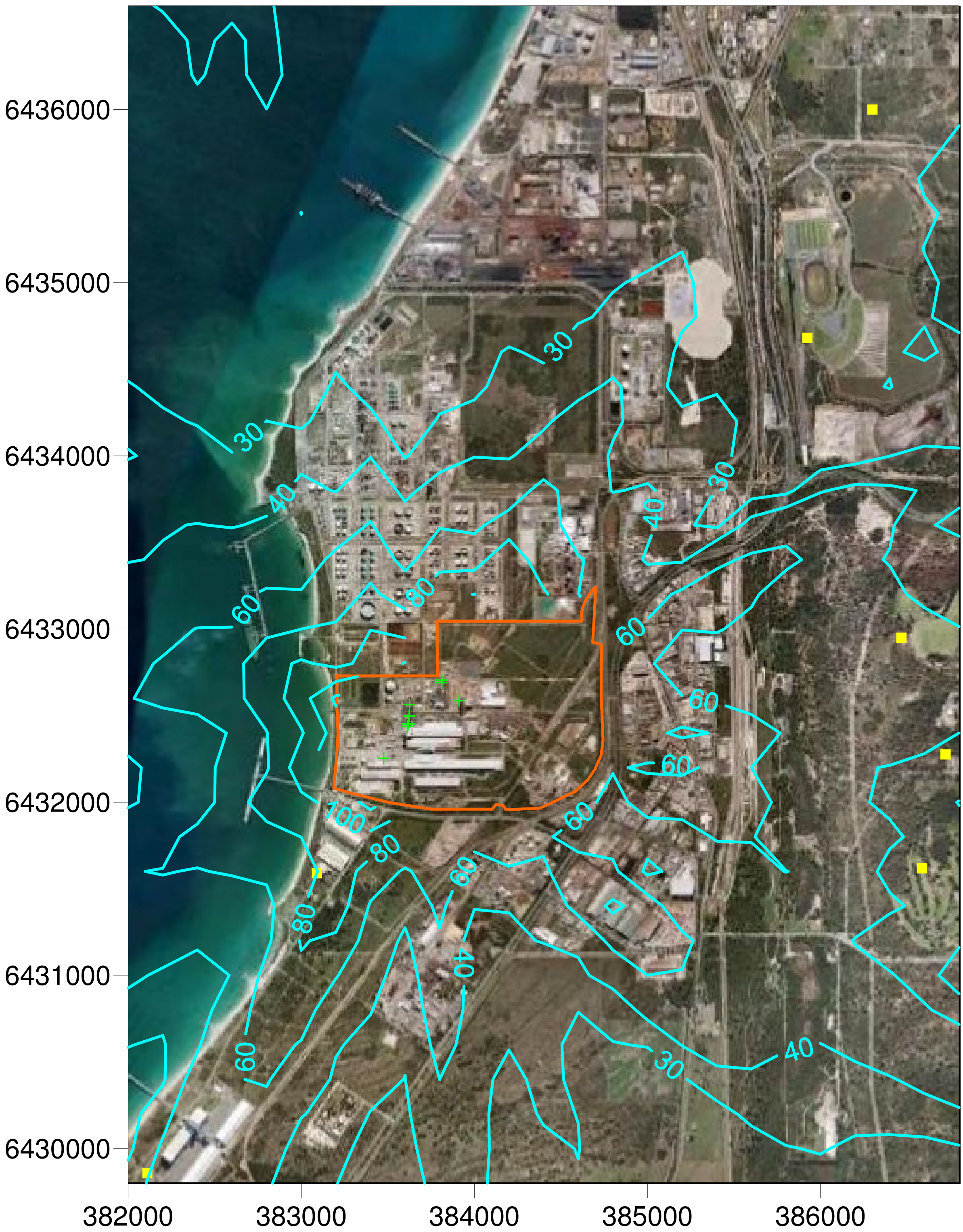


Figure 3.4 Maximum predicted 1-hour NO_2 (baseline) GLCs – shutdown operations (Dispmod)

2.4 POTENTIAL SOURCES OF IMPACT

The main sources of NOx resulting from the proposed expansion will be from the nitric acid plants (Section 2.3.1), in the form of unabsorbed NO and NO_2, and from a new auxiliary boiler (when operating) from combustion of natural gas.

This proposed auxiliary boiler will have a steam generating capacity of 40 tph, and will be able to accommodate increased production for the third nitric acid ammonium nitrate plant. CSBP anticipates that the existing boiler associated with the Ammonia Plant will only be required in the event of multiple plant trips that will then require contemporaneous start-up (no more than 5 per cent of the time).

Emissions data used for the assessment are provided in Table 3.4. Full details are in Appendix 4.

Table 3.4 Nitric acid plant stack parameters and emissions data

	Existing nitric acid plant 1	Existing Nitric Acid Plant 2	Proposed Nitric Acid Plant	Proposed auxiliary boiler
Stack Exit Height (m)	63.8	70.7	70.7	30
Stack Exit Diameter (m)	1.1	1.1	1.1	1.2
Stack Exit Temperature (K)	378	378	378	443
Volumetric Flow Rate (m^3/s)	39.5	39.5	39.5	9.7
Stack Exit Velocity (m/s)	41.6	41.6	41.6	8.5
NOx Emission Rate (g/s) normal operations (96% of time)	3.4	3.4	3.4	2.4
NOx Emission Concentration (mg/Nm^3) normal operations (96% of time)	120	120	120	400
NOx Emission Concentration (ppmv) normal operations (96% of time)	58.4	58.4	58.4	195
NOx Emission Rate (g/s) start-up conditions	37.8	37.8	37.8	-[a]
NOx Emission Concentration (mg/Nm^3) start-up conditions	2000	2000	2000	-[a]
NOx Emission Concentration (ppmv) start-up conditions	974	974	974	-[a]

a. no startup or sutdown conditions apply to the operation of the boiler.

2.5 ASSESSMENT OF POTENTIAL IMPACT

The following sections describe the predicted direct impacts (from the expanded ANPF) and the predicted cumulative impacts (using offsite monitoring stations for reference). The potential contribution to photochemical smog in Perth originating from CSBP activities has also been described.

2.5.1 Direct impacts

The maximum offsite NOx concentrations predicted by ENVIRON (2010) for both the Dispmod and ISC3 dispersion models for the expansion emissions scenarios (baseline emissions and the proposed expanded ANPF emissions), under all operating conditions, are presented in Table 3.5. Table 3.5 also presents a comparison of predicted concentrations with the relevant ambient air quality criteria (NEPM criteria) expressed as percentages of the criteria values. The concentrations highlighted in bold represent the highest offsite GLC predicted by the alternative models applied.

Table 3.5 Summary of maximum predicted (expansion) GLCs - NOx

Compound	Averaging Period	Maximum Predicted Offsite GLCs (µg/m³)[a]		
		Dispmod	ISC3	
			Rural Setting	Urban Setting
Normal Operations				
NOx	1-hour	55	95	**155**
	Annual	1.4	3.7	**5.1**
NO_2	1-hour	31	53	**82**
	1-hour Guideline[b]	*246*	*246*	*246*
	% 1-hour Guideline	13%	21%	**34%**
	Annual	0.8	2.2	**3.0**
	Annual Guideline[c]	*62*	*62*	*62*
	% Annual Guideline	1.4%	3.6%	**4.9%**
Start-up operations				
NOx	1-hour	**524**	345	429
NO_2	1-hour	**205**	158	183
	1-hour Guideline[b]	*246*	*246*	*246*
	% 1-hour Guideline	**83%**	64%	75%
Shutdown operations				
NOx	1-hour	**442**	373	400
NO_2	1-hour	**187**	167	175
	1-hour Guideline[b]	*246*	*246*	*246*
	% 1-hour Guideline	**76%**	68%	71%

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. 1-hour NEPM air quality criterion as per Table 3.1
c. Annual NEPM air quality criterion as per Table 3.1

From Table 3.5, the maximum offsite 1-hour average NO_2 GLC predicted under the expansion scenario for CSBP operations in isolation during normal operation is 82 µg/m³ (ISC3 urban setting). This concentration is 49 per cent higher than the maximum 1-hour average NO_2 GLC predicted for the baseline scenario (Table 3.3) and is below the 1-hour average NEPM for NO_2 of 246 µg/m³, at 34 per cent of the guideline. Contours of the maximum 1-hour average NO_2 GLCs predicted for the expansion emission scenarios are presented in Figure 3.5 and peak concentrations are predicted to occur across the model domain.

The maximum offsite annual average NO_2 GLC predicted under the expansion scenario for CSBP operations in isolation during normal operation is 3.0 $\mu g/m^3$ (ISC3 urban setting). This concentration is 50 per cent higher than the maximum offsite annual average NO_2 GLC predicted for the baseline scenario and is well below the annual average NEPM for NO_2 of 62 $\mu g/m^3$, at 4.9 per cent of the guideline. The maximum annual average NO_2 GLCs predicted for the expansion emission scenario indicates that the highest long-term NO_2 GLCs are predicted to occur immediately to the north of the CSBP site boundary (Figure 3.6).

The maximum offsite 1-hour average NO_2 GLC predicted under the expansion scenario for CSBP operations in isolation during start-up conditions is 205 $\mu g/m^3$ (Dispmod). This concentration is almost 16 per cent higher than the maximum 1-hour average NO_2 GLC predicted for the baseline scenario and is below the 1-hour average NEPM for NO_2 of 246 $\mu g/m^3$, at 83 per cent of the guideline. The maximum predicted offsite 1-hour average NO_2 concentrations are predicted to occur along the western boundary of the site, as illustrated in Figure 3.7.

The maximum offsite 1-hour average NO_2 GLC predicted under the expansion scenario for CSBP operations in isolation during shutdown conditions is 187 $\mu g/m^3$ (Dispmod). This concentration is 31 per cent higher than the maximum 1-hour average NO_2 GLC predicted for the baseline scenario and is below the 1-hour average NEPM for NO_2 of 246 $\mu g/m^3$, at 76 per cent of the guideline. The maximum predicted offsite 1-hour average NO_2 concentrations are predicted to occur along the western boundary of the site, as illustrated in Figure 3.8.

The maximum predicted concentrations for start-up and shutdown conditions are considered to be conservative as they have been modelled as occurring continuously, when these emissions are expected to only occur less than 1 per cent of the time.

The air dispersion modelling assessment indicates that atmospheric emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to NOx emissions.

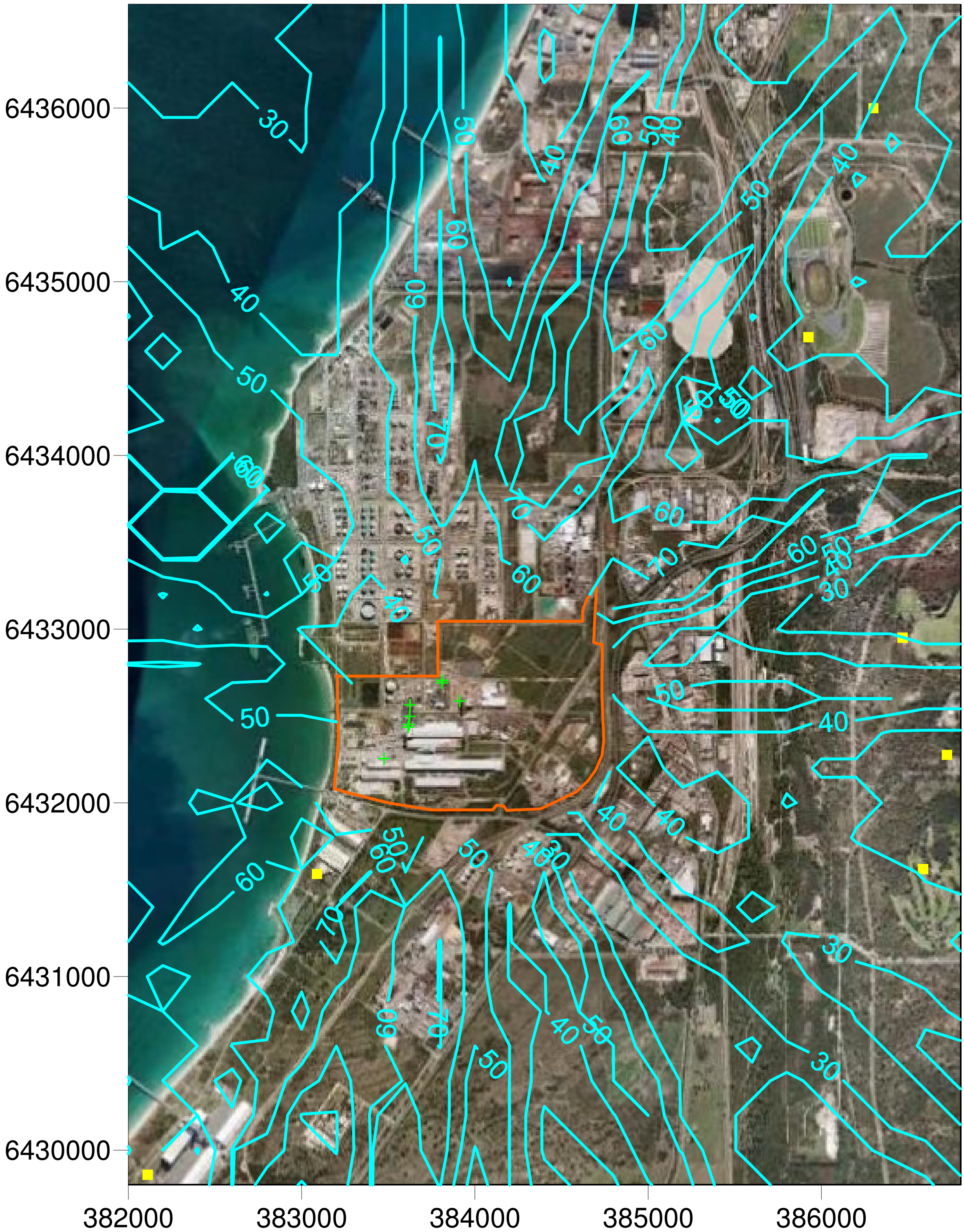


Figure 3.5 Maximum predicted 1-hour NO_2 (expansion) GLCs – normal operations (ISC3 – urban)

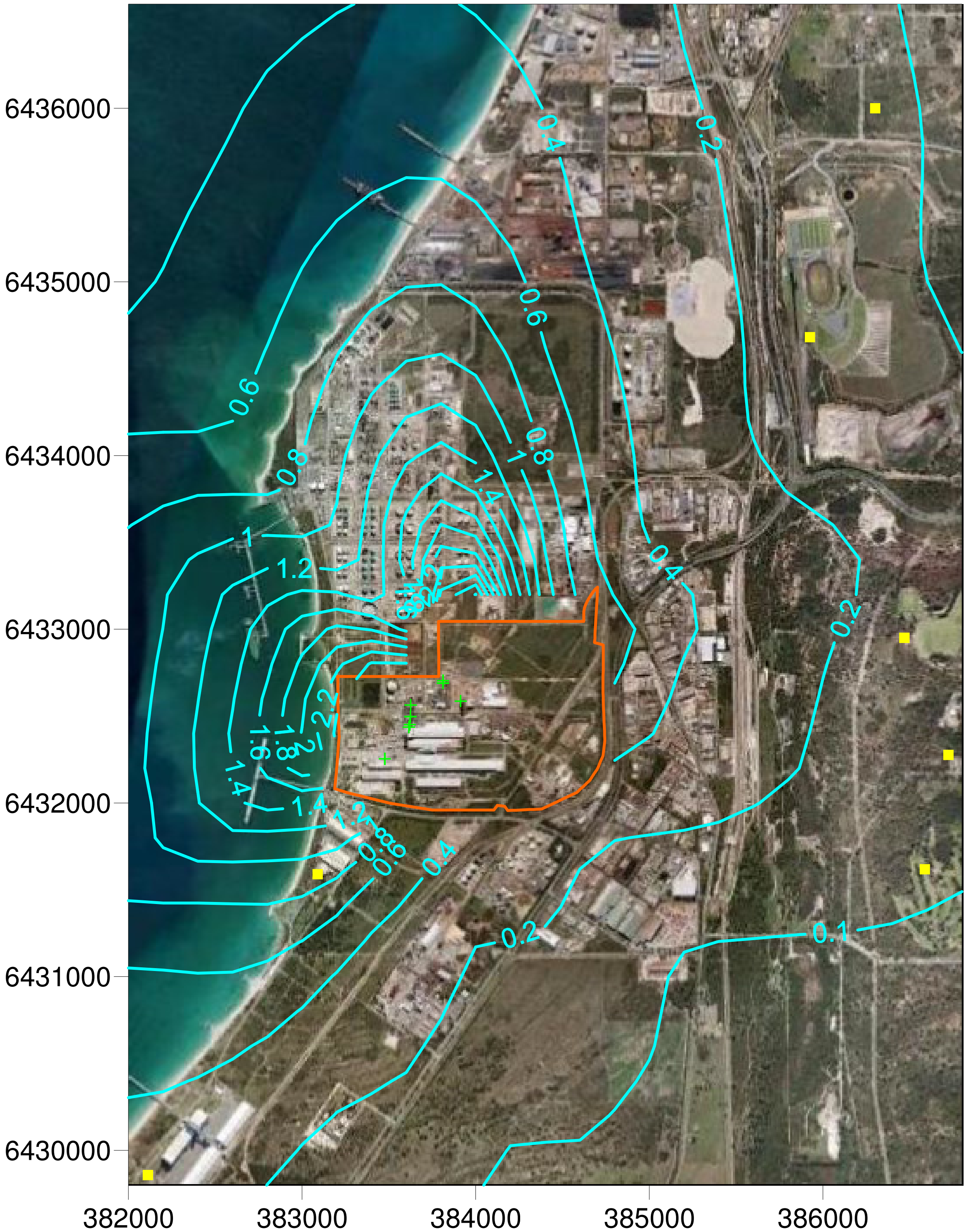


Figure 3.6 Predicted annual average NO_2 (expansion) GLCs – normal operations (ISC3 – urban)

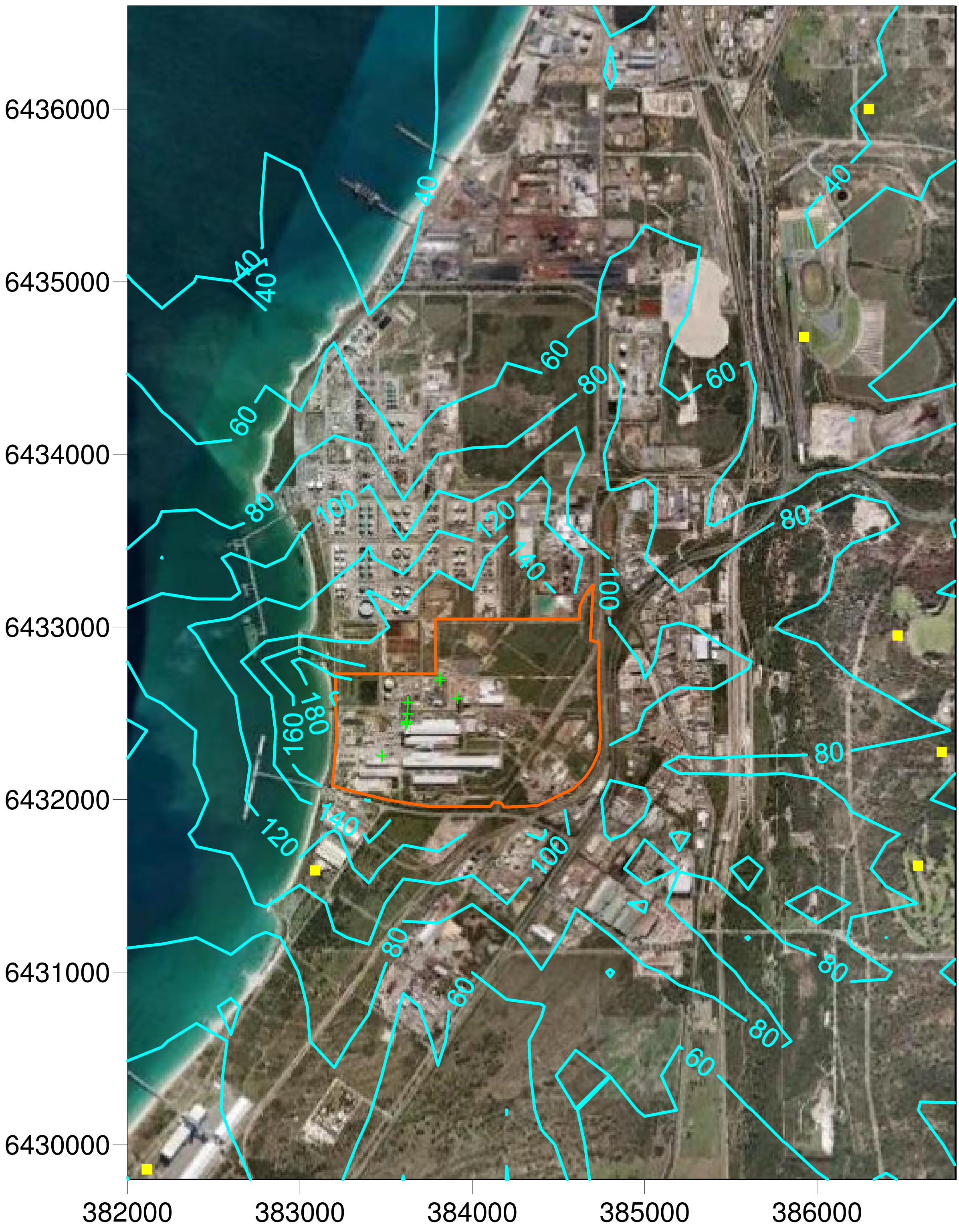


Figure 3.7 Maximum predicted 1-hour NO_2 (expansion) GLCs – start-up operations (Dispmod)

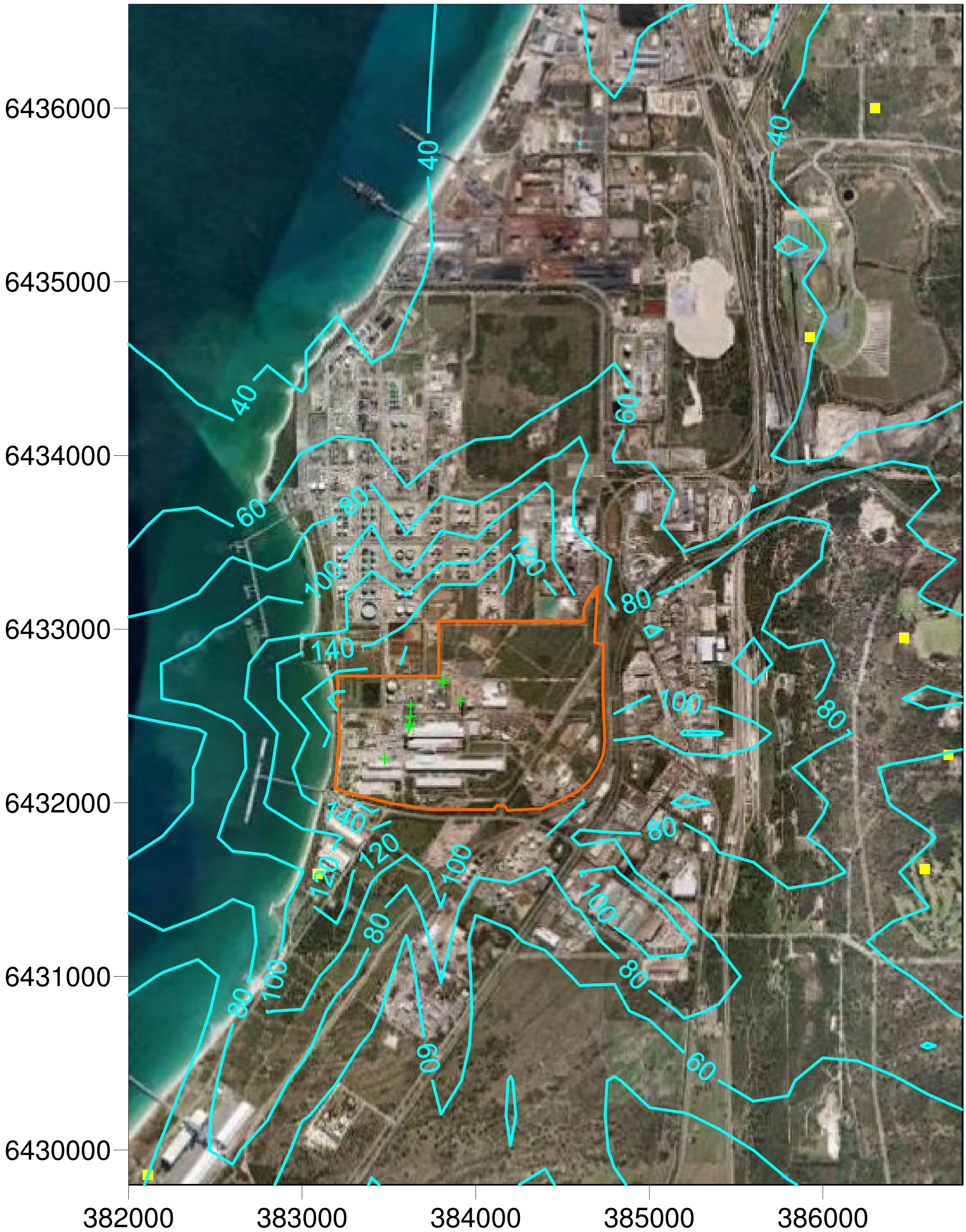


Figure 3.8 Maximum predicted 1-hour NO_2 (expansion) GLCs – shutdown operations (Dispmod)

2.5.2 Cumulative impacts

Cumulative GLCs of NO_2 on ambient concentrations resulting from the expansion were calculated by ENVIRON (2010) using ambient NO_2 GLCs monitored at Hope Valley and North Rockingham. The cumulative GLCs have been calculated by adding the maximum incremental change in predicted GLCs at each of the monitoring sites to the GLCs monitored at each site.

It should be noted that this assessment is extremely conservative for the short term (1-hour) averaging times as the maximum predicted incremental change in GLCs at each of the monitoring sites has been added to the maximum ambient concentrations recorded at the monitoring sites. This is not expected to occur in reality; the actual GLCs for NO_2 are expected to be less than stated due to the over estimation associated with this conservative calculation method.

A summary of the cumulative impacts of normal operations on ambient air quality at the available monitoring locations under the baseline and expansion emissions scenarios is presented in Table 3.6. The cumulative GLCs have been expressed as a percentage of the corresponding ambient air quality criteria. The concentrations highlighted in bold represent the greatest incremental change in GLC predicted by the alternative models applied.

Table 3.6 Summary of the cumulative maximum predicted NO_2 GLCs for the expansion emissions scenario

Averaging Period	Reference Parameter	Maximum GLC (µg/m³)[a]		
		Dispmod	ISC3	
			Rural	Urban
Hope Valley				
1-hour	Maximum Incremental Change[b]	4.1	8.8	**11.6**
	Ambient GLC[c]	173	173	173
	Cumulative GLC	177	182	**185**
	1-hour Guideline[c]	*246*	*246*	*246*
	% Guideline Ambient GLC	70%	70%	70%
	% Guideline Cumulative GLC	72%	74%	**75%**
Annual	Maximum Incremental Change[b]	0.06	**0.11**	0.05
	Ambient GLC[c]	18	18	18
	Cumulative GLC	18.1	**18.1**	18.1
	Annual Guideline[e]	*62*	*62*	*62*
	% Guideline Ambient GLC	29%	**29%**	29%
	% Guideline Cumulative GLC	29.1%	**29.2%**	29.1%
North Rockingham				
1-hour	Maximum Incremental Change[b]	4.3	9.3	**16**
	Ambient GLC[c]	113	113	113
	Cumulative GLC	117	122	**129**
	1-hour Guideline[d]	*246*	*246*	*246*
	% Guideline Ambient GLC	46%	46%	46%
	% Guideline Cumulative GLC	48%	50%	**52%**

Averaging Period	Reference Parameter	Maximum GLC (µg/m³)[a]		
		Dispmod	ISC3	
			Rural	Urban
North Rockingham				
Annual	Maximum Incremental Change[b]	0.02	0.17	**0.13**
	Ambient GLC[c]	27	27	27
	Cumulative GLC	27.0	27.1	**27.1**
	Annual Guideline[e]	*62*	*62*	*62*
	% Guideline Ambient GLC	43.5%	43.5%	**43.5%**
	% Guideline Cumulative GLC	43.6%	43.7%	**43.8%**

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. Maximum incremental change in predicted GLCs associated with the expansion project
c. Highest ambient GLC as per Table 3.2
d. 1-hour NEPM air quality criterion as per Table 3.1
e. Annual NEPM air quality criterion as per Table 3.1

From Table 3.6, the maximum 1-hour average NO_2 GLC monitored at the Hope Valley site is 173 µg/m³. Under the expansion project, the cumulative 1-hour average NO_2 GLC is predicted to increase by 8 per cent to 187 µg/m³ (ISC3 urban setting). This concentration is equal to 76 per cent of the 1-hour average NEPM for NO_2 of 246 µg/m³ and is primarily driven by the maximum 1-hour NO_2 GLC measured at Hope Valley.

The highest annual average NO_2 GLC monitored at the Hope Valley site is 18 µg/m³. Under the expansion project, the cumulative annual average NO_2 GLC is predicted to increase by less than 1 per cent to 18.1 µg/m³ (ISC3 rural setting). This concentration is equal to 29.1 per cent of the annual average NEPM for NO_2 of 62 µg/m³.

The maximum 1-hour average NO_2 GLC monitored at the North Rockingham site is 113 µg/m³. Under the expansion project, the cumulative 1-hour average NO_2 GLC is predicted to increase by 14 per cent to 129 µg/m³ (ISC3 urban setting). This concentration is equal to 52 per cent of the 1-hour average NEPM for NO_2 of 246 µg/m³ and is primarily driven by the maximum 1-hour NO_2 GLC measured at North Rockingham.

The highest annual average NO_2 GLC monitored at the North Rockingham site is 27 µg/m³. Under the expansion project, the cumulative annual average NO_2 GLC is predicted to increase by less than 1 per cent to 27.1 µg/m³ (ISC3 urban setting). This concentration is equal to 43.7 per cent of the annual average NEPM for NO_2 of 62 µg/m³.

Assessment of the incremental change in NO_2 concentrations at the air quality monitoring locations indicates short-term increases of no more than 16 µg/m³ (or 6.5 per cent of the NO_2 NEPM criterion) and long-term increases of approximately 0.1 µg/m³ (or <1 per cent of the NO_2 NEPM criterion) at North Rockingham and Hope Valley. The cumulative impacts associated with the expansion project are expected to remain well below both the 1-hour and annual NO_2 NEPM criteria at each site. Based on these results and given the use of BAT for NOx control, the expansion project is not expected to be a significant contributor to ambient NO_2 concentrations at offsite receptors.

In addition, the cumulative concentrations are driven by the maximum measured NO_2 GLCs at each site and are considered highly conservative as the cumulative assessment assumes that the monitored and predicted maximum concentrations occur at the same time, which is unlikely to occur in reality.

2.5.3 Contribution to photochemical smog production

Photochemical smog is an air pollution problem common in large cities. It is characterised by high ozone concentrations at ground level, and can be generated through the interaction of NOx and reactive organic compounds (ROC) in the environment. Potential sources of NOx and ROC include industrial processes, vehicle exhausts and bushfires.

The relationship between NOx and ozone is in equilibrium between the following reactions:

$$NO_2 + \text{light} \rightarrow NO + O$$

$$O + O_2 \rightarrow O_3 \qquad \{\text{Ozone Production}\}$$

and

$$O_3 + NO \rightarrow NO_2 + O_2 \qquad \{\text{Ozone Depletion}\}$$

From these equations, it can be seen that ozone production caused by elevated levels of NO_2 is offset by ozone depletion caused by the reaction of ozone with NO. Ozone build-up is only significant when NO is removed from the atmosphere through other mechanisms, such as reactions with ROC, because the NO is no longer available to deplete ozone.

NOx emissions from both existing nitric acid plants are comprised of a 1:1 molar ratio of NO to NO_2. This molar ratio is not expected to change due to this proposal as the technology of NOx production and NOx attenuation methods is the same for the new nitric acid plant. As a result, these emissions are only likely to be significant for photochemical smog production in the event of NO depletion, which would change the balance of NO:NO_2.

The meteorology of Perth is such that ozone formed through reactions between NOx and ROC at Kwinana in the morning tends to be blown out to sea by prevailing winds, and then blown back onto land in a north-easterly direction by the sea breeze. Therefore, the impact of ozone formed in Kwinana may be experienced elsewhere in the general Perth metropolitan region, particularly in the south-western suburbs located northeast of Kwinana.

As photochemical smog is characterised by high ozone GLCs, a review of ozone GLC monitoring data collected by the DEC at monitoring stations around the Perth metropolitan region was undertaken to assess whether emissions from the expanded ANPF would have an impact on photochemical smog levels in the Perth airshed. The reviewed data was from the *2008 Western Australia Air Monitoring Report* (DEC 2009), where highest measured levels are compared to the NEPM standard for ozone of 0.10 ppm averaged over 1 hour and 0.08 ppm averaged over 4 hours (NEPM 2003).

The results for ozone monitoring are shown in Table 3.7 and the location of the monitoring stations that monitor ozone are shown in Figure 3.9.

Table 3.7 2008 highest daily ozone at various monitoring sites (DEC 2009)

Monitoring location	Highest 1-hour ppm	Highest 4-hour ppm
Rockingham	0.077	0.072
South Lake	0.082	0.067
Swanbourne	0.076	0.070
Caversham	0.083	0.076
Quinns Rock	0.083	0.073
Rolling Green	0.087	0.075

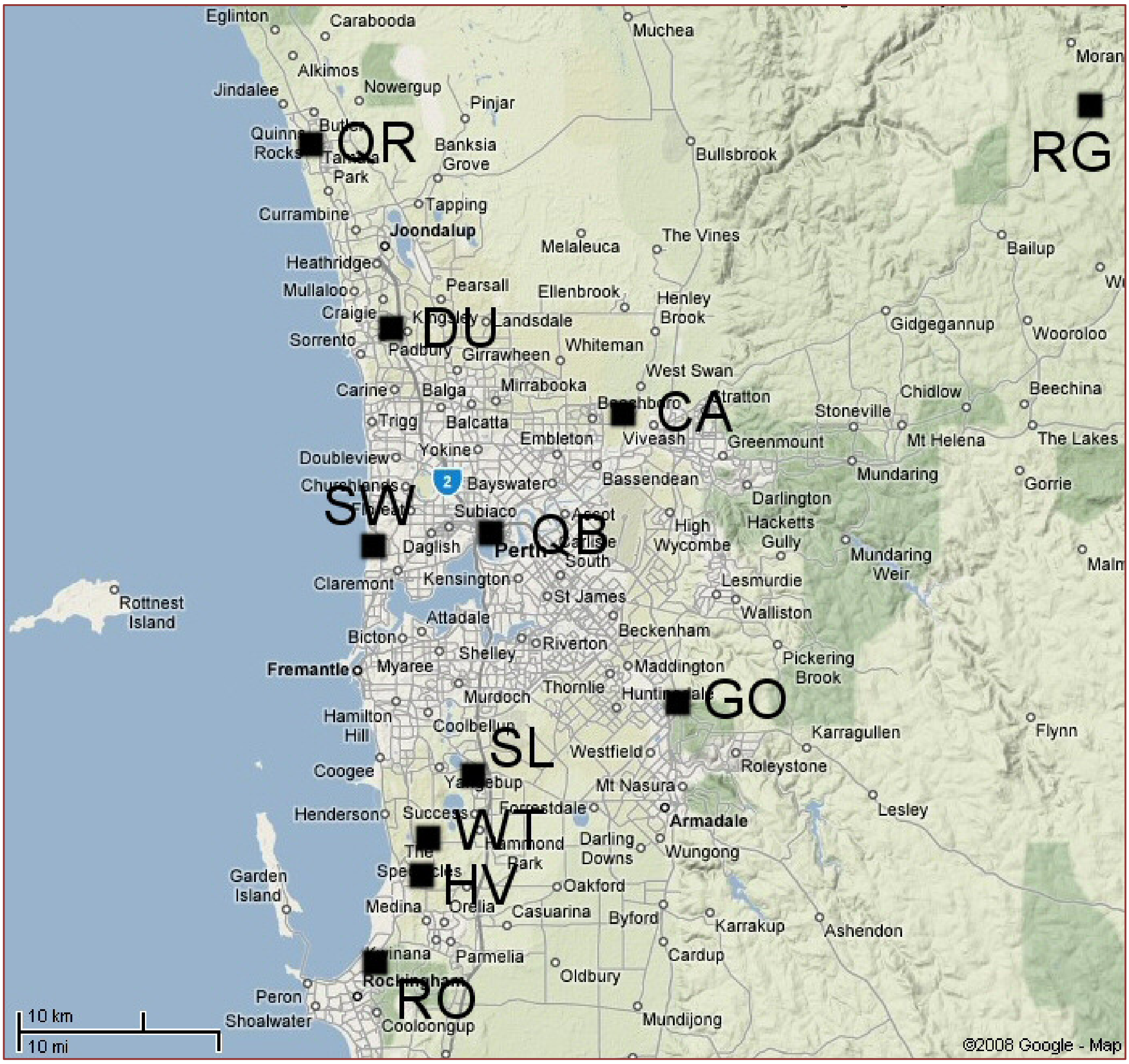
The Rockingham site is located close to the KIA, and provides information about ozone levels in the general area. The South Lake station is located inland to the north-east of the KIA, and would be expected to detect ozone initially produced at Kwinana and subsequently blown inland on the sea breeze.

Monitoring trends indicate that ozone levels at Rockingham and South Lake are generally lower than most of the other metropolitan stations (DEC 2009), which indicates that ozone production in the KIA is not a dominant driver of photochemical smog in Perth. The highest 4-hour ozone levels are recorded at the Caversham monitoring station, which is more likely to be influenced by ozone production in the Perth Central Business District (CBD). Ozone concentrations at all stations in the Perth region tend to be below health criterion levels, with exceedances observed rarely, and only for short periods.

Overall, CSBP is a relatively small emitter of NOx in the Perth airshed. NPI data for 2008/09 indicates that CSBP emitted 340 tonnes of NOx compared to the total airshed emissions of 58 090 tonnes (0.59 per cent of the total airshed emissions). In considering this, the 2008/09 NPI data indicate that within the Perth airshed, approximately 41 717 tonnes (of a total 58 090 tonnes) of NOx emissions are from diffuse (i.e. non-industrial) sources including motor vehicles (28 000 tonnes) and biogenic sources (8400 tonnes). These diffuse emission estimates are for 1999 and it is likely they emissions are now higher due to increased vehicle registration (Australian Bureau of Statistics 2009).

The proposal will apply best available techniques for controlling NOx emissions and is conservatively estimated to add approximately 150 tonnes per year of NOx to the Perth airshed (a further 0.26 per cent to the total airshed NOx emissons). Due to the complexity of photochemistry in the Perth airshed, it is difficult to reliably quantify the impact of such a small increase in the overall NOx emissions as the change in the total airshed emission is very small and would be no more than "noise" in any numerical modelling assessment.

The *Perth Photochemical Smog Study* (WP & DEP 1996) concluded that motor vehicle emissions contributed more to NOx and ROC levels in the Perth airshed than industrial emissions, and that ozone production was greatest in areas where vehicle emissions were concentrated, such as the Perth CBD. Therefore, as photochemical smog levels are greatest in areas where vehicle emissions are concentrated and the monitoring stations closest to the KIA show a lower level of ozone compared to stations closer to the Perth CBD, the relative contribution to the generation of photochemical smog from the current and proposed expansion at the CSBP site will be minimal.



CA Caversham*	HV Hope Valley	RO Rockingham*	SW Swanbourne*
DU Duncraig	QB Queen's Buildings	RG Rolling Green*	WT Wattleup
GO Gosnells	QR Quinns Rock*	SL South Lake*	

*denotes a monitoring station that also monitors O_3

Figure 3.9 DEC air quality monitoring stations (for ozone) operating in the Perth metropolitan region during 2008 (DEC 2009)

The *Perth Photochemical Smog Study* also found that the emissions from the KIA "resulted in a significant quenching of ozone across those portions of the metropolitan area impacted by the Kwinana NOx plume" (WP & DEP 1996). This quenching (or reduction) was due to the presence of NO and a low ROC:NOx ratio within the KIA emissions. Therefore, considering the proposal will result in a small increase in the airshed's NOx emissions, it may result in further slight quenching of ozone in the airshed. The proposal may result in a small reduction in the ROC:NOx ratio which may also contribute to a small reduction in the ozone formation potential.

2.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will continue to manage emissions in accordance with EP Act Licence L6107/1967, and the Environmental Management System for the site.

The proposed nitric acid plant will include BAT for controlling NOx emissions to levels comparable to the existing CSBP nitric acid plants. This will include the installation of a selective catalytic reactor and monitoring control as per the existing plants.

CSBP considers that this factor can be managed through conditions applying to works approvals and licences under Part V of the EP Act.

2.7 ENVIRONMENTAL OUTCOME

In view of the following, it is expected that the environmental objective for this factor will be met:

- results of the air dispersion modelling assessment indicate that atmospheric emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to NOx emissions
- the cumulative impact of the expansion may result in an increase in the short-term ambient NO_2 GLCs at the Hope Valley and North Rockingham monitoring stations, while long-term ambient NO_2 GLCs at these sites are expected to increase marginally
- it is unlikely that emissions from the current and proposed operations at the CSBP site will add to photochemical smog production as photochemical smog levels are greatest in areas where vehicle emissions are concentrated and the monitoring stations closest to the KIA show a lower level of ozone compared to stations closer to the Perth CBD.

3 AIR QUALITY – PARTICULATES

3.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for air quality (particulates) is:

- to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).

3.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

Standards and goals for ambient air quality are given in the NEPM for PM_{10} Ambient Air Quality (NEPC 2003) and are presented in Table 3.8. The NEPM also sets advisory reporting standards for $PM_{2.5}$, with a goal to gather sufficient data to facilitate a review of Standards as part of the review of the ambient air quality NEPM that is currently being undertaken. Table 3.8 also outlines the $PM_{2.5}$ advisory reporting standards.

Table 3.8 Ambient air quality criteria – PM

Compound	Averaging Period	Concentration (µg/m^3)	Goal	Source
PM_{10}	24-hour	50	Not to be exceeded more than 5 days per year	NEPC NEPM
$PM_{2.5}$	24-hour	25	Goal is to gather sufficient data nationally to facilitate a review of the Advisory Reporting Standards	NEPC NEPM
	Annual	8		NEPC NEPM

3.3 DESCRIPTION OF FACTOR

Airborne particles, known as PM, are a broad classification of material that consists of solid particles and fine liquid droplets. A wide range of human and natural sources produces PM. Human sources include combustion processes in motor vehicles, power generating plants and solid fuel domestic heating. Natural sources include ocean spray, wind-driven soil dust and smoke from bush fires.

Total Suspended Particulates (TSPs) are particles of an equivalent aerodynamic diameter of less than 50 µm. TSPs are generally associated with aesthetic effects rather than health effects, as TSPs tend to settle or deposit on surfaces.

Inhalable PM is grouped into the following two size categories:

- PM_{10} particles, with an effective aerodynamic diameter of up to 10 µm associated primarily with industrial and mining activities
- $PM_{2.5}$ particles, with an effective aerodynamic diameter of up to 2.5 µm associated primarily with fuel burning activities.

Inhalable PM is associated with increases in respiratory illness such as asthma, bronchitis and emphysema. As such, investigating the amount of inhalable PM present at sensitive receptor locations is used to measure potential PM impacts.

The nearest sensitive residential premises are located approximately three kilometres to the east of the site in Medina and Calista, and the nearest sensitive marine environment is Cockburn Sound, which is immediately adjacent to the CSBP industrial complex western boundary.

3.3.1 Existing emissions of PM

Ammonium Nitrate Production Facility PM licence conditions

CSBP Kwinana Industrial Complex air emissions are managed in accordance with conditions contained in EP Act Licence L6107/1967 issued by the DEC.

EP Act Licence L6107/1967 prescribes particulate emissions for the hourly emission for TSP emissions from the 2008 prilling plant to a maximum of 0.05 g/m^3. No criteria for $PM_{2.5}$ or PM_{10} are described in the licence.

PM emission sources

Hot ammonium nitrate solution is pumped to the top of the prilling tower and sprayed at a temperature of between 140°C and 150°C into the void inside the tower, where it falls under gravity against a fan forced air stream. The liquid cools and solidifies as it falls, and creates the small round prill. The prill are then dried in the pre-dryer(s) and dryer, cooled, screened and coated. Waste air is directed to the atmosphere via the prilling plant stack.

PM abatement technology

The prilling air from the 2008 prilling plant is scrubbed in the prilling air scrubber to remove any entrained fine particulates. Ammonium nitrate particulates are entrained by the slightly acidified and pH-controlled dilute ammonium nitrate solution. After scrubbing, the prilling air is recycled to the bottom of the prilling tower by the prilling air scrubber fans.

Waste air from the pre-dryer, dryer, and screen and transfer points dust recovery is sent to the final scrubber (a two stage packed tower scrubber) to be washed to remove ammonium nitrate particulates. Bleed air from the prilling tower air circulation system is also passed to the final scrubber. Failure of scrubbing liquor circulation results in plant shutdown.

After treatment, waste air is discharged to the atmosphere via the final scrubber fan to the prilling plant stack, located on top of the prilling tower. Water effluent from the scrubber is recycled through the plant to recover ammonium nitrate.

Ambient air quality - PM

The 2008 Western Australia Air Monitoring Report (DEC 2009) contains ambient air concentrations of PM throughout the Perth metropolitan region. The South Lake station is the closest site to Kwinana; however, the site is between 15 and 20 km from the CSBP site and would not be representative of the PM concentrations in the model domain (ENVIRON 2010). Therefore, no PM background data were used in the analysis.

3.3.2 Modelling of baseline and expansion PM emissions

Point sources of PM from activities managed under EP Act Licence L6107/1967 have been considered in the baseline and expansion PM emission scenarios. These sources include the 2008 prilling plant which forms part of the ANPF, and superphosphate manufacturing plant and granulation plant emission sources which are not part of the ANPF and therefore will not change as a result of this proposal.

In the absence of particle sizing information, all reported PM emissions have been assumed to be $PM_{2.5}$. This is a conservative assumption as the standards for $PM_{2.5}$ are more restricted compared to PM_{10} standards and, in reality, PM emissions will be primarily a blend of $PM_{2.5}$ and PM_{10}, not $PM_{2.5}$ alone. By representing all PM as $PM_{2.5}$ a conservative worst case scenario for the emissions of PM is achieved.

Compliance of the maximum 24-hour average PM (as $PM_{2.5}$) GLCs with the respective NEPM advisory reporting standard would indicate compliance with the higher 24-hour average PM_{10} standard.

The modelling methodology for emission scenarios has been described in Section 2.3.1. The following table (Table 3.9) presents a summary of the maximum predicted GLCs for PM (as $PM_{2.5}$) emissions.

Table 3.9 Summary of maximum predicted (baseline) GLCs – PM (as $PM_{2.5}$)

Compound	Averaging Period	Maximum Predicted Offsite GLCs (µg/m³)[a]		
		Dispmod	ISC3	
			Rural Setting	Urban Setting
$PM_{2.5}$	24-hour	3.8	**13.5**	13
	24-hour Guideline[b]	*25*	*25*	*25*
	% 24-hour Guideline	15%	**54%**	52%
	Annual	0.5	**2.1**	2.1
	Annual Guideline[c]	*8*	*8*	*8*
	% Annual Guideline	6.5%	**27%**	26%

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. 24-hour NEPM air quality criterion as per Table 3.8
c. Annual NEPM air quality criterion as per Table 3.8

The maximum offsite 24-hour average PM (as $PM_{2.5}$) GLC as predicted by ISC3 (rural setting) is 13.5 µg/m³. This concentration complies with the 24-hour average NEPM advisory reporting standard for $PM_{2.5}$ of 25 µg/m³. Contours of the maximum predicted 24-hour average PM (as $PM_{2.5}$) GLCs, as illustrated in Figure 3.10, indicate that peak offsite impacts are likely to occur to the west of the site boundary.

The maximum offsite annual average PM (as $PM_{2.5}$) GLC as predicted by ISC3 (rural setting) is 2.1 µg/m³. This concentration complies with the annual average NEPM advisory reporting standard for $PM_{2.5}$ of 8 µg/m³. Contours of the maximum predicted annual average PM (as $PM_{2.5}$) GLCs, as illustrated in Figure 3.11, indicate that peak offsite impacts are likely to occur to the west of the site boundary.

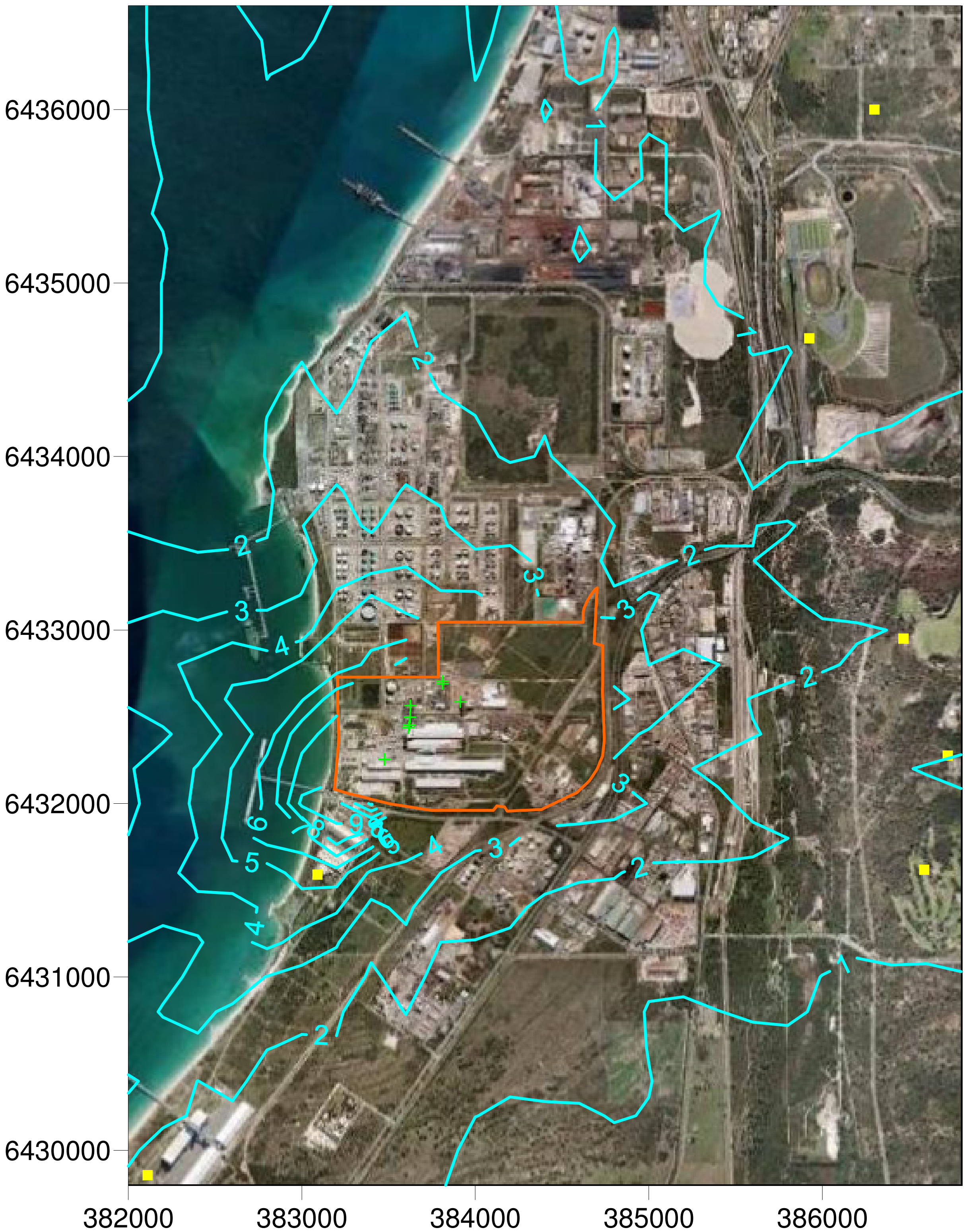


Figure 3.10 Maximum predicted 24-hour PM (as $PM_{2.5}$) (baseline) GLCs (ISC3 – rural)

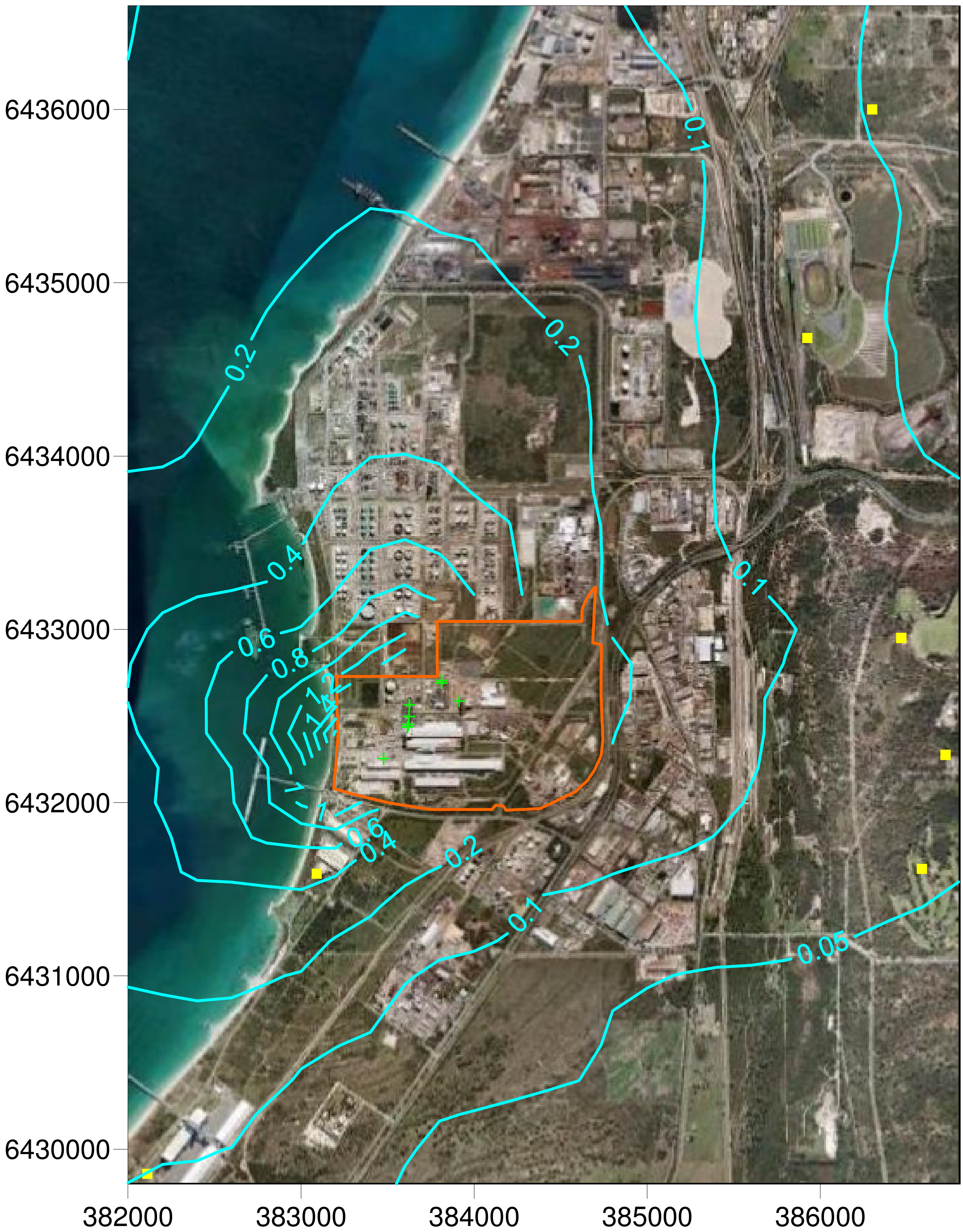


Figure 3.11 Maximum predicted annual PM (as $PM_{2.5}$) (baseline) GLCs (ISC3 – rural)

3.4 POTENTIAL SOURCES OF IMPACT

The 2008 prilling plant will be debottlenecked as part of the expansion project in order to increase capacity and improve efficiency. This process is expected to result in an increase in the volumetric flow rate of emissions from the 2008 prilling plant stack by up to 25 per cent.

Emissions data used for the assessment are provided in Table 3.10. Full details are in Appendix 4.

Table 3.10 2008 prilling plant stack parameters and emissions data

	2008 Prilling Plant
Stack Exit Height (m)	65
Stack Exit Diameter (m)	1.7
Stack Exit Temperature (K)	303
Volumetric Flow Rate (m^3/s)	48.1
Stack Exit Velocity (m/s)	20.7
TSP Emission Rate (g/s)	0.33
$PM_{2.5}$ Emission Rate (g/s)	0.33
$PM_{2.5}$ Emission Concentration (mg/Nm^3)	7.61
$PM_{2.5}$ Emission Concentration (ppmv)	NA[a]

a. ppmv is calculated using molecular weight of a component. As a consequence; ppmv for PM cannot be accurately calculated as PM is comprised of a number of molecules and the overall molecular weight can vary greatly between particles

3.5 ASSESSMENT OF POTENTIAL IMPACT

The following sections describe the predicted direct impacts (from the expanded ANPF) and the potential for particulates to add to the nitrogen loading (production on algae) in Cockburn Sound.

3.5.1 Direct impacts

The maximum offsite PM (as $PM_{2.5}$) concentrations predicted by ENVIRON (2010) for both the Dispmod and ISC3 dispersion models for the expansion emissions scenarios (baseline emissions and the proposed expanded ANPF emissions), under normal operating conditions, is presented in Table 3.11. The predicted concentrations have been compared to the relevant ambient air quality advisory reporting standard and are expressed as percentages of the advisory reporting standard value. The concentrations highlighted in bold represent the highest offsite GLC predicted by the alternative models.

Table 3.11 Summary of maximum predicted (expansion) GLCs - PM (as $PM_{2.5}$)

Compound	Averaging Period	Maximum Predicted Offsite GLCs ($\mu g/m^3$)[a]		
		Dispmod	ISC3	
			Rural Setting	Urban Setting
$PM_{2.5}$	24-hour	3.8	**13.5**	13
	24-hour Guideline[b]	*25*	*25*	*25*
	% 24-hour Guideline	15%	**54%**	52%
	Annual	0.5	**2.1**	2.1
	Annual Guideline[c]	*8*	*8*	*8*
	% Annual Guideline	6.5%	**27%**	26%

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. 24-hour NEPM air quality criterion as per Table 3.8
c. Annual NEPM air quality criterion as per Table 3.8

The maximum offsite 24-hour average PM (as $PM_{2.5}$) GLC predicted for both the baseline (Table 3.9) and expansion emissions scenario for CSBP operations in isolation is 13.5 $\mu g/m^3$ (ISC3 rural setting). This concentration complies with the 24-hour average NEPM advisory standard for $PM_{2.5}$ of 25 $\mu g/m^3$. As all of the PM emissions were assumed to be $PM_{2.5}$, compliance with the $PM_{2.5}$ advisory reporting standard also demonstrates compliance with the 24-hour average PM_{10} NEPM standard of 50 $\mu g/m^3$.

The maximum offsite annual average PM (as $PM_{2.5}$) GLC predicted for both the baseline (Table 3.9) and expansion emissions scenario for CSBP operations in isolation is 2.1 $\mu g/m^3$ (ISC3 rural setting). This concentration complies with the annual average NEPM advisory standard for $PM_{2.5}$ of 8 $\mu g/m^3$.

Contours of the maximum predicted 24-hour average and annual average PM (as $PM_{2.5}$) GLCs predicted for the expansion emission scenarios are presented in Figure 3.12 and Figure 3.13, respectively, and indicate that peak offsite impacts of are likely to occur to the west of the site boundary. At the nearest residential receptors, 24-hour PM (as $PM_{2.5}$) GLCs are less than 8 per cent of the NEPM advisory standard for each scenario (Figure 3.12).

Analysis of the predicted PM (as $PM_{2.5}$) GLCs indicates that emissions from the 2008 prilling plant contribute less than 6 per cent to the maximum predicted 24-hour and annual average PM (as $PM_{2.5}$) GLCs. As such, the increase in PM (as $PM_{2.5}$) emissions from this source under the expansion project are not expected to impact on maximum predicted offsite PM (as $PM_{2.5}$) GLCs.

The results of the air dispersion modelling assessment indicate that atmospheric emissions associated with the expansion project are unlikely to result in unacceptable air quality impacts with respect to PM (as $PM_{2.5}$) emissions.

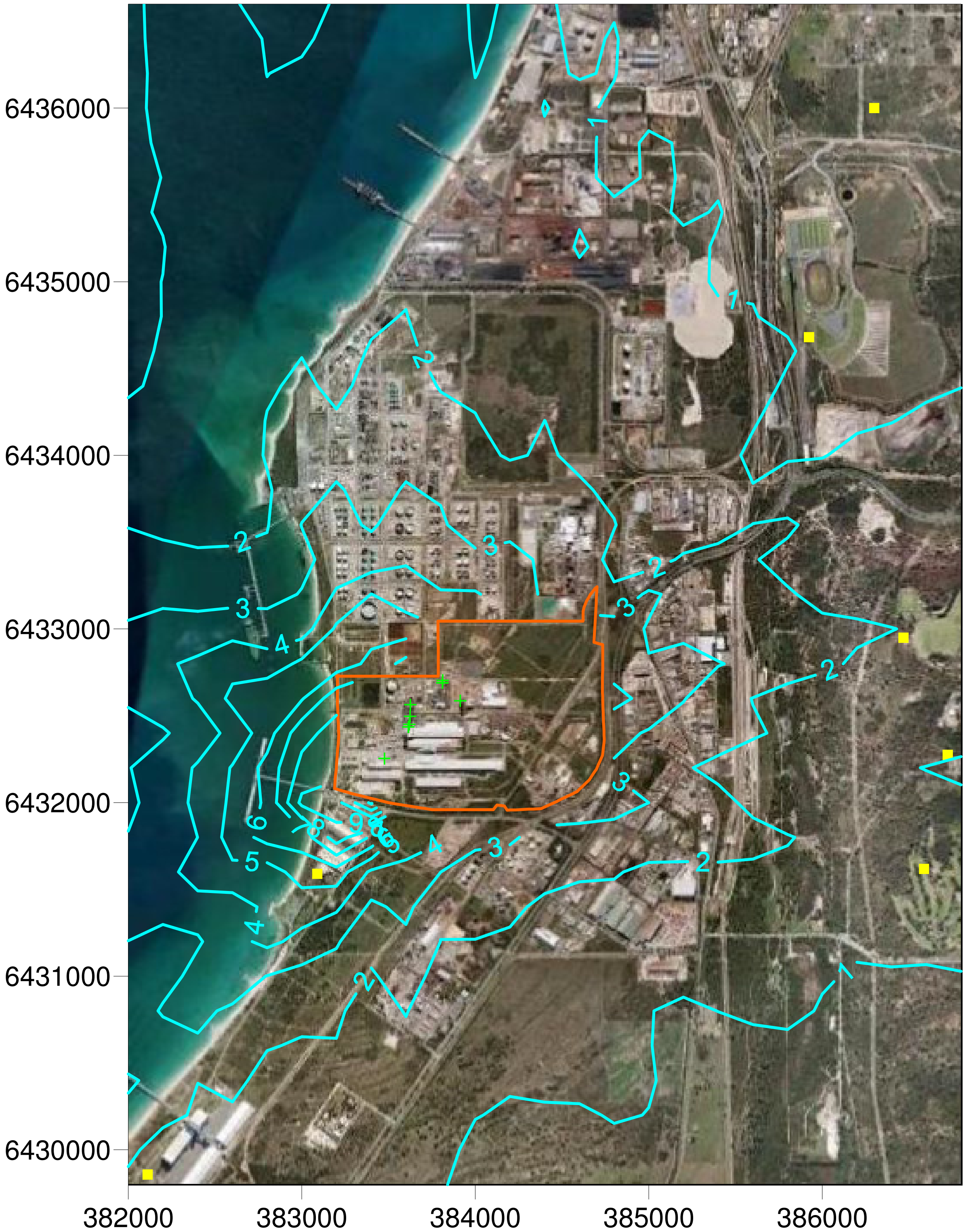


Figure 3.12 Maximum predicted 24-hour PM (as $PM_{2.5}$) (expansion) GLCs (ISC3 – rural)

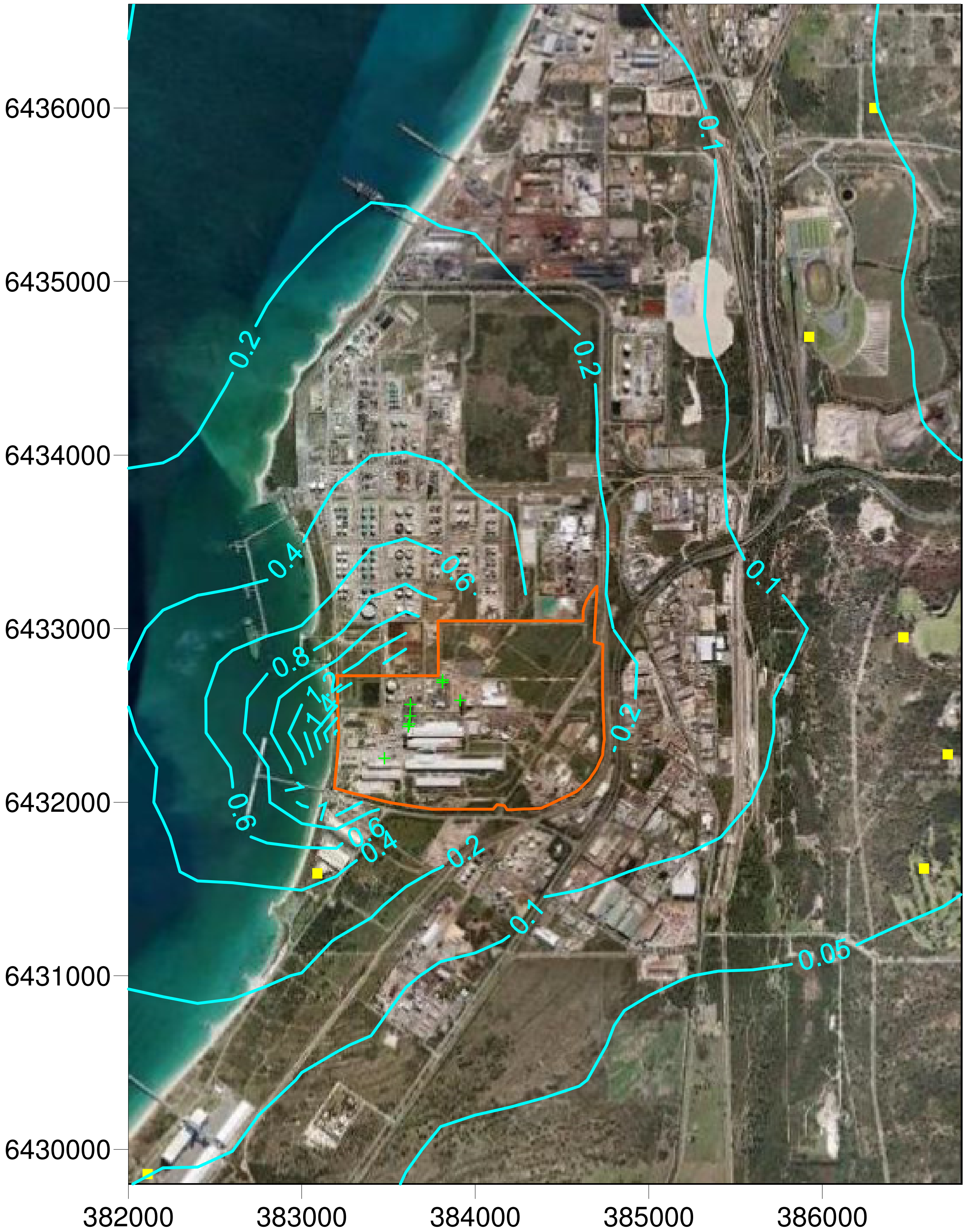


Figure 3.13 Maximum predicted annual PM (as $PM_{2.5}$) (expansion) GLCs (ISC3 – rural)

3.5.2 Ammonium nitrate deposition over Cockburn Sound

Particulate emissions from the 2008 prilling plant are largely composed of ammonium nitrate particles. The PER of the previous expansion project (CSBP 2005) investigated ammonium nitrate particle deposition over Cockburn Sound as a contributing factor to the total load of nitrogen entering the Sound. The assessment showed that the nutrient addition from particulate ammonium nitrate was not significant when compared to the total nitrogen load entering Cockburn Sound.

Since the 2005 PER was conducted (CSBP 2005), the estimated particulate emission load from the 2008 prilling plant has been revised from 2.8 g/s (derived originally from equipment design specifications) to 0.26 g/s (derived from stack testing results during actual plant operations). The particulate emission load from the 2008 prilling plant is expected to increase by a maximum of 25 per cent to 0.33 g/s as a result of the increased volumetric flow rate of emissions arising from the debottlenecking activities proposed.

The particulate load from the 2008 prilling plant for the proposed expansion is estimated to be an order of magnitude lower than estimated for the previous assessment of ammonium nitrate deposition over Cockburn Sound. As such, based on the findings from the previous assessment, emissions from the debottlenecked 2008 prilling plant are expected to remain a relatively minor contributor to the total load of nitrogen entering Cockburn Sound.

3.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will continue to monitor and manage particulate emissions from the 2008 prilling plant stack and report the results through the relevant licensing system.

CSBP considers that this factor can be managed under Part V of the EP Act, as has occurred at the ANPF to date.

3.7 ENVIRONMENTAL OUTCOME

As the air dispersion modelling assessment indicates that PM emissions are not likely to result in unacceptable air quality impacts and particulate load is estimated to be a relatively minor contributor to the total load of nitrogen entering Cockburn Sound, it is expected that the environmental objective will be met.

4 AIR QUALITY – AMMONIA

4.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for air quality (ammonia) is:

- to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).

4.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

Ammonia is not covered by the NEPM or any other national Australian based ambient air quality standards. The Victorian State Environmental Protection Policy (Vic SEPP) has established 3-minute average Design Criteria for a number of pollutants, including ammonia (Victoria EPA 2001). The Design Criteria have been derived from the National Occupational Health and Safety Commission (NOHSC) exposure standards for atmospheric contaminants in the occupational environment and are designed to protect against adverse health effects.

The United Kingdom Environmental Agency (UKEA) has also defined Environmental Assessment Levels (EALs) for ammonia derived from the UK Health and Safety Executive (UKHSE) Occupational Exposure Limits (UKEA 2009). These criteria were referenced by the DEC in their assessment of monitored ammonia concentrations collected as part of the Background Air Toxics Study (DEC 2010a) and have also been applied for the purposes of this assessment.

In the absence of a NEPM standard for ammonia, both the Vic SEPP and UKEA EALs have been applied. The Vic SEPP 3-minute average Design Criteria has been converted to a 1-hour average concentration using the power law for timescale conversion, based on the approach recommended by Hanna *et al*. (1977).

These criteria are presented in Table 3.12.

Table 3.12 Ambient air quality criteria – ammonia

Compound	Averaging Period	Concentration (µg/m^3)	Goal	Source
Ammonia	1-hour	330[a]	NA	Vic SEPP
	1-hour	2500[b]	NA	UKEA
	Annual	180[c]	NA	UKEA

a. Derived from 3-minute design criterion of 600 µg/m^3 and, using the conventional 0.2 power law for timescale conversion, converted to 1-hour average based on the approach recommended by Hanna *et al*. (1977)
b. Derived from 15-minute average Occupational Exposure Level and converted to 1-hour average
c. Derived from 8-hour average Occupational Exposure Level and converted to annual mean

4.3 DESCRIPTION OF FACTOR

Ammonia is a colourless gas which occurs both naturally and by human activity. It is an important source of nitrogen which is required by plants and animals. Ammonia is an extremely important bulk chemical widely used in fertilizers, plastics, and explosives and is used in many household and industrial cleaners, window-cleaning products and smelling salts. It has a very sharp, pungent odour which can cause lung damage or death in high doses and be mildly irritating in low doses.

The nearest sensitive residential premises are located approximately three kilometres to the east of the site in Medina and Calista. The nearest Public Open Space is at Wells Park, to the south of the CSBP site with industry being considered as being the dominant contributor to ammonia at this location.

4.3.1 Existing emissions of ammonia

Ammonia- emission sources

Ammonium nitrate, a strengthening agent and nitric acid are mixed to ensure homogeneity in a melt tank, to which ammonia is added to adjust the pH, before the combined solution is sent to the prilling tower.

Hot ammonium nitrate solution is pumped to the top of the prilling tower and sprayed at a temperature of between 140ºC and 150ºC into the void inside the tower, where it falls under gravity against a fan forced air stream. The liquid cools and solidifies as it falls, and creates the small round prill. The prill are then dried in the pre-dryer(s) and dryer, cooled, screened and coated. Waste air is directed to the atmosphere via the prilling plant stack.

Ammonia is also emitted from the treated tail gas from the nitric acid plants as a result of slippage of ammonia through the SCR; however, this tail gas contains small concentrations of ammonia (typically less than 1 ppm). As ammonia slippage is only associated with the operation of the SCR, ammonia emissions from the nitric acid plants are not expected during start-up or shut down conditions, when the SCR is offline.

Ammonia- abatement technology

The prilling air from the 2008 prilling plant is scrubbed in the prilling air scrubber to remove any vaporised ammonia. Ammonia is entrained by a slightly acidified and pH-controlled dilute ammonium nitrate solution. After scrubbing, the prilling air is recycled to the bottom of the prilling tower by prilling air scrubber fans.

Waste air from the pre-dryer, dryer, and screen and transfer points dust recovery is sent to the final scrubber (a two stage packed tower scrubber) to be washed to remove ammonia. Bleed air from the prilling tower air circulation system is also passed to the final scrubber. The pH of the scrubbing liquor is controlled automatically to ensure efficient removal of ammonia. Failure of scrubbing liquor circulation results in a plant shut down.

After treatment, the waste air is discharged to the atmosphere via the final scrubber fan to the prilling plant stack, located on top of the prilling tower. The water effluent from the scrubber is recycled through the plant to recover any ammonium nitrate.

The 2008 prilling plant will be debottlenecked as part of the expansion project in order to increase capacity and improve efficiency. This process is expected to result in an increase in the volumetric flow rate of emissions from the 2008 prilling plant stack by up to 25 per cent. The scrubbing system has sufficient capacity to accommodate the increased volume and therefore the concentration of ammonia emissions in the exhaust gas stream will remain unchanged.

Performance of the SCR catalyst in the nitric acid plants is monitored to determine if ammonia slippage is occurring, with plant adjustments to ensure this is minimised, as the plant technology provider recommends maintaining the SCR to 5 ppm ammonia or less. With debottlenecking as part of the expansion project, the concentration of NOx, and therefore ammonia, from the SCR in the exhaust gas stream will remain unchanged.

Ambient air quality – ammonia

The DEC conducted the *Background Air Quality (Air Toxics) Study* (DEC 2010a) that involved monitoring of ambient concentrations of various air toxics in the Perth metropolitan area (including Kwinana). The results of the study are posted on the DEC website[2].

Passive samplers were used to collect six day samples of ammonia at Wells Park between May 2005 and July 2006. The average concentration of ammonia collected over the duration of the study was found to be approximately 17 $\mu g/m^3$, and is considered to be the best information available to determine the annual average background ammonia concentration in the area (ENVIRON 2010).

Due to the limitations of the passive samplers used to measure ammonia concentrations in the Background Air Quality (Air Toxics) Study, shorter term average ammonia background concentrations were not available for analysis within the study undertaken by ENVIRON (2010).

4.3.2 Modelling of baseline and expansion ammonia emissions

Point sources of ammonia from activities managed under EP Act Licence L6107/1967 have been considered in the baseline and expansion ammonia emission scenarios. These sources include the 2008 prilling plant and nitric acid plants which form part of the ANPF, and granulation plant emission sources which are not part of the ANPF and therefore will not change as a result of this proposal.

The modelling methodology for emission scenarios has been described in Section 2.3.1. Table 3.13 presents a summary of the maximum predicted GLCs for ammonia emissions.

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[2] http://portal.environment.wa.gov.au/portal/page?_pageid=54,5286561&_dad=portal&_schema=PORTAL

Table 3.13 Summary of maximum predicted (baseline) GLCs – ammonia

Compound	**Averaging Period**	**Maximum Predicted Offsite GLCs (µg/m³)[a]**		
		Dispmod	ISC3	
			Rural Setting	Urban Setting
Ammonia	1-hour	11	**25**	24
	1-hour Guideline[b]	*330*	*330*	*330*
	% 1-hour Guideline	3.3%	**7.6%**	7.3%
	Annual	0.3	1.0	**1.1**
	Annual Guideline[c]	*180*	*180*	*180*
	% Annual Guideline	0.1%	0.5%	**0.6%**

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. Vic SEPP 1-hour air quality criterion as per Table 3.12
c. Annual air quality criterion as per Table 3.12

The maximum predicted (offsite) 1-hour average ammonia GLC as predicted by ISC3 (rural setting) is 25 µg/m^3 and comfortably complies with the Vic SEPP criterion of 330 µg/m^3. The maximum predicted (offsite) annual average ammonia GLC, as predicted by ISC3 (urban setting), is 1.1 µg/m^3 and comfortably complies with the corresponding UKEA EAL criterion of 180 µg/m^3.

Contours of the maximum predicted 1-hour average and annual average ammonia GLCs as presented in Figure 3.14 and Figure 3.15, respectively, indicate that the peak offsite impacts are likely to occur immediately to the west of the CSBP site boundary.

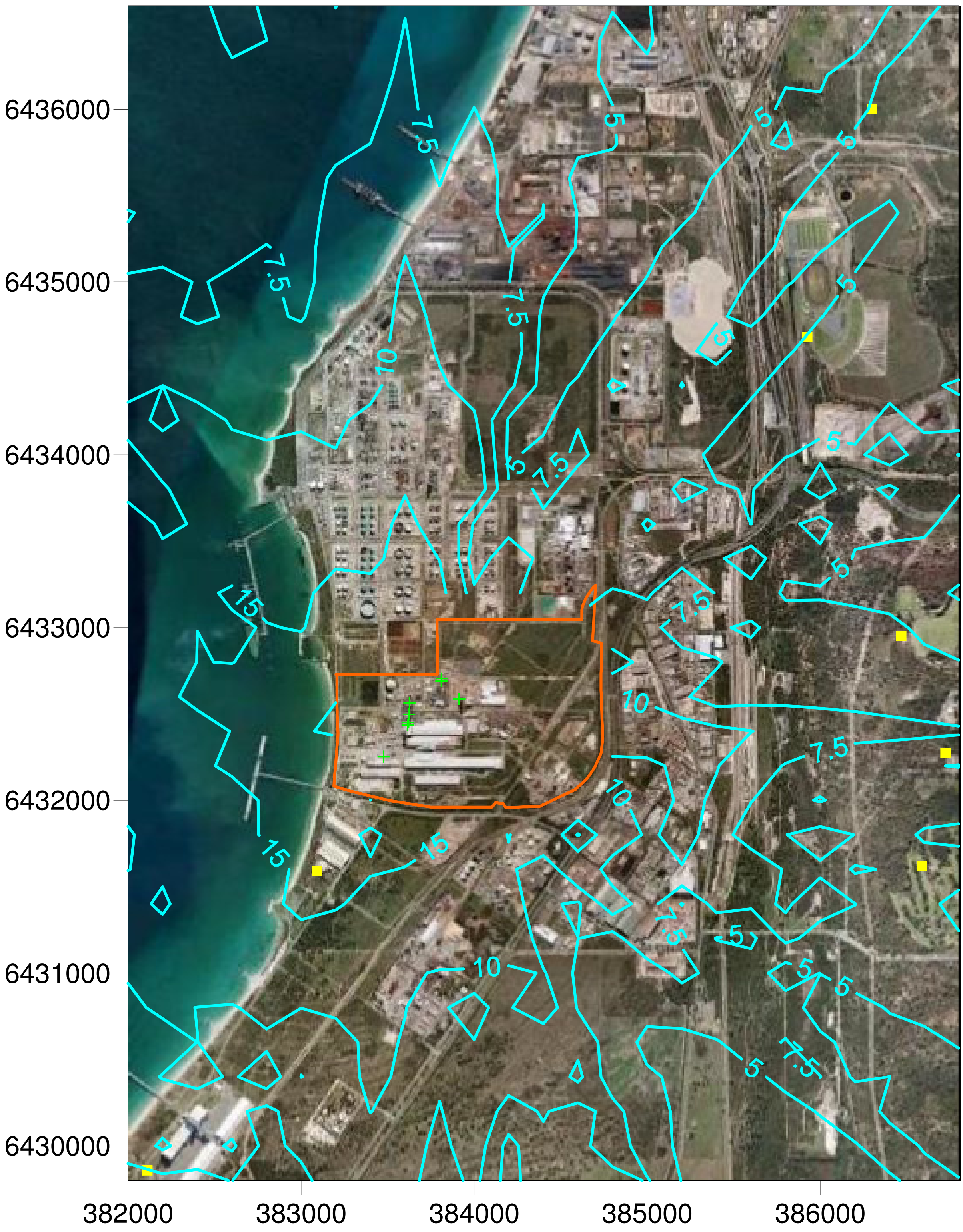

Figure 3.14 Maximum predicted 1-hour ammonia (baseline) GLCs (ISC3 – rural)

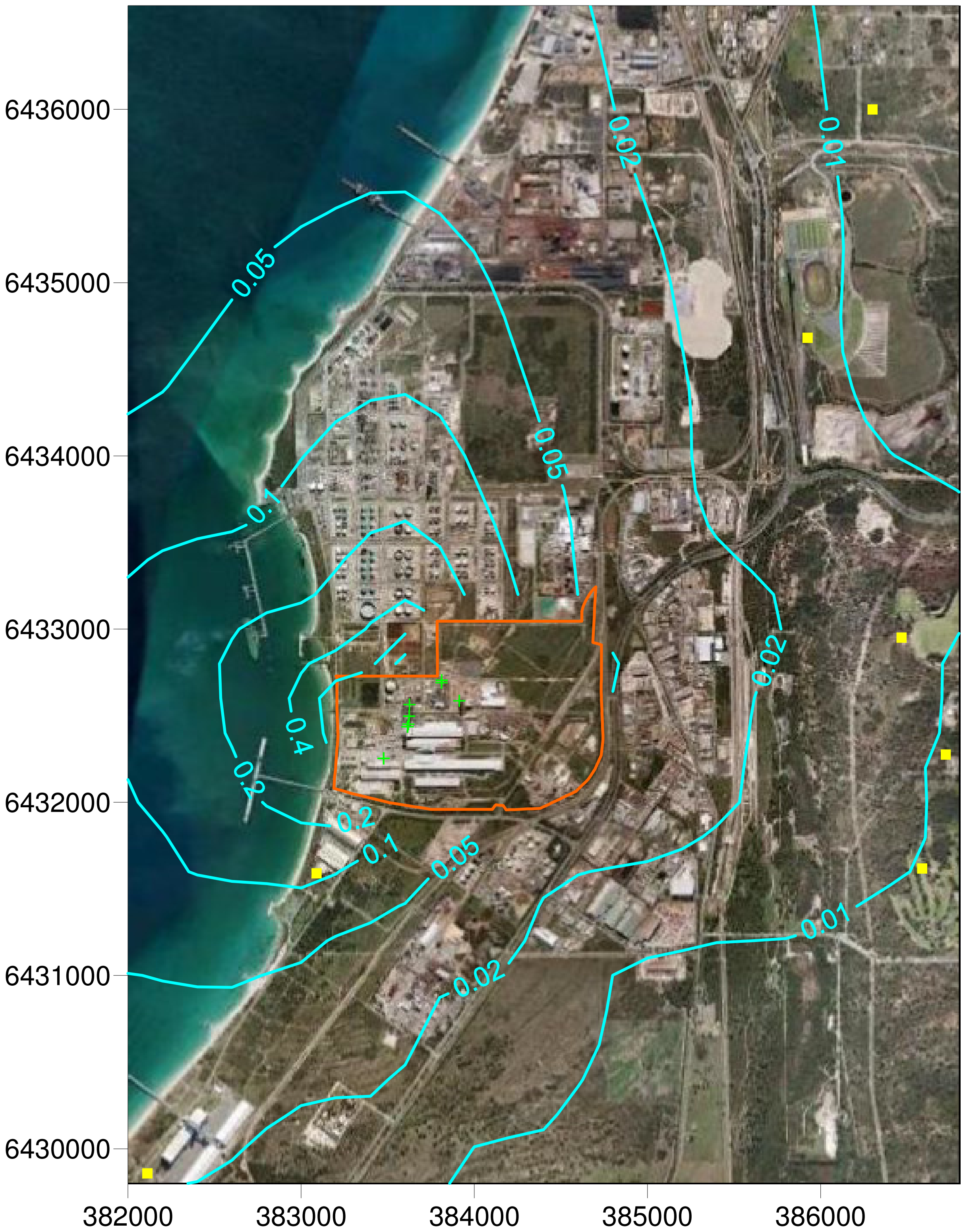

Figure 3.15 Maximum predicted annual ammonia (baseline) GLCs (ISC3 – urban)

4.4 POTENTIAL SOURCES OF IMPACT

The 2008 prilling plant will be debottlenecked as part of the expansion project in order to increase capacity and improve efficiency. This process is expected to result in an increase in the volumetric flow rate of emissions from the 2008 prilling plant stack by up to 25 per cent.

A small amount (typically less than 1ppm) of gaseous ammonia slippage occurs through the SCR. With a proposed third nitric acid plant, total ammonia emissions from the nitric acid plants could potentially increase by 50 per cent.

Emissions data used for the assessment are provided in Table 3.14. Full details are in Appendix 4.

Table 3.14 Nitric acid and 2008 prilling plant stack parameters and emissions data

	Existing nitric acid plant 1	Existing Nitric Acid Plant 2	Proposed Nitric Acid Plant	2008 prilling plant
Stack Exit Height (m)	63.8	70.7	70.7	65
Stack Exit Diameter (m)	1.1	1.1	1.1	1.7
Stack Exit Temperature (K)	378	378	378	303
Volumetric Flow Rate (m^3/s)	39.5	39.5	39.5	48.1
Stack Exit Velocity (m/s)	41.6	41.6	41.6	20.7
Ammonia Emission Rate (g/s)	0.11	0.11	0.11	0.04
Ammonia Emission Concentration (mg/Nm^3)	3.69	3.69	3.69	1.01
Ammonia Emission Concentration (ppmv)	4.86	4.86	4.86	1.33

4.5 ASSESSMENT OF POTENTIAL IMPACT

The following sections describe the predicted direct impacts (from the expanded ANPF) and the predicted cumulative impacts (using an offsite monitoring station for reference).

4.5.1 Direct impacts

The maximum offsite ammonia concentrations predicted by ENVIRON (2010) for both the Dispmod and ISC3 dispersion models for the expansion emissions scenarios (baseline emissions and the proposed expanded ANPF emissions), under normal operating conditions, is presented in Table 3.15. The predicted concentrations have been compared to relevant ambient air quality criteria and are expressed as percentages of the criteria values. The concentrations highlighted in bold represent the highest offsite GLC predicted by the alternative models applied.

Table 3.15 Summary of maximum predicted (expansion) GLCs – ammonia

Compound	Averaging Period	Maximum Predicted Offsite GLCs (µg/m^3)[a]		
		Dispmod	ISC3	
			Rural Setting	Urban Setting
Ammonia	1-hour	11	**25**	24
	1-hour Guideline[b]	*330*	*330*	*330*
	% 1-hour Guideline	3.3%	**7.6%**	7.3%
	Annual	0.3	1.0	**1.1**
	Annual Guideline[c]	*180*	*180*	*180*
	% Annual Guideline	0.1%	0.5%	**0.6%**

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. Vic SEPP 1-hour air quality criterion as per Table 3.12
c. Annual air quality criterion as per Table 3.12

The maximum offsite 1-hour average ammonia GLC predicted for both the baseline (Table 3.13) and expansion emissions scenario for CSBP operations in isolation is 25 µg/m^3 (ISC3 rural setting). This concentration comfortably complies with the UKEA 1-hour average ammonia EAL of 2500 µg/m^3 and the Vic SEPP equivalent design criterion of 330 µg/m^3. Contours of the maximum predicted 1-hour average ammonia GLCs predicted for the expansion emission scenario, as presented in Figure 3.16, illustrate that peak offsite impacts are predicted to occur immediately to the west of the CSBP site boundary.

The maximum offsite annual average ammonia GLC predicted for both the baseline and expansion scenarios for CSBP operations in isolation is 1.1 µg/m^3 (ISC3 urban setting). This concentration comfortably complies with the annual average UKEA ammonia EAL of 180 µg/m^3. Contours of the annual average ammonia GLCs also indicate peak offsite impacts are predicted to occur immediately to the west of the CSBP site boundary (Figure 3.17).

Combined emissions from the nitric acid plants and 2008 prilling plant contribute less than 8 per cent to the maximum predicted 1-hour or annual average ammonia GLC under both the baseline and expansion scenarios. As such, ammonia emissions from these sources under the proposal do not significantly impact on the maximum predicted offsite ammonia GLCs predicted for CSBP operations in isolation.

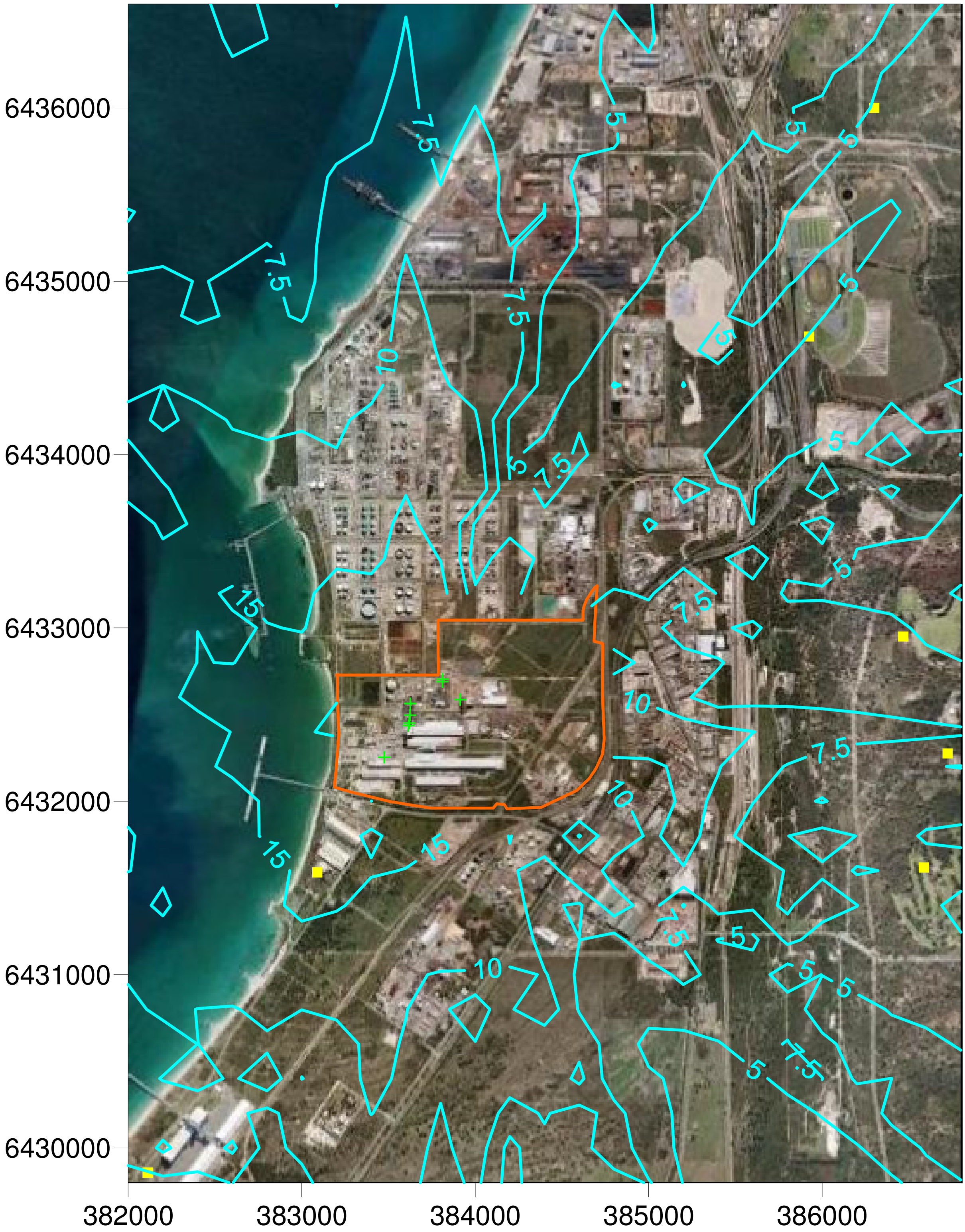

Figure 3.16 Maximum predicted 1-hour ammonia (expansion) GLCs (ISC3 – rural)

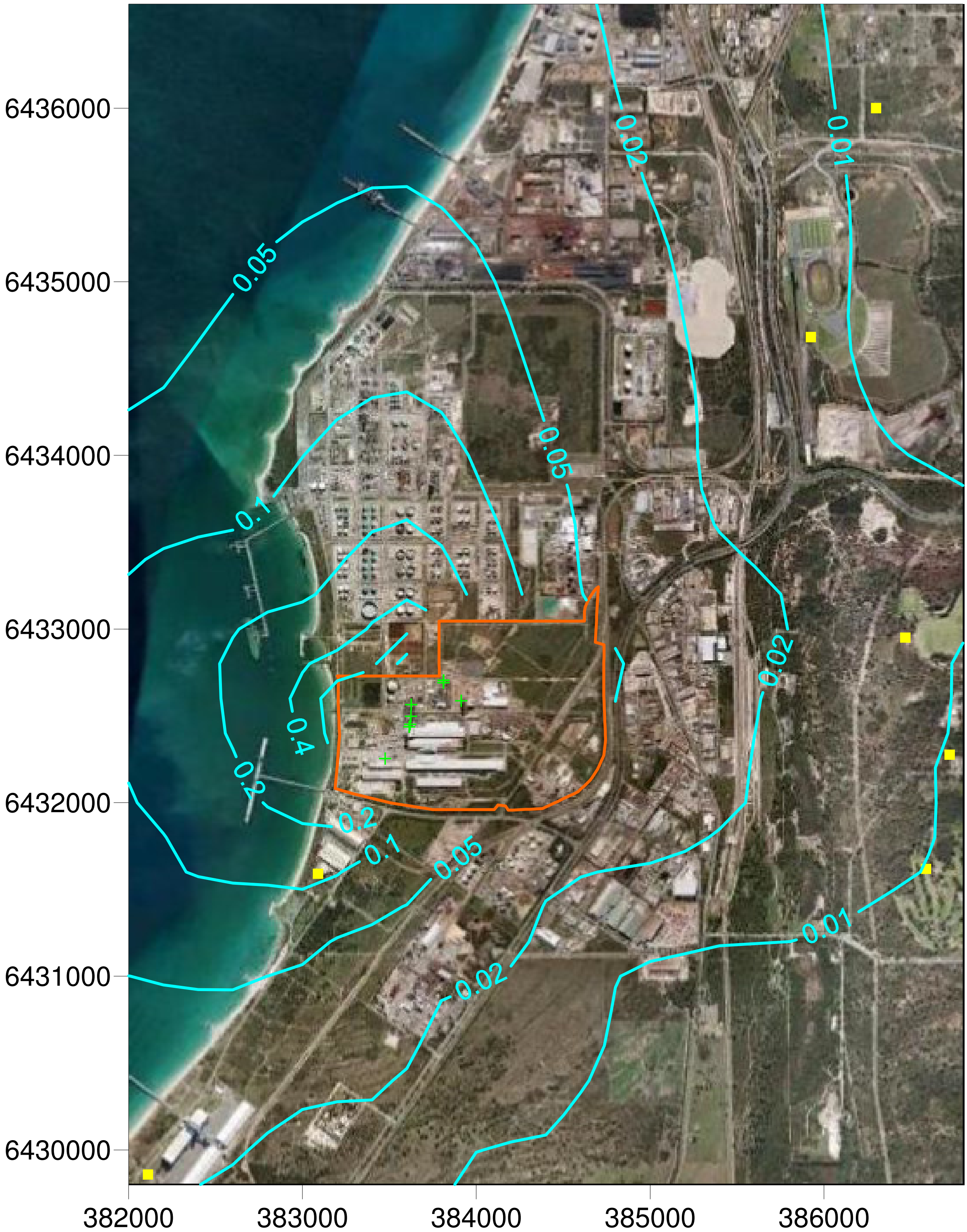

Figure 3.17 Maximum predicted annual ammonia (expansion) GLCs (ISC3 – urban)

4.5.2 Cumulative impacts

Cumulative GLCs of ammonia from the expansion on ambient concentrations were calculated by ENVIRON (2010) using ambient ammonia GLCs monitored at Wells Park.

The cumulative GLCs have been calculated by adding the maximum incremental change in predicted GLCs at each of the monitoring sites to the monitored GLCs at each site. It should be noted that this assessment is extremely conservative for the short term (i.e. 1-hour) averaging times as the maximum predicted incremental change in GLCs associated with the proposed expansion project at each of the monitoring sites has been added to the maximum ambient concentrations recorded at the monitoring sites. This is not expected to actually occur.

A summary of the cumulative impacts of normal operations under the baseline and expansion emissions scenarios on ambient air quality at the available monitoring locations is presented in Table 3.16. The cumulative GLCs have been expressed as a percentage of the corresponding ambient air quality criteria. The concentrations highlighted in bold represent the greatest incremental change in GLC predicted by the alternative model applied.

Table 3.16 Summary of the cumulative maximum predicted ammonia GLCs for the expansion emissions scenario

Averaging Period	Reference Parameter	Maximum GLC (µg/m^3)[a]		
		Dispmod	ISC3	
			Rural	Urban
Annual	Maximum Incremental Change[b]	0.004	0.004	**0.01**
	Ambient GLC[c]	17	17	17
	Cumulative GLC	17	17	**17**
	Annual Guideline[d]	*180*	*180*	*180*
	% Annual Guideline	9.4%	9.4%	**9.4%**

a. Maximum GLC predicted offsite (excluding within the CSBP site boundary)
b. Maximum incremental change in predicted GLCs associated with the expansion project
c. Highest ambient GLC as per Section 4.3.1
d. Annual UKEA air quality criterion as per Table 3.12

The proposal is not expected to impact on the cumulative long-term ambient ammonia GLCs predicted at the Wells Park monitoring station of 17 µg/m^3. This concentration is predicted to remain unchanged and complies comfortably with the annual average ammonia UKEA EAL of 180 µg/m^3, at below 10 per cent of the guideline.

4.5.3 Odour impacts

The modelling results indicate the expansion project is not expected to have a significant impact on off-site ammonia concentrations. The maximum predicted off-site ammonia concentration for both the baseline and expansion scenarios is 25 µg/m^3. Although this concentration approaches the low odour threshold for ammonia of 26 µg/m^3 (Ruth 1986), the predicted 1-hour ammonia concentrations at the nearest residence, located approximately three kilometres east of the CSBP ANPF, are less than 7.5 µg/m^3 which is well below the low odour threshold (Ruth 1986) and both the UKEA and Vic SEPP ambient air quality guidelines. Assessment of the long-term incremental change in ammonia concentrations at Wells Park indicates the expansion project is expected to have a negligible impact (i.e. +0.1 µg/m^3) on ambient ammonia concentrations.

4.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

No further mitigation measures are proposed for ammonia other than the technology currently installed in the 2008 prilling plant and nitric acid plants.

CSBP considers that this factor can be managed under Part V of the EP Act, as has occurred at the ANPF to date.

4.7 ENVIRONMENTAL OUTCOME

As the increase in ammonia emissions from the proposal does not impact on the maximum predicted offsite ammonia GLCs and that the proposal is not expected to impact on the cumulative long-term ambient ammonia GLCs at Wells Park, it is expected that the environmental objective for this factor will be met.

5 AIR EMISSIONS – OTHER

Substances other than NOx, PM and ammonia are emitted from the ANPF as a result of combustion of natural gas in the auxiliary boiler.

These emissions are regularly reported via the NPI reporting process and are estimated using the *Emission Estimation Technique Manual for Combustion in Boilers* (DEWHA 2003)[3]. These emissions are outlined in Table 3.17 as reported for the 2008/09 NPI, which also include estimated emissions from the proposal.

Table 3.17 Estimation of other air emissions from NPI emissions 2008/09

Substance	Existing emissions (kg/yr)[a]	New auxiliary boiler estimated emissions (kg/yr)[b]	Existing auxiliary boiler estimated emissions (kg/yr)[c]	Total estimated emissions (kg/yr)
Carbon monoxide[d]	648	972	32	1004
Volatile Organic Carbons (VOC) total	745	1117	37	1154
Arsenic	0.0271	0.0407	0.0014	0.0421
Beryllium	0.0016	0.0024	0.0001	0.0025
Cadmium	0.0152	0.0228	0.0008	0.0236
Chromium (iii)	0.1300	0.1950	0.0065	0.2015
Chromium (vi)	0.0559	0.0839	0.0028	0.0867
Cobalt	0.0110	0.0165	0.0006	0.0171
Copper	0.1190	0.1785	0.0060	0.1845
Lead	0.0677	0.1016	0.0034	0.1050
Manganese	0.0516	0.0774	0.0026	0.0800
Mercury	0.0356	0.0534	0.0018	0.0552
Nickel	0.2880	0.4320	0.0144	0.4464
Zinc	3.8900	5.8350	0.1945	6.0295

a. Emissions estimated for the existing auxiliary boiler
b. Estimation based on the proposed auxiliary boiler being 50 per cent larger than the existing boiler
c. Existing auxiliary boiler assumed to run for no more than 5 per cent of the time
d. Carbon monoxide estimated from direct measurements at the existing auxiliary boiler. Emissions are dependent on the quality of the natural gas feed supplied to CSBP.

The Background Air Quality (Air Toxics) Study carried out by the DEC involved ambient air quality monitoring for heavy metals in the Kwinana area (DEC 2010a). The results of that study indicate that ambient heavy metal concentrations measured in Hope Valley (closest heavy metal monitoring site to the ANPF) comfortably comply with the relevant ambient air quality guidelines.

As these emissions are at a low level, they do not vary significantly from existing emissions and ambient heavy metal concentrations comfortably comply with the relevant ambient air quality guidelines. CSBP consequently considers that this factor should not warrant assessment by the EPA.

[3] This estimation technique has subsequently been updated in February 2010.

6 GREENHOUSE GASES

6.1 ENVIRONMENTAL OBJECTIVE

The documented environmental objective for greenhouse gas (GHG) emissions is:

- minimise GHG emissions in absolute terms and reduce emissions per unit of product to as low as reasonably practicable
- mitigate GHG emissions, mindful of Commonwealth and State GHG strategies and programs (EPA 2010).

6.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

The EPA position with respect to GHG issues is detailed in *Guidance for the Assessment of Environmental Factors, Statement No. 12: Minimising Greenhouse Gas Emissions* (EPA 2002). It is expected that this guidance statement will be reviewed in response to changes in government policies in relation to GHG mitigation and developments in the scientific understanding of climate change and its impacts.

Recent EPA assessments of projects with significant GHG emissions[4] has indicated a policy approach based on providing an interim management strategy to cover the period until a Federal scheme becomes operational.

The Australian Government has committed to reduce Australia's carbon emissions by between 5 per cent and 15 per cent below 2000 levels by 2020, dependent upon the extent to which there is global agreement of major economies to commit to take on reductions comparable to Australia (Australian Government 2008). It is likely that some form of national management of GHG emissions will be implemented in the years to come. The exact nature of this management has not been determined as yet. Participation of CSBP in a national scheme (in whatever form it ultimately takes) will ensure that this proposal contributes to achievement of the proposed national trajectory.

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act), establishes the National Greenhouse Gas Emissions Reporting Scheme (NGERS) as a national framework for Australian corporations to report GHG emissions, reductions, removals and offsets, and energy consumption and production[5]. The NGER Act will increase the quality and consistency of greenhouse and energy data to better inform policy and meet Australia's international obligations.

CSBP, as part of Wesfarmers Limited, reports annually on GHG emissions, energy production and energy consumption under the NGER Act, with the first reporting period being 1 July 2008 to 30 June 2009. Data for this period was submitted to the Department of Climate Change on 30 October 2009 and the next reporting period ended in June 2010.

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[4] Three recent EPA assessments of projects with major greenhouse gas emissions are the Bluewaters Power Station Expansion - Phase III and Phase IV (EPA Report 1349, March 2010); Collie Urea Project (EPA Report 1358 May, 2010), Coolimba Power Station Project (EPA Report 1350, March 2010).

[5] http://www.greenhouse.gov.au/reporting/publications/pubs/nger-fs.pdf [12 May 2008]

CSBP participates in the Australian Government Energy Efficiency Opportunities program which is regulated under the *Energy Efficiency Opportunities Act 2006*. The Act requires large energy using businesses to:

- undertake an assessment of their energy efficiency opportunities to a minimum standard in order to improve the way in which opportunities are identified and evaluated
- report publicly on the outcomes of that assessment in order to demonstrate to the community that those businesses are effectively managing their energy.

6.3 DESCRIPTION OF FACTOR

The manufacture of ammonium nitrate contributes to the overall greenhouse inventory of the CSBP site. GHG emissions are currently generated directly from emissions of nitrous oxide (N_2O) from the integrated nitric acid ammonium nitrate plants (hereafter referred to as nitric acid plants as there are no gaseous emissions from the ammonium nitrate manufacturing components of the plants) and indirectly from the consumption of electricity. Direct emissions of carbon dioxide from the combustion of natural gas to generate steam in an additional auxiliary boiler will also occur in the expanded facility.

N_2O is produced as a by-product of nitric acid production process where ammonia and oxygen are combined. N_2O is a GHG and has a global warming potential of 310, which means that each tonne of this gas has the equivalent greenhouse effect of 310 tonnes of CO_2.

6.3.1 Existing emissions of GHG

A summary of GHG emissions from the ANPF is shown in Table 3.18. In 2009/10 the ANPF produced approximately 925 688 tonnes CO_2-e (nett). N_2O emissions from the two nitric acid plants were in the order of 937 262 tonnes CO_2-e (nett).

Table 3.18 Ammonium nitrate production facility GHG emission data

ANPF[a]	Power Consumption (tCO_2-e)			N_2O[b] (tCO_2-e)	Total ANPF GHG emissions[c] (tCO_2-e)
	Generated	Consumed	Nett		
2006/07	-24 166	15 112	-9054	488 958	479 904
2007/08	-27 340	20 267	-7073	567 393	560 320
2008/09	-38 751	32 035	-6716	788 817	782 101
2009/10	-44 728	33 154	-11 574	937 262	925 688

a. Ammonium Nitrate Production Facility (integrated nitric acid ammonium nitrate plants, prilling plant).
b. Estimated N_2O emissions have decreased from previously reported estimates following identification of an error in N_2O emissions estimation methodology used for previous reporting.
c. Total ANPF GHG emissions are calculated by adding the Nett Power Consumption emissions and N_2O emissions. CO_2-e calculations from 2005/06 to 2007/08 based on factors provided through Greenhouse Challenge Plus reporting and calculations from 2008/09 and 2009/10 from NGER reporting requirements.

Table 3.19 shows the ratio of GHG emission versus total annual product production.

Table 3.19 Ammonium nitrate production GHG emission ratio

ANPF	Total product produced at the ANPF[a] (tpa)	Total ANPF GHG emissions (tCO_2-e)	GHG emission ratio (tCO_2-e/tonne product)
2006/07	627 696	479 904	0.76
2007/08	751 347	560 320	0.75
2008/09	1 162 966[b]	782 101	0.67
2009/10	1 260 479	925 688	0.73

a. This is the sum of tonnes nitric acid, tonnes ammonium nitrate solution and tonnes ammonium nitrate prill (i.e. 2009/10, nitric acid – 398 223 tonnes, ammonium nitrate solution – 499 335 tonnes, ammonium nitrate prill – 362 921 tonnes, total produced = 1 260 479 tonnes).

b. Increase in production (tonnes per annum) as a result of commissioning of second nitric acid ammonium nitrate plant in 2008.

CSBP has designed and constructed Nitric Acid Plant 2 with a larger reactor boiler than originally designed and fitted to Nitric Acid Plant 1, as described in the 2005 proposal (CSBP 2005). CSBP has subsequently retrofitted Nitric Acid Plant 1 with a similar larger capacity reactor boiler in November 2009, as committed to in the 2005 proposal. Larger capacity reactor boilers result in reduced loading of inlet gases per unit area of gauze, potentially reducing the generation of N_2O per tonne of nitric acid produced. The amount of N_2O emitted depends on a number of factors, including the age and condition of catalytic gauzes used in the reactor boiler, the surface area of the reactor boiler, temperatures of reaction, and the presence of any abatement technologies. Optimisation of the process including optimising plant operating pressure and the physical configuration of ammonia oxidation catalyst is continuing.

The average kg N_2O per tonne of nitric acid in Nitric Acid Plant 1 for the period December 2009 to June 2010 was 6.4 kg N_2O/tonne of nitric acid (period represents operation following installation of a larger reactor boiler). The average kg N_2O per tonne of nitric acid in Nitric Acid Plant 2 for the period July 2009 to June 2010 was 7.1 kg N_2O/tonne of nitric acid. For plants of this type, N_2O emissions are typically 5 – 9 kg N_2O/tonne of nitric acid; however, this is dependent on the plant operating pressure and the physical configuration of the reactor boiler and catalyst.

Both plants have been designed and constructed to accept secondary N_2O reduction catalyst technologies.

6.3.2 Energy Efficiency

The nitric acid plants are net producers of electricity because of the exothermic nature of the chemical reactions occurring in the production of nitric acid/ammonium nitrate.

Taking into account power consumption for each component, the ammonium nitrate plants, prilling plants and nitric acid plants combined resulted in a net power generation of approximately 53 248 MWhr in 2009/10. This is a credit in terms of plant GHG accounting of almost 44 728 tonnes CO_2-e per annum, based on 2009/10 production rates. As a result, the ANPF exports energy to other areas of the CSBP Kwinana industrial complex and offsets the GHG impact of CSBP business units overall. Net GHG emissions saving from power generation was 11 574 tonnes CO_2-e in 2009/10.

6.3.3 GHG abatement technology

The use of new catalyst materials, which could result in substantial reductions in N_2O emissions, will contribute significantly to GHG reductions in the ammonium nitrate production facility. Indications are that N_2O emissions could be reduced by more than 80 per cent through the use of secondary abatement systems, and more than 90 per cent for tertiary abatement systems.

Secondary abatement systems

Secondary abatement catalysts are located immediately below the primary ammonia oxidation catalyst and typically take the place of the existing inert support system for the primary catalyst, refer Figure 3.18. Making use of the heat of reaction of the ammonia oxidation process, the secondary catalyst abatement system requires no additional fuel and does not affect the efficiency of the primary ammonia conversion reaction, converting nitrous oxide to nitrogen and oxygen according to the following reaction: $2N_2O \rightarrow 2N_2 + O_2$

Secondary abatement catalyst providers with whom CSBP is in regular contact are Johnson Matthey PLC (utilising technology provided by Yara International), BASF, Umicore AG & Co. KG and W. C. Heraeus GmbH. In March 2010, CSBP requested an updated list of reference sites for the use of secondary abatement catalyst from each of the technology providers. The reference sites for each secondary catalyst vendor are shown in Table 3.20. The expected nitrous oxide abatement efficiency for each technology is also shown.

Table 3.20 Nitrous oxide secondary abatement catalyst supplier reference list

Technology provider & catalyst description	Discrete plant references for secondary abatement catalyst	Expected nitrous oxide abatement efficiency (%)
Johnson Matthey (Amoxis) /Yara 58 –Y1	67	90
BASF (O3-8X)	30	90
Heraeus (HR-SC)	18	90
Umicore (MultiComb Greeline)	4	70 – 80

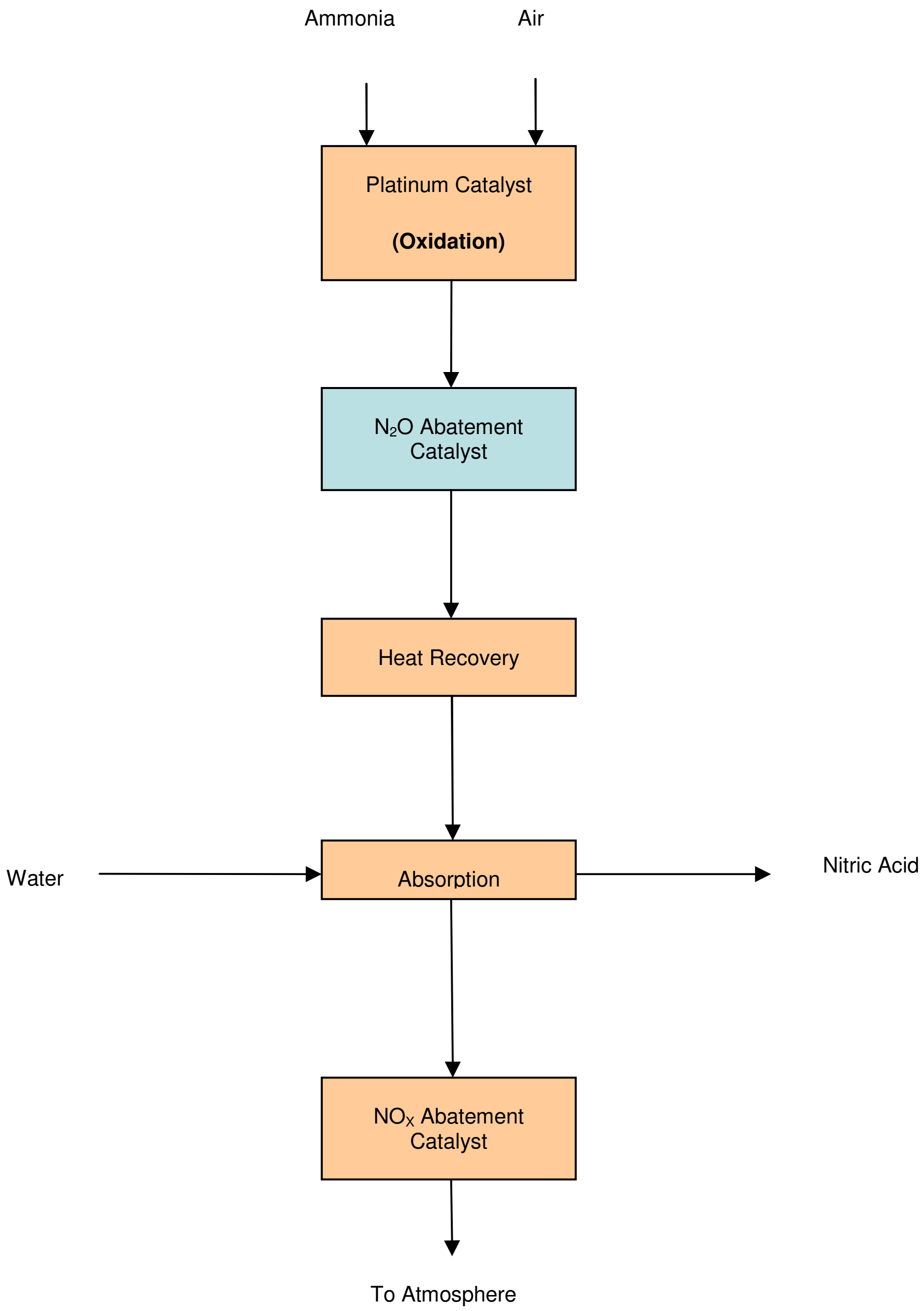

Figure 3.18 Location of secondary N_2O abatement catalyst in nitric acid process

Tertiary abatement systems

Installed in the tail gas stream, tertiary systems selectively destroy nitrous oxide. The use of tertiary abatement catalyst systems can achieve virtually complete destruction of nitrous oxides contained in the tail gas emissions of nitric acid production processes.

Retrofitting requires very significant capital expenditure due to additional heating and cooling requirements for the tail gas (heating to achieve tertiary catalyst activation temperatures, and cooling to avoid exceeding of downstream rotating equipment design temperatures). Capital costs for retrofitted tertiary abatement systems are significantly higher than for secondary abatement systems.

Tertiary nitrous oxide abatement systems represent the most costly but potentially the most effective methods for reducing nitrous oxide emissions. Due to the high cost of retrofitting this system, CSBP is not currently proposing to pursue tertiary abatement options for its existing nitric acid plants one and two; however, CSBP is proposing to install tertiary abatement in the proposed third nitric acid plant.

6.4 POTENTIAL SOURCES OF IMPACT

The main source of GHG emissions will originate from the proposed third nitric acid plant, and the debottlenecked nitric acid plants in the form of N_2O. The proposal also includes an additional auxiliary boiler.

6.5 ASSESSMENT OF POTENTIAL IMPACT

6.5.1 New nitric acid plant

The proposed third nitric acid plant will be similar in capacity and technology to that of the second nitric acid plant assessed in the previous proposal by CSBP (2005) with the exception of the inclusion of N_2O abatement technology. The type of tertiary N_2O abatement technology to be utilised has yet to be determined; however, it is conservatively estimated that GHG emissions due to N_2O from the third nitric acid plant, following debottlenecking, are expected to be in the order of 53 000 tonnes CO_2-e per annum (0.71 kg N_2O/tonne HNO_3), approximately 90 per cent lower than N_2O emissions from the existing nitric acid plants per tonne of nitric acid (7.1 kg N_2O/tonne HNO_3)[6]. The amount of N_2O emitted depends on a number of factors, including the type and condition of N_2O abatement technology.

6.5.2 Debottlenecking of the nitric acid plants

Debottlenecking all three nitric acid plants is included in this proposal; however, debottlenecking activities are dependent on market conditions and represent the maximum operational capacity for the CSBP site and as such may occur in a staged fashion. As debottlenecking of these plants will increase output of nitric acid by up to 20 per cent for each plant, output of N_2O will potentially increase.

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[6] Based on the 2009/10 emissions of N_2O per tonne of HNO_3 of nitric acid plant 2.

To reduce the N_2O emissions, CSBP commits to trialling secondary abatement technology in Nitric Acid Plant 2 in 2011. CSBP also commits to installing secondary abatement technology in Nitric Acid Plant 1 if trialling in Nitric Acid Plant 2 is successful. To be considered successful, N_2O reduction efficiencies must meet secondary abatement technology supplier specifications and have no adverse impact to current nitric acid plant performance; specifically, ammonia conversion to nitric acid must remain within current design guidelines and production rates unaffected.

Abatement technology, if successful, will mitigate a minimum of 80 per cent of the total N_2O produced from Nitric Acid Plants 1 and 2, reducing the N_2O emissions from Nitric Acid Plants 1 and 2 to less than 106 000 tonnes CO_2-e per annum per plant (based on an N_2O emission rate of 1.42 kg N_2O/tonne HNO_3 and a total production from the two plants of 480 000 tonnes HNO_3).

6.5.3 Auxiliary Boiler

GHG emissions associated with CO_2 from combustion of natural gas in the new auxiliary boiler are expected to be in the order of 15 000 tonnes per annum.

6.5.4 Greenhouse gas offset strategies

The EPA Greenhouse Gas Guidance Statement (EPA 2002) requires proponents to address methods for both reducing the overall GHG emissions, or the GHG intensity of operations.

CSBP's commitments to reduce both overall GHG emissions and the GHG intensity of operations are detailed in Section 6.7.

6.5.5 Energy Efficiency

The nitric acid plant is a net producer of electricity as a result of the exothermic nature of many of the chemical reactions occurring in the production of nitric acid.

Taking into account power consumption for each component, the ammonium nitrate plants, prilling plants and nitric acid plants combined are expected to result in a net power generation of approximately 95 000 MWhr from the expanded facility under the maximum expected production. This represents a credit in terms of plant GHG accounting of almost 80 000 tonnes CO_2-e per annum, based on maximum production rates. As a result, the ANPF exports energy to other areas of the CSBP industrial complex and offsets the GHG impact of CSBP business units overall.

6.5.6 Predicted GHG emissions

As the proposed expansion will occur in stages, the GHG emissions for various operating scenarios have been calculated. All scenarios assume maximum production rates of:

- ammonium nitrate, 936 000 tonnes per annum
- nitric acid, 720 000 tonnes per annum
- prill, 780 000 tonnes per annum
- total production, 2 436 000 tonnes per annum.

The scenarios are described in the following sections:

Scenario 1

This scenario represents expected emissions in the absence of implementation of CSBP commitments as detailed in Section 6.7. The scenario assumes the plant to be fully debottlenecked and no N_2O abatement fitted to the three nitric acid plants.

This scenario leads to an increase in 2009/10 ANPF GHG emissions of approximately 660 000 tonnes CO_2e, or 71 per cent.

Scenario 2

This scenario represents the maximum expected emissions from the ANPF following construction and full debottlenecking of the third nitric acid plant with tertiary N_2O abatement technology, and with full debottlenecking of Nitric Acid Plants 1 and 2, to a maximum production rate without installation of secondary abatement as detailed in CSBP commitments described in Section 6.7. It assumes no N_2O abatement on the two existing nitric acid plants and the inclusion of tertiary abatement on the proposed third nitric acid plant (90 per cent N_2O reduction).

This scenario leads to an increase in 2009/10 ANPF GHG emissions of approximately 184 000 tCO_2e, or 20 per cent.

Scenario 3

This scenario represents the expected emissions from the ANPF following implementation of commitments detailed in Section 6.7. The scenario assumes full debottlenecking of the nitric acid plants, secondary N_2O abatement in the two existing nitric acid plants following trialling in Nitric Acid Plant 2 in 2011, if successful, (80 per cent N_2O reduction), and tertiary N_2O abatement in the proposed third nitric acid plant (90 per cent N_2O reduction).

This scenario leads to a decrease in 2009/10 ANPF GHG emissions of approximately 661 000 tonnes CO_2e, or 71 per cent and represents the expected maximum emissions from the proposal – subject to the successful trialling of secondary abatement technology in Nitric Acid Plant 2 in 2011.

The predicted emissions of each scenario are tabulated in Table 3.21.

Table 3.21 Predicted GHG emissions

ANPF[a]	Power Consumption (tCO_2-e)			N_2O (tCO_2-e)	Auxiliary Boiler emissions of CO_2[d] (tCO_2-e)	Total ANPF GHG emissions[e] (tCO_2-e)
	Generated[b]	Consumed[c]	Nett			
2009/10	-44 728	33 154	-11 574	937 262	-	925 688
Scenario 1	-80 000	66 000	-14 000	1 585 000	15 000	1 586 000
Scenario 2	-80 000	66 000	-14 000	1 109 000	15 000	1 110 000
Scenario 3	-80 000	66 000	-14 000	264 000	15 000	264 000

a. Ammonium Nitrate Production Facility (integrated nitric acid ammonium nitrate plants, prilling plant).
b. Generated – nett power generated by nitric acid plants.
c. Consumed – nett power consumed from 2008 prill plant and ammonium nitrate plants.
d. Conservative estimate of direct CO_2 emissions due to new auxiliary boiler.
e. Total predicted ANPF GHG emissions are calculated by adding the Nett Power Consumption emissions N_2O emissions and CO_2 emissions from the new auxiliary boiler. Estimates are rounded to the nearest 1000.

Table 3.22 shows the predicted ratio of GHG emission versus total expected annual product production.

Table 3.22 Predicted GHG emission ratio

ANPF	Total product produced at the ANPF[a] (tpa)	Total ANPF GHG emissions (tCO_2-e)	GHG emission ratio (tCO_2-e/tonne product)
2009/10	1 260 479	925 688	0.73
Scenario 1	2 436 000	1 586 000	0.65
Scenario 2	2 436 000	1 110 000	0.46
Scenario 3	2 436 000	264 000	0.11

a. This is the sum of tonnes nitric acid, tonnes ammonium nitrate solution and tonnes ammonium nitrate prill (i.e. 2009/10, nitric acid – 398 223 tonnes, ammonium nitrate solution – 499 335 tonnes, ammonium nitrate prill – 362 921 tonnes, total produced = 1 260 479 tonnes).

6.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP strives to continuously improve the efficiency of its operations. N_2O from the nitric acid plants constitute the largest component of greenhouse emissions from the ANPF. GHG abatement and technology solutions consequently focus on these plants. In the nitric acid plants the focus is on potential N_2O abatement through the installation of secondary and/or tertiary abatement technology. The abatement of N_2O emissions from the nitric acid plants is expected to represent the single largest potential reduction in GHG emissions from the CSBP site. The abatement of N_2O emissions is dependent on the deployment of viable abatement technology.

CSBP has updated the current Greenhouse Gas Abatement Program (Incorporating Nitrous Oxide Emissions Improvement Plan) to incorporate management measures for the proposed expansion (Appendix 2). This Program will form the basis of reporting of the progression of trialling secondary abatement in Nitric Acid Plant 2 and, if successful, the inclusion of secondary abatement in Nitric Acid Plant 1. Notwithstanding this, CSBP commits to ensuring abatement technologies are in place in the existing nitric acid plants one and two when their combined production reaches 480 000 tonnes per annum nitric acid and this, too, will be reported in the Program.

6.7 CSBP COMMITMENTS

CSBP will implement the following management measures to mitigate the emissions of GHG:

1. CSBP will design and construct the new third nitric acid plant with a reactor boiler of similar size to that installed in the Nitric Acid Plants 1 and 2.
2. CSBP will design and construct the new third nitric acid plant to include tertiary N_2O abatement technology. Tertiary abatement technology will mitigate a minimum of 90 per cent of the total N_2O produced from this nitric acid plant.

3. CSBP commits to trialling secondary abatement technology in Nitric Acid Plant 2 in 2011 and, if the trial is successful, CSBP commits to installation of secondary abatement technology in Nitric Acid Plant 1later in 2011. To be considered successful, N_2O reduction efficiencies must meet secondary abatement technology supplier specifications and have no adverse impact to current nitric acid plant performance. Specifically, ammonia conversion to nitric acid must remain within current design guidelines and production rates unaffected. Abatement technology installed will mitigate a minimum of 80 per cent of the total N_2O produced from these plants.
4. Notwithstanding the above commitments, CSBP commits to ensuring abatement technologies are in place in the existing Nitric Acid Plants 1 and 2 when their combined production reaches 480 000 tpa nitric acid: that is, fully debottlenecked.
5. CSBP will submit an updated Greenhouse Gas Abatement Program report to the EPA three months prior to the commissioning of the new third nitric acid plant which will review the current state of testing of low N_2O emission catalysts. An update of this report will be submitted annually to the OEPA until the new technology is adopted or the EPA advises that the report is no longer required.
6. The Greenhouse Gas Abatement Program will be based on a template understood to be under development by the EPA.
7. The Greenhouse Gas Abatement Program will be regularly updated to:
    a. ensure that the plant is designed and operated in a manner which achieves reductions in "greenhouse gas" emissions as far as practicable
    b. provide for ongoing "greenhouse gas" emissions reductions over time
    c. ensure that through the use of available proven technology, the total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product from the project are minimised
    d. achieve continuous improvement in "greenhouse gas" intensity through the periodic review, and where feasible, the application adoption of advances in technology and process management.
8. CSBP expects to be an obligatory participant in any legislated national carbon emissions reduction scheme when operational, and will be required to conform with the legislated requirements to reduce national GHG emission rates.

6.8 ENVIRONMENTAL OUTCOME

The increase in GHG from this proposal is estimated to be in the order of 184 000 tonnes CO_2-e per annum, in the event of construction of a third nitric acid plant with tertiary N_2O abatement technology, and with debottlenecking of Nitric Acid Plants 1 and 2, to a maximum production rate without triggering the requirement for the installation of secondary abatement (i.e. Scenario 2).

If the secondary abatement trial in Nitric Acid Plant 2 is successful, and therefore, secondary abatement to Nitric Acid Plant 1 is subsequently implemented, GHG emissions from the ANPF are estimated to be in the order of 264 000 tonnes CO_2-e per annum following implementation of this proposal. That is, construction and debottlenecking of a third nitric acid plant with tertiary N_2O abatement technology, and debottlenecking of Nitric Acid Plants 1 and 2 and the installation of secondary abatement in Nitric Acid Plants 1 and 2 following trialling in Nitric Acid Plant 2 in 2011, if successful. This represents a reduction of approximately 661 000 tonnes CO_2-e of 2009/10 ANPF GHG emissions.

As the third nitric acid plant will be designed and constructed to include tertiary N_2O abatement technologies and through CSBP commitments detailed above it is expected that the environmental objective will be met.

CSBP expects to be an obligatory participant in any legislated national carbon emissions reduction scheme when operational, and will be required to conform with the legislated requirements to reduce national GHG emission rates.

7 MARINE ENVIRONMENT

7.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for the marine environment is:

- to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).

7.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

Water related issues on site are managed such that discharge waters comply with the Revised National water quality management strategy: *Australian water quality guidelines for fresh and marine waters Revised Guideline No 4* (ANZECC & ARMCANZ 2000a), *Australian Guidelines for Water Quality Monitoring and Reporting (Guideline No 7)* (ANZECC & ARMCANZ 2000b) and the *State Environmental (Cockburn Sound) Policy 2005* (EPA 2005a).

All wastewater discharges are managed in accordance with conditions contained in EP Act Licence 6107/1967. For discharges to the Sepia Depression Ocean Outlet Landline (SDOOL), obligations in the Water Services Agreement between the Water Corporation and CSBP Limited also apply. The discharge of wastewater to the SDOOL is governed by the Ministerial Conditions of Approval for the Kwinana Wastewater Recycling Plant (KWRP) Project (Ministerial Statement No. 665). The Water Corporation can only accept and convey effluent to the Sepia Depression from industry partners where their toxicant loads conform to those permitted to be discharged to Cockburn Sound by their individual Part V EP Act licences (Water Corporation 2005).

CSBP continues to liaise with Water Corporation to ensure monitoring is undertaken in accordance with the Sepia Depression Ocean Outlet Monitoring and Management Plan, and that CSBP wastewater quality does not adversely impact Water Corporation compliance with Ministerial and Licence obligations.

CSBP has a Wastewater Management Plan in place that covers the appropriate collection, monitoring and discharge management for wastewater on site that is discharged to the SDOOL.

For other liquid wastes, CSBP has a Liquid Waste Management Plan in place that covers the appropriate handling, storage and disposal methods for liquid waste on site, other than process effluents and stormwater.

7.3 DESCRIPTION OF FACTOR

7.3.1 Discharge to SDOOL

Cooling tower blowdown water and stormwater runoff from the CSBP Kwinana Industrial Complex is directed to the wastewater containment system. Manual analysis of water quality in the blowdown water is undertaken on a weekly basis by a contracted third party. A number of sample points are maintained around the Kwinana site to collect representative daily samples from inputs to the containment system.

Under normal operating conditions, wastewater in the CSBP containment system is discharged via the SDOOL. The previously used Cockburn Sound outfall remains as a licensed discharge point and is maintained as an emergency back-up for the discharge to SDOOL. Discharge to Cockburn Sound will only occur in the event of a loss of access to the SDOOL, either through an emergency event or in the event of a planned shut-down of the SDOOL. There is also an emergency beach outfall which is maintained for the event of overflows caused by extreme stormwater flows. Current operations are such that overflows to the beach and discharges to Cockburn Sound via the diffuser are no longer part of normal operations. The average wastewater volume currently disposed from the Kwinana Industrial Complex through the SDOOL is approximately 2 ML/d.

When discharge of wastewater to SDOOL occurs, a side stream from the discharge pipeline is automatically delivered into a monitoring station. A series of online instruments continuously analyse pH, conductivity, turbidity, ammonia, nitrate and phosphorus concentrations. A flow weighted composite sample is also collected for subsequent analysis to demonstrate compliance with relevant EP Act licence parameters. Table 3.23 shows the licence parameters (limits) that the wastewater is analysed against and the measured concentrations over the 2009/10 period. All concentrations of wastewater discharged via the SDOOL were within licence limits.

The discharge system is under the control of a Programmable Logic Controller (PLC). Wastewater discharge pumps are automatically shut down if the discharge reaches an internal limit or if any condition is detected indicating equipment malfunction or parameters out of specification.

Within the ANPF process, wastewater generated from the nitric acid plants (other than cooling tower blowdown and stormwater runoff) is segregated and directed to dedicated impervious collection sumps. The two existing nitric acid plants collect about 0.16 ML of this process water per month. This water has a high nutrient concentration and is either reused in the on-site fertiliser granulation plant (a process not related to the manufacture of ammonium nitrate) or recycled off site.

Process condensate is generally recycled within the plant.

Table 3.23 Summary of 2009/10 measured data versus licence condition limits

Parameter	Licence Limit	Measured monthly load (kg/day)												Licence Limit (daily limit)[d]	
	Monthly Average Daily Load Limit (kg/day)	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	98% of time for rolling 365 days (mg/L)	2% of time for rolling 365 days (mg/L)
Nitrogen	200[a]	166	170	138	89	80	75	81	93	128	172	184	149	-	-
Phosphorus	100[a]	5	4	4	4	3	2	2	3	3	4	5	8	-	-
Aluminium	1[a]	0.108	0.086	0.101	0.045	0.037	0.035	0.044	0.045	0.062	0.058	0.054	0.051	-	-
Arsenic	0.045	0.017	0.007	0.016	0.020	0.012	0.010	0.011	0.014	0.015	0.019	0.027	0.033	0.050	0.100
Cadmium	0.137	0.059	0.052	0.052	0.044	0.037	0.033	0.039	0.044	0.053	0.049	0.050	0.051	-	-
Chromium	0.137	0.059	0.052	0.052	0.044	0.037	0.033	0.039	0.044	0.053	0.049	0.050	0.051	0.100	0.100
Cobalt	0.240	0.059	0.052	0.052	0.044	0.037	0.033	0.039	0.044	0.053	0.049	0.050	0.051	0.050	0.05
Copper	0.240	0.059	0.052	0.052	0.044	0.037	0.033	0.039	0.044	0.053	0.049	0.050	0.051	0.285	0.485
Free Cyanide	-[b]	-	-	-	-	-	-	-	-	-	-	-	-	0.100	0.100
Fluoride	54	5	4	5	4	3	2	3	3	4	4	4	5	-	-
Tot. Hydrocarbon	5[c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	2	0.085	0.096	0.100	0.081	0.075	0.064	0.075	0.105	0.151	0.098	0.102	0.262	-	-
Lead	0.137	0.024	0.022	0.025	0.018	0.015	0.017	0.017	0.032	0.031	0.024	0.021	0.020	0.050	0.075
Manganese	0.240	0.112	0.102	0.102	0.094	0.083	0.082	0.095	0.124	0.122	0.142	0.133	0.187	-	-
Mercury	0.020	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	-
Molybdenum	1	0.131	0.116	0.140	0.119	0.114	0.130	0.164	0.167	0.223	0.220	0.186	0.159	0.250	0.250
MDEA	-[b]	-	-	-	-	-	-	-	-	-	-	-	-	16	16
Nickel	0.240	0.059	0.052	0.052	0.044	0.037	0.033	0.039	0.044	0.053	0.049	0.050	0.051	0.125	0.300
Vanadium	0.137	0.059	0.052	0.052	0.044	0.037	0.033	0.039	0.044	0.053	0.049	0.050	0.051	0.050	0.060
Zinc	5	0.059	0.052	0.062	0.049	0.040	0.042	0.056	0.047	0.089	0.053	0.052	0.051	2.250	2.250

a. These limits are three monthly rolling averages (kg/day)
b. No Daily Load Limit stated in Licence
c. Hydrocarbons analysis required only if CSBP receives water from BP (this has not occurred to date)
d. Concentrations for daily limits as stipulated in the Licence provided for information, CSBP has not exceeded these daily limits

7.3.2 Nutrient-stripping wetland

In 2004, CSBP constructed a pilot nutrient-stripping wetland at its CSBP Kwinana Industrial Complex to treat industrial wastewater prior to discharge to Cockburn Sound and, from October 2005, to the SDOOL. This pilot wetland was an important part of the development of the approach to wastewater management on site and was the first of its kind in Australia constructed to treat industrial wastewater.

In 2006, CSBP engaged Murdoch University (Environmental Technology Centre) to research the performance of the pilot wetland and assist CSBP in optimising wetland performance. Murdoch University recommended the construction of two additional wetland cells with wastewater inlets at the surface and outlets at the base of each cell. The additional cells were designed to enhance bacterial nitrification of ammoniacal nitrogen in the wastewater with the original cell to be used for denitrification to convert the nitrate nitrogen to nitrogen gas. As a result, in June 2009, CSBP completed a $2.1 million expansion of the wetland to assist in further reducing the nitrogen load in wastewater prior to discharge and increase storm water holding capacity for the site. The expanded wetland improves the sustainable management of CSBP wastewater by providing a permanent treatment option for suitable streams, in a low-energy, natural approach. CSBP is continually investigating how to optimise efficiency of the wetland performance and this will continue through the proposed expansion.

7.3.3 Emergency response

Despite the robust nature of the wastewater management system, CSBP recognises there is potential for accidental release of process fluids or effluent that could lead to a discharge of contaminants in the form of liquid ammonia, nitric acid or ammonium nitrate. Accordingly, an emergency response plan and management procedures have been developed to address a range of potential incidents (such as spills, fire and transport accidents) that could result in the release of contaminants to Cockburn Sound or the Sepia Depression. Additionally, CSBP is committed to the Kwinana Industries Mutual Aid (KIMA) agreement including various local industries within the KIA, established to provide a combined industry response to emergency situations, as part of its leadership of the Kwinana Industries Public Safety Group (KIPS) group.

7.4 POTENTIAL SOURCES OF IMPACT

The proposed expansion will result in generation of additional liquid wastes during construction and operation phases. Around 360 kL/day is expected to be generated from cooling water blowdown for the new nitric acid and ammonium nitrate solution plant. Stormwater may increase marginally as the proposed area of construction is on previously developed land and in close proximity to the existing stormwater collection system.

7.5 ASSESSMENT OF POTENTIAL IMPACT

The anticipated average discharge to the SDOOL from the CSBP Kwinana Industrial Complex is expected to increase from approximately 2 ML/day to approximately 2.4 ML/day due to the implementation of this proposal.

The impact of additional liquid waste from the proposed expansion is considered to be manageable using the existing liquid waste management system. There is adequate capacity in the existing wastewater management system including the nutrient stripping wetland and only minor additions to the stormwater collection system in the proposal footprint are required. There is adequate pumping and storage capacity in the existing wastewater management system for the expected increase in wastewater due to the implementation of this proposal.

The current EP Act Licence 6107/1967/16 contains a combination of concentration and load based limits for contaminants in wastewater to ensure environmental protection objectives are achieved. The quantity and composition of wastewater that is to be discharged into the SDOOL as a result of this proposal will continue to comply with the Licence 6107/1967/16 Marine Pollution Control Conditions. Based on current average concentrations and the proposed discharge volume increase to 2.4 ML/day, the loads discharged as a result of this proposal will remain within current licence limits. Treatment through the nutrient stripping wetland and other CSBP water recycling initiatives will aid this endeavour.

A review of CSBP Kwinana Industrial Complex wastewater discharges was undertaken by Oceanica (2007a) in accordance with the requirements set out in the DEC Environmental Assessment Report template. The report examined the issues related to the disposal of wastewater from the CSBP Kwinana Industrial Complex and the risks posed to the marine environment. Discharge data was compared against the Environmental Quality Criteria (EQC) for Cockburn Sound and demonstrated that concentrations were unlikely to have an unreasonable impact on the environment. The report also identified that discharge to SDOOL posed a lower risk due to greater dilution of CSBP wastewater with wastewater from other sources in the pipeline and the greater assimilative capacity of the Sepia Depression compared to Cockburn Sound.

Oceanica (2007a) recommended undertaking Whole of Effluent Toxicity (WET) testing of CSBP wastewater in accordance with the ANZECC/ARMCANZ (2000) and EPA (2005a) water quality management framework. This was also undertaken in 2007 and concluded that a high level of protection would be attained whether discharge was to Cockburn Sound or to the SDOOL (Oceanica 2007b).

The Ministerial Conditions of Approval for the KWRP Project (Ministerial Statement No. 665) were based in part on the Water Corporation assessment of typical and worst-case wastewater contaminant concentrations and volumes anticipated to be discharged via the SDOOL following acceptance of industrial inputs. CSBP provided the Water Corporation with anticipated wastewater quality data to be utilised in the assessment process and actual discharges continue to be broadly consistent with the original data. Minor variations in individual water quality parameters have occurred and the EPA has confirmed "that the concentrations and loads which were used as indicative parameters in the Public Environmental Review Document "Use of the Cape Peron Outlet Pipeline to Dispose of Industrial Wastewater to the Sepia Depression Kwinana" are not legal limits in the approval of the proposal. As long as CSBP effluent meets its Part V licence obligations into the SDOOL and the Water Corporation meets its Part IV and Part V obligations regarding discharge limits to Sepia, the legal obligations will be met. Variations in effluent do not need to be referred to the EPA unless these are significantly different to the original proposal and may pose a risk of the discharge limits to Sepia Depression being exceeded." (pers. comm. G. Storey, EPA via email 2005).

The Water Corporation assesses compliance on a quarterly basis in accordance with the Sepia Depression Ocean Outlet Monitoring and Management Plan, which includes sampling and analysis of individual inputs and the combined wastewater flow prior to discharge to the Sepia Depression.

The Water Corporation report, *Sepia Depression Ocean Outlet Landline (SDOOL) Annual report 2009*, states that "results from the monitoring and investigative studies undertaken over the 2008-2009 monitoring period indicate that there is minimal risk to the marine environment due to the discharge of the combined waste stream into the Sepia Depression. The water quality conditions required for ecosystem protection and public health in terms of contaminant levels were met." (Water Corporation 2009). This analysis, which includes the wastewater CSBP discharges to SDOOL, has demonstrated compliance with Water Corporation EP Act licence and Ministerial obligations and that the environmental protection objectives were achieved.

As wastewater contaminant loads and concentrations are not expected to change significantly from those previously modelled as a result of this proposal, CSBP considers potential environmental impacts to have been adequately addressed in previous assessments.

CSBP has committed to continue managing wastewater discharges in accordance with EP Act Licence L6107/1967 conditions.

7.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will continue to discharge wastewater to the SDOOL within current EP Act Licence L6107/1967 obligations.

CSBP will continue to explore methods for optimising the efficiency of the wetland.

CSBP will continue to contribute to the State ambient monitoring program of Cockburn Sound waters.

7.7 ENVIRONMENTAL OUTCOME

As the volume and quality of wastewater generated from this proposal is not expected to change substantially, and will be managed within the existing liquid waste management system and under existing EP Act Licence L6107/1967 conditions, it is anticipated that the objective in relation to the marine environment will be met.

8 WATER RESOURCES

8.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for water resources is:

- to maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected (EPA 2009a).

8.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

The *Rights in Water and Irrigation Act 1914* (RWI Act) regulates water issues with respect to the taking of groundwater (amongst other matters) and is administered by Department of Water (DoW).

CSBP water resource management is based on the three central concepts of:

- source diversity
- source protection
- appropriate water for relevant uses.

With the water management activities for the site based on this policy, CSBP received the State Environment Award in 2005 for Water Management and Conservation from the Premier's Water Foundation. Whilst appreciating the independent recognition of its activities, CSBP also recognises that its performance in managing water needs to continually improve to ensure it retains Government and community support for its activities.

CSBP has an operating strategy for groundwater extraction and use which is currently implemented on site. The document covers how much water per day can be extracted and from which bores. It also outlines the monitoring that is undertaken at the site for water levels and for water quality conditions.

8.3 DESCRIPTION OF FACTOR

Process water usage by the CSBP Kwinana Industrial Complex was approximately 3230 ML/yr in 2009 to 2010. Water is sourced as follows:

- KWRP (1400 ML/yr)
- directly from groundwater (1355 ML/yr)
- remediated groundwater from Western Power (455 ML/yr)
- recycled process waters (20 ML/yr).

The use of potable scheme water for processing is minimised wherever possible. Scheme water usage at CSBP has progressively decreased through ensuring process needs are met from alternative sources such as KWRP and bore water. Scheme water use by the CSBP Kwinana Industrial Complex was approximately 76 ML in 2009 to 2010.

CSBP is a foundation client of KWRP, which supplies (secondary treated) high quality industrial-grade water following treatment of wastewater from the Woodman Point wastewater treatment plant. Water from KWRP is supplied to purchasers in the KIA to replace potable scheme water use in industrial processes.

CSBP holds water abstraction licences under the RWI Act, which permits abstraction of up to 4400 ML/yr from bores in the Tamala (superficial) and Yarragadee (sub-artesian) aquifers. Annual groundwater abstraction has gradually increased over the years but has remained within licence limits. The increase is mainly due to scheme water saving initiatives between CSBP and its neighbours, where a significant volume of sub-artesian water is transferred to Tiwest.

8.4 POTENTIAL SOURCES OF IMPACT

The proposed expansion will increase annual water consumption to meet process demands. The expansion will require approximately 520 ML/yr (minimum usage when using preferred water source options) additional to the current usage of 3230 ML/yr. Table 3.24 outlines the current and future water resource use by the various CSBP facilities at Kwinana.

Table 3.24 Current and proposed water sources and use

Water source	CSBP Kwinana Allocation (ML/y)	Current use 2009/10 (ML/yr)	Future use (incorporating this proposal) (ML/yr)
Kwinana Water Reclamation Plant	1400	1400	1800[b]
Superficial Aquifer	1900	1374	1550 – 1900
Sub-artesian Aquifer	2900	0	0 - 2500
Western Power Industrial Water Source[a]	730	455	730
Water Recycled between CSBP plants	-	20	24

Notes:

a. This relatively high quality water is supplied to CSBP for industrial use under contract by Western Power.

b. CSBP preference is to use KWRP water (an additional supply) for this proposal (cooling tower use), but is subject to a satisfactory agreement being reached with the Water Corporation. In the event this is not possible, CSBP has access to other sustainable sources that can be used as described in the volume ranges in the Table.

The exact mixture of water sources for the nitric acid plant cooling tower is difficult to predict. Waters from various sources need to be blended to prevent corrosion damage to the cooling tower. Given the uncertainties, the volume ranges in Table 3.24 above will provide sustainable resources for the project.

Scheme water consumption in amenity areas will increase during implantation of the expansion due to the employment of additional staff during the construction phase. Following commissioning of the expansion, a small increase in the permanent site workforce is expected to contribute to a small increase in scheme water consumption.

8.5 ASSESSMENT OF POTENTIAL IMPACT

The preferred outcome for meeting the increased process water demands resulting from the proposal is to use recycled water from the KWRP, subject to satisfactory negotiations with the Water Corporation to extend the CSBP off-take of KWRP water, which is likely to occur in 2012. In the event that this source is not available and/or is inadequate to meet the project demands, CSBP considers there is sufficient access to sustainable groundwater (superficial and artesian aquifers) to supply water for this proposed project (estimated at 1500 to 1900 ML/yr depending on water quality) within the allocation limit on the current RWI Act licence. Scheme water from the Water Corporation reticulated system is available to the site if needed to supplement the other sources, and is the least preferred alternative.

While the preference would be to use recycled water from the KWRP, CSBP is confident that alternative water sources are available to satisfy projected ANPF water demands. This alternative would require additional treatment chemicals and the installation of a dedicated (reverse osmosis) water treatment plant on site. Such a treatment plant would also generate additional liquid wastes such as backwash water requiring disposal to SDOOL (Refer to Section 7).

As part of CSBP commitments to the KWRP, the use of treated industrial grade water sourced from the KWRP is considered the most preferable source of water for the project, subject to environmental, technical and commercial factors, which are based on the quality of the available water and the security of supply.

8.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will source water for this project from either KWRP, or sustainable ground water supplies under licence.

Water Corporation scheme water will not be used extensively for process purposes except in emergency or supply disruption situations.

CSBP will continue its internal programs directed at increasing water use efficiency and source protection.

8.7 ENVIRONMENTAL OUTCOME

As the project will use recycled water from the KWRP or sustainable ground water supplies under licence, the environmental objective for this factor will be met.

9 SITE CONTAMINATION

9.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for contamination is:

- to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).

9.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

The *Contaminated Sites Act 2003* and the *Contaminated Sites Regulations 2006* are enforced by the DEC. The Contaminated Sites Management Series by the DEC provides guidance to the *Contaminated Sites Act 2003* ranging from contaminating activities, investigation and reporting through to auditing and classification.

Concentrations of contaminants in soil and groundwater are compared to guidelines in order to ascertain the risk to environmental and human health. Soil guidelines for both the Ecological Investigation Levels (EILs) and Health Investigation Levels for an industrial setting (HIL-F) are sourced from the DEC document, *Contaminated Sites Management Series – Assessment Levels for Soil, Sediment and Groundwater* (DEC 2010b). Groundwater guidelines are sourced from ANZECC & ARMCANZ (2000b) *Australian Water Quality Guidelines for Fresh and Marine Water Quality* as the down-hydraulic gradient receptor to the site is the Cockburn Sound.

9.3 DESCRIPTION OF FACTOR

The CSBP Kwinana Industrial Complex has been classified as '*Possibly Contaminated – Investigation Required*' by the Contaminated Sites Branch of the DEC under the *Contaminated Sites Act 2003*. As a result of historic industrial practices during fertiliser and chemicals manufacture, contamination has been reported in soil and groundwater. Table 3.25 lists contaminants reported to the DEC and their relevance to the proposal.

Table 3.25 Environmental contaminants at CSBP Kwinana Industrial Complex

Contaminant	Soil impacts	Groundwater impacts	Within Proposal footprint
Arsenic	Yes	Yes	Yes
Hydrocarbons	Yes	Yes	No
Ammonium sulphate	Yes	Yes	No
Heavy metals	Yes	Yes	No

Elevated concentrations of arsenic in groundwater were detected during routine groundwater monitoring in the vicinity of the original ammonia plant (now demolished). Investigations determined that the arsenic was relatively immobile, remaining relatively close to the source area.

A recent human health and environmental risk assessment completed by URS Australia Pty Ltd (URS 2010) found that the main arsenic plume is decreasing in size and concentration. The human health risk of arsenic in groundwater is considered to be a risk only for direct dermal contact and inhalation. Concentrations of arsenic in soil were not of a level considered to be a risk to human health.

9.4 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will continue to manage the site in accordance with the *Contaminated Sites Act 2003* classification of '*Possibly Contaminated – Investigation Required*'.

CSBP will continue to communicate investigations and management undertaken; with the DEC and a *Contaminated Sites Act* accredited auditor.

CSBP will continue to review and implement the existing CSBP Waste Management Plan and related Solid Waste Procedure with respect to any contaminated soil/groundwater that may be excavated during construction.

9.5 ENVIRONMENTAL OUTCOME

As CSBP will continue to manage the site in accordance with the *Contaminated Sites Act 2003* classification, and known contamination at the site is unlikely to be disturbed by the construction, it is expected that the environmental objective for this factor will be met.

10 SOLID WASTE

10.1 ENVIRONMENTAL OBJECTIVE

The environmental objectives for solid waste are:

- to ensure that land uses and activities that may emit or cause pollution are managed to maintain:
  - physical and biological environment and the natural processes that support life
  - the health, welfare and amenity of people and land uses (EPA 2008)
- to ensure that pollutants emitted are as low as reasonably practicable, and comply with all statutory requirements and acceptable standards (EPA 2008).

10.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

Waste disposal is managed on site in accordance with the Environmental Protection Regulations 1987 which governs the general control of pollution and, more specifically, the Environmental Protection (Controlled Waste) Regulations 2004 which outline obligations relating to the transportation and disposal of ‘controlled’ (generally hazardous) wastes.

CSBP has a Solid Waste Management Plan in place which addresses the appropriate handling, storage and disposal methods for solid waste on site. This plan includes information on appropriate management of recyclable materials, non-recyclable materials, hazardous waste and emergency response waste recovery.

10.3 DESCRIPTION OF FACTOR

10.3.1 Existing waste generation

Solid waste is produced on site as a part of the manufacturing process. Table 3.26 lists the solid waste types and amounts produced at the CSBP site for all the operations on site from 2003 to 2009.

Table 3.26 Solid waste generation (in tonnes per annum)

Waste type	03/04	04/05	05/06[a]	06/07	07/08	08/09
Domestic waste	98	97	93	100	97	82
Domestic recycling	24	24	27	26	38	29
General waste	415	449	446	921	734	403
Site recycling (scrap metal, etc)[b]	183	452	251	156	140	494
Asbestos removal[c]	29	215	840	172	202	414
Contaminated	1117	366	552	0.14	1	17
Total	**1866**	**1603**	**2209**	**1375**	**1212**	**1439**

a. Year 05/06 included the old ammonia plant demolition.
b. Recycling is variable and dependent upon the activities undertaken on site.
c. Asbestos removal was required for shed cladding, which is not a part of the ammonium nitrate process.

The ammonium nitrate production process will primarily generate general waste and includes provisions for on-site recycling. As shown in Table 3.26, the volume of general waste increased in 06/07 and 07/08 during construction of the previous expansion (CSBP 2005) but reduced to pre-construction levels in 08/09.

Generation of solid waste from the existing ammonium nitrate plants and the 2008 prilling plant is negligible; however, some solid waste is produced by the nitric acid plants.

10.3.2 Current waste minimisation initiatives

CSBP implements a waste recycling program that focuses on reducing waste to local landfill by re-cycling, reuse or reduction of waste. CSBP recycles or reuses catalyst, steel, paper, oil, grease, pallets, batteries, rubber conveyor belts, drums, paper and plastics, utilising an on-site recycling transfer station as a central repository for many of these. All avenues for reuse and recycling are considered for each waste stream and are explored by CSBP prior to disposal to a landfill.

Some initiatives already adopted at the site include the reuse of conveyor belts, water and oil, as well as appropriate induction of personnel in waste management procedures.

CSBP is an active member of the Kwinana Industry Council (KIC) Eco Efficiency Committee. Through participation in this group, CSBP is involved in reviewing the potential for synergies between industry, in the areas of waste and energy, to take advantage of potential improvements in efficiency and contribute to sustainability in the region.

10.3.3 Ammonium nitrate off-specification product

CSBP has defined processes for the storage, handing and treatment of ammonium nitrate materials. Ammonium nitrate off-specification product within control of classified areas of the ammonium nitrate supply chain is allowed to be reincorporated into the normal product stream.

Ammonium nitrate material that has not been kept within control of classified areas of the ammonium nitrate supply chain, or that has come into contact with incompatible materials, is not to be stored on site within these classified ammonium nitrate storage areas. This material is rendered safe and disposed of appropriately.

The 2008 prilling plant currently generates approximately 5000 m^3 per annum of 10-20 per cent w/w ammonium nitrate solution as a result of washing and cleaning activities that occur within the plant. This weak nitrogenous solution has a low nutrient value and can be recycled as a water source within the manufacturing that occurs in fertiliser granulation, and as a component of some liquid fertilisers.

The vast majority of ammonium nitrate solution is generated during 2008 prilling plant cleaning/shut-down activities. As operational experience and reliability of the 2008 prilling plant has increased significantly since it was commissioned, the generation of off specification ammonium nitrate has greatly reduced. CSBP focuses on ensuring continuing minimisation of this waste solution and on improving the reliability of 2008 prilling plant.

The expansion of ammonium nitrate production capacity will in itself require the 2008 prilling plant to maintain reliable smooth prilling operations to consume this new ammonium nitrate capacity. Therefore, the proposed expansion is not expected to result in additional waste generation within the prilling operation because no new cleaning or shutdown requirements additional to the current mode of operation are required.

10.4 POTENTIAL SOURCES OF IMPACT

The proposed expansion will result in the generation of additional wastes during the construction phase; however, solid waste from the operational phase is expected to be negligible.

10.5 ASSESSMENT OF POTENTIAL IMPACT

During construction, it is likely that the general wastes will increase to levels similar to those shown for years 06/07 and 07/08 in Table 3.26; however, these increases will be temporary. It is expected that levels of general waste will reduce to close to current levels during operation.

Solid wastes produced on site as a part of the manufacturing process are held on site, assessed and disposed of in accordance with the site waste management procedures. Any waste deemed as 'controlled waste' will conform to DEC regulations for licensed disposal.

Solid waste generation on site is considered a minor impact and the additional waste volumes will be managed under the CSBP Waste Management Plan and procedures that will be updated to account for implementation of this proposal.

10.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will continue to review and implement the existing CSBP Waste Management Plan and related Solid Waste Procedure.

10.7 ENVIRONMENTAL OUTCOME

As there will only be a slight increase in the generation of solid waste as a result of this proposal, and that existing procedures can ensure no significant environmental impact results, it is expected that the EPA objective in relation to solid waste will be met.

11 NOISE

11.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for noise is:

- to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards (EPA 2009a).

11.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

Environmental noise is governed by the Environmental Protection (Noise) Regulations 1997. These regulations stipulate maximum allowable external noise levels that can be emitted by premises (Table 3.27).

Table 3.27 Assigned noise levels

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Residential	0700 – 1900 hours Monday to Saturday	45	55	65
	0900 - 1900 hours Sunday and Public Holidays	40	50	65
	1900 - 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35	45	55
Commercial premises	All hours	60	75	80
Industrial and utility premises	All hours	65	80	90

The levels in Table 3.27 are conditional on the absence of certain characteristics existing in the noise of concern, such as tonality, modulation or impulsiveness. If such characteristics exist then any measured level is adjusted according to Table 3.28.

Table 3.28 Adjustment to measured levels

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: these adjustments are cumulative to a maximum of 15 dB.

The closest residences to the site have no influencing factor and the levels in Table 3.27 consequently apply to the ANPF. As the ANPF operates for more than 10 per cent of the time, the L_{A10} levels of 45 dB(A) and 35 dB(A) must be met at the closest sensitive receptor during the day and night times, respectively.

Noise emissions from the ANPF are not expected to have tonal characteristics at noise sensitive receiver locations. The predicted noise emissions from CSBP are relatively low compared to the overall background noise at the receiver locations and will typically be at least 5 dB(A) less than the overall noise level. The CSBP noise emissions are unlikely to have distinctive audible characteristics at the residential locations, due to the masking effect of cumulative background noise and the lack of distinct noise characteristics in the noise emission. Noise emissions from CSBP operations are predicted to be 30 dB(A) or less at residential areas, and under the Regulations will therefore not be considered as 'significantly contributing' to the overall noise level. The predicted noise emissions are expected to comply with the Regulation requirements.

At present, the industrial receiver L_{A10} 'assigned levels' are 65 dB(A), with an adjustment of +5 dB(A) to the measured/predicted level if the noise is tonal in characteristic.

DEC is in the process of a 'Regulation Review' and has advised that a change to industrial noise 'assigned levels' is being pursued. The DEC proposal is to increase the Industrial Receiver L_{A10} 'assigned level' from 65 dB(A) to 75 dB(A), with an adjustment of +5 dB(A) to the measured/predicted level if the noise is tonal in characteristic.

11.3 DESCRIPTION OF FACTOR

11.3.1 Current noise abatement technology

Noise attenuation measures implemented in various areas of the ANPF to date have included installation of acoustic lagging on pipe work and intercoolers, silencers on plant boiler blowdown vents and lining of the compressor house with acoustic absorbent material. These attenuation measures have been implemented to reduce the area of high intensity noise (>100 dB(A)) within the ANPF, and achieve noise levels in occupancy areas within the CSBP Kwinana Industrial Complex of less than 85 dB(A) where practicable. Noise control of the compressor and intercooler system of the nitric acid ammonium nitrate plant commissioned in 1996 (a commitment made as part of the previous expansion) achieved the objective of a 10 dB(A) reduction in emitted sound power.

11.3.2 Existing noise emissions

The nearest industrial noise sensitive premises is the BP Refinery adjacent to the northern boundary of the CSBP site, which has experienced historical noise exceedances from CSBP operations, and the nearest non-industrial noise sensitive premises is located approximately three kilometres east of the site at Medina and Calista (Figure 1.8). CSBP measures noise emissions from the CSBP Kwinana Industrial Complex on an ongoing basis due to the proximity of sensitive industrial and non-industrial premises.

Herring Storer Acoustics (2008a) conducted post-commissioning acoustic measurements following completion of construction of the second nitric acid ammonium nitrate plant. Noise monitoring demonstrated that the noise control applied to the existing nitric acid ammonium nitrate plants had met the previous expansion project commitments (Herring Storer 2008a). As post-commissioning measurements were consistent with modelling inputs, it was reasonably concluded that noise emissions from CSBP operations at Kwinana to residential premises at Medina and Calista complied with the requirements of the Regulations (Herring Storer 2008b).

Herring Storer Acoustics also conducted acoustic commissioning measurements for the 2008 prilling plant (Herring Storer 2008b). Noise monitoring conducted on the 2008 prilling plant identified the final scrubber pump sets as significant noise emitters; however, the location of these pumps in comparison to the plant and other buildings meant that significant buffering of this noise occurred in the Medina and Calista residential area direction (Herring Storer 2008b).

Noise control monitoring on the ammonia plant conducted by Herring Storer Acoustics (2008c) identified noise at the northern boundary to be slightly greater than the proposed compliance target of 70 dB(A) (following adjustment for tonality). Contributions to this measured noise level closest to the boundary were from steam condensate vents, control valves and the auxiliary boiler (Herring Storer 2008c).

Directional noise monitoring was conducted at Chalk Hill in Medina by Herring Storer Acoustics in April 2009 following commissioning of the previous expansion. The overall noise level at Chalk Hill had decreased; however, the measured noise from the CSBP Kwinana Industrial Complex direction was considered to have increased. Noise originating from the site direction under full operation was measured to be 6 to 8 dB(A) greater than the acoustic model predicted. At this level, the contribution from the CSBP direction exceeded the night time assigned level of the Regulations by up to 8.5 dB (after adjustment for tonal characteristic or significantly contributing premises).

The additional noise was considered to be from the direction of the Sodium Cyanide Manufacturing Facility (SCMF) located on the eastern side of the site (Herring Storer 2009). The monitoring in 2009 was not able to establish whether there were noise sources other than CSBP SCMF contributing to the noise attributed to the CSBP directional component; however, the audibility of some SCMF sources suggested that the SCMF was at least partly responsible for the measured noise level. Noise attenuation actions are occurring in the SCMF, as detailed in the CSBP Kwinana Environmental Noise Management Plan 2008-2010 (CSBP 2009a). To date, Action 19, involving the replacement of one of the two main blowers on Sodium Cyanide Liquids Plant One to eliminate harmonic vibration through pipe work, has been completed. In addition, noise control has been implemented to attenuate solids plant hopper vibrator unit noise which was audible during the 2009 monitoring.

Noise measurements for this proposal were collected from around the CSBP site by Herring Storer Acoustics in February 2010 to enable plotting of current ‘measurement noise contours’ as presented in Figure 3.19. These contours were used to assist in upgrading and verification of the acoustic model prior to predicting noise levels for the proposed expanded ANPF. The noise report is located in Appendix 5.

Figure 3.19 also shows the existing predicted noise contours. It can be seen that the predicted levels are conservative since corresponding measured levels are generally less than the predicted noise levels at the various locations within the noise footprint.

Directional noise monitoring was also conducted at Chalk Hill in July 2010 following the recent upgrade of the Sodium Cyanide Liquids Plant Two Maxitherm and completion of SCMF noise attenuation activities as described above. This monitoring indicated that the overall noise level at Chalk Hill had decreased, and the CSBP Kwinana Industrial Complex contribution was shown to be of the order of 30 dB(A) at Chalk Hill. This is consistent with the acoustic modelling carried out by Herring Storer Acoustics, which predicted slightly higher noise levels.

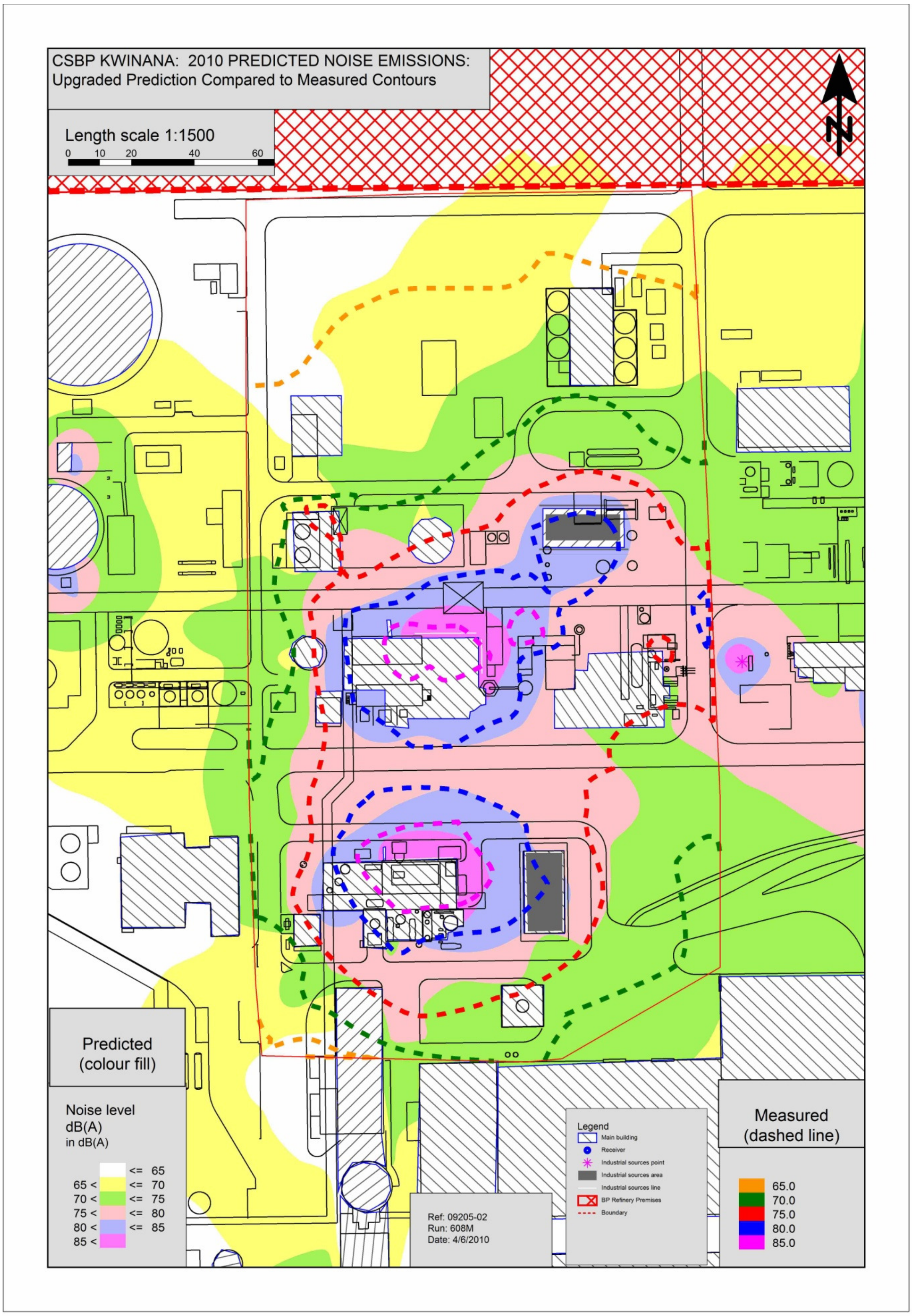


Figure 3.19 Existing nitric acid ammonium nitrate plants predicted and measured noise levels

11.4 POTENTIAL SOURCES OF IMPACT

The proposed expansion is expected to contribute to noise impacts at the premises during both the construction and operation phases. The major sources of noise impacts from this proposal are expected to be from the construction and operation of the proposed nitric acid ammonium nitrate plant.

11.5 ASSESSMENT OF POTENTIAL IMPACT

Herring Storer Acoustics undertook acoustic modelling for the proposal (Herring Storer 2010). There is an existing acoustic model for the site which is represented using modelling software 'SoundPlan, Version 7' and which has been utilised to predict noise emissions from the proposed expansion.

11.5.1 Predicted noise levels at residential premises

Predicted noise levels from the single point calculations are 'worst case' night-time conditions with wind from source to receiver and temperature inversion, and are summarised below in Table 3.29.

Table 3.29 Results of single point calculations operational noise at residential premises

Location	Existing Predicted L_{A10} (dB(A))	Proposed Predicted Proposed Nitric Acid Ammonium Nitrate Plant Only L_{A10} (dB(A))	Proposed Predicted Combined Emitters L_{A10} (dB(A))
Medina Residence	30	22	30
Calista Residence	30	13	30
Leda Residence	27	14	28
Hillman Residence	24	15	25
North Rockingham	25	17	26
East Rockingham (coast)	21	15	22

The predicted noise emissions show that the proposal will not have a significant impact in residential receiver locations. In terms of compliance with Regulations, noise emission contributions of 30 dB(A) or less are not 'significantly contributing' and comply with the requirements. The operational noise impact is therefore considered to be relatively insignificant as the predicted net increase in noise received at residential areas is less than 0.5 dB(A) and would not be detected by the human ear. In addition, there were no noise complaints received by CSBP during 2008/09.

Figure 3.20 shows predicted noise contours during 'worst case' night propagation conditions extending to the residential areas such as Kwinana – Calista – Leda and Hillman and North Rockingham.

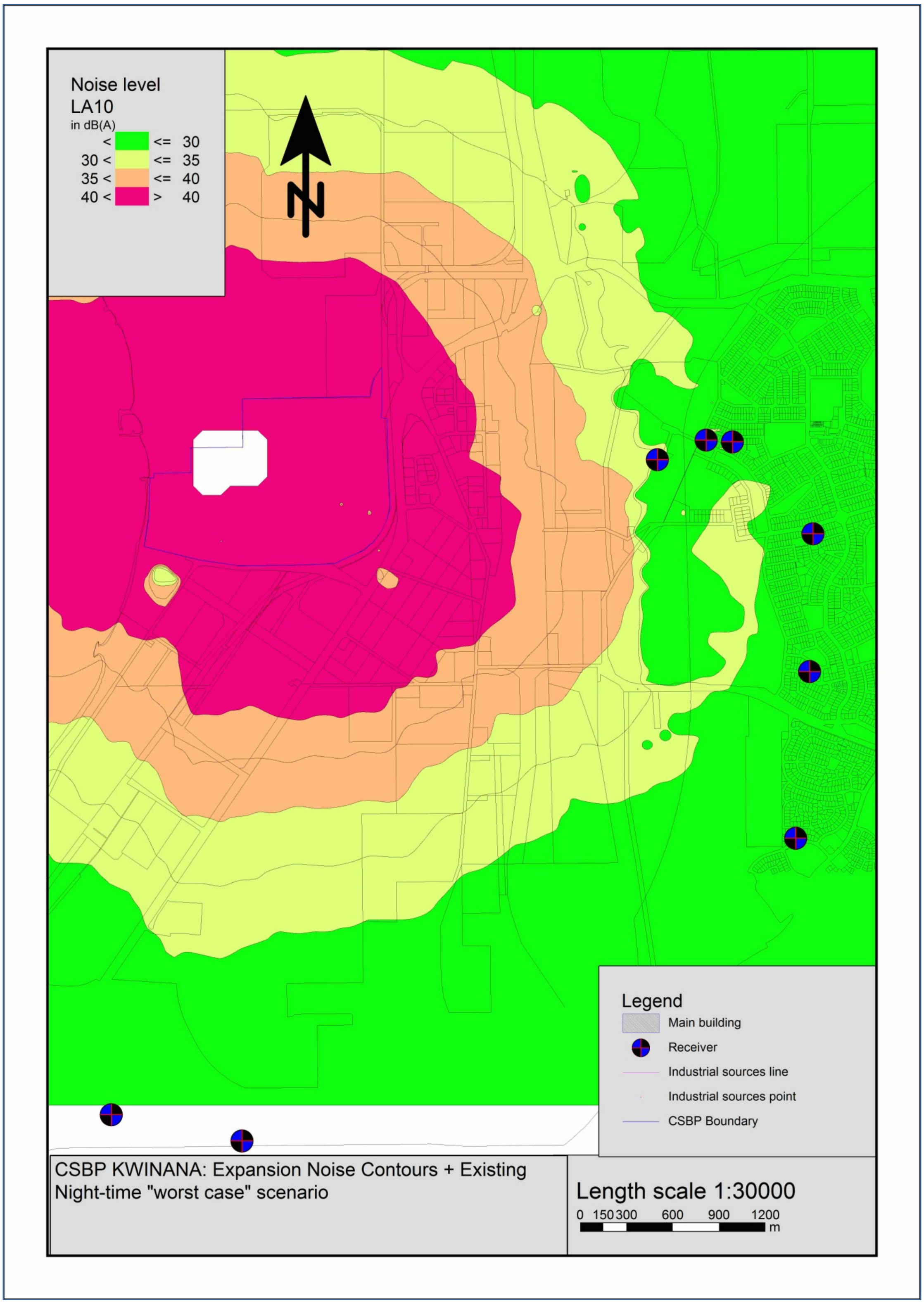


Figure 3.20 Noise contours at residential premises

11.5.2 Predicted noise levels at industrial receivers

The predicted noise levels from the expansion at the BP Refinery nearest boundary under 'worst case' daytime wind conditions are shown in Figure 3.21. Daytime wind conditions have been used for the nearfield modelling as the propagation of noise close to a noise source is not significantly affected by thermal inversions which are an important factor for propagation of noise at night. The predicted noise levels for day or night conditions are therefore similar for locations close to the plant. It has also been assumed that the northern boundary noise emission will be tonal in characteristic. These conditions are considered to present a conservative scenario for the estimation of impacts as the area where CSBP generated noise historically exceeds the noise regulations at the boundary is used for soil remediation and not for processing or for offices.

The noise emissions to the adjacent BP Refinery premises are expected to comply with the proposed Regulation Review industrial 'assigned level' of 75 dB(A) with adjustment for tonal characteristic (design target of 70 dB(A)) if noise attenuation is undertaken within the CSBP Kwinana Industrial Complex or at the northern boundary of the site. This attenuation will be finalised during the design phase of the expansion.

In the event of the proposed Regulation Review not increasing the assigned levels as expected, then CSBP will comply with the existing Regulations within twenty four months of the Regulation Review process ceasing (it is relevant that the small area of the BP Refinery currently potentially subject to exceedance is not a permanent workplace for any person).

11.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will, where necessary, fit noise attenuation features to new equipment or plant installed as part of the expansion to ensure that the overall noise impact from the expanded ANPF complies with the Regulations, as they are proposed to be amended. In the event of the proposed Regulation Review not increasing the assigned levels as expected, then CSBP will comply with the existing Regulations within twenty four months of the Regulation Review process ceasing (it is relevant to note that the small area of the BP Refinery currently potentially subject to exceedance is not a permanent workplace for any person).

CSBP will implement noise control measures in the proposed third nitric acid ammonium nitrate plant to match the second nitric acid ammonium nitrate plant noise attenuation measures.

CSBP will ensure the engineering changes to be implemented for the debottlenecking of the nitric acid ammonium nitrate plants and the 2008 prilling plant will be reviewed by an acoustic consultant to allow identification of any potential increases in noise emission and implementation of appropriate noise control.

The noise mitigation measures for the proposal will be incorporated into the updated Environmental Noise Management Plan (Appendix 3) for the site.

11.7 ENVIRONMENTAL OUTCOME

As CSBP is not expected to significantly contribute to noise levels at sensitive residential receivers, the environmental objective for this factor will be met. As noise monitoring and modelling results show that noise levels at industrial receivers will meet statutory requirements and acceptable standards with appropriate noise attenuation measures implemented, the environmental objective for this factor will be met.

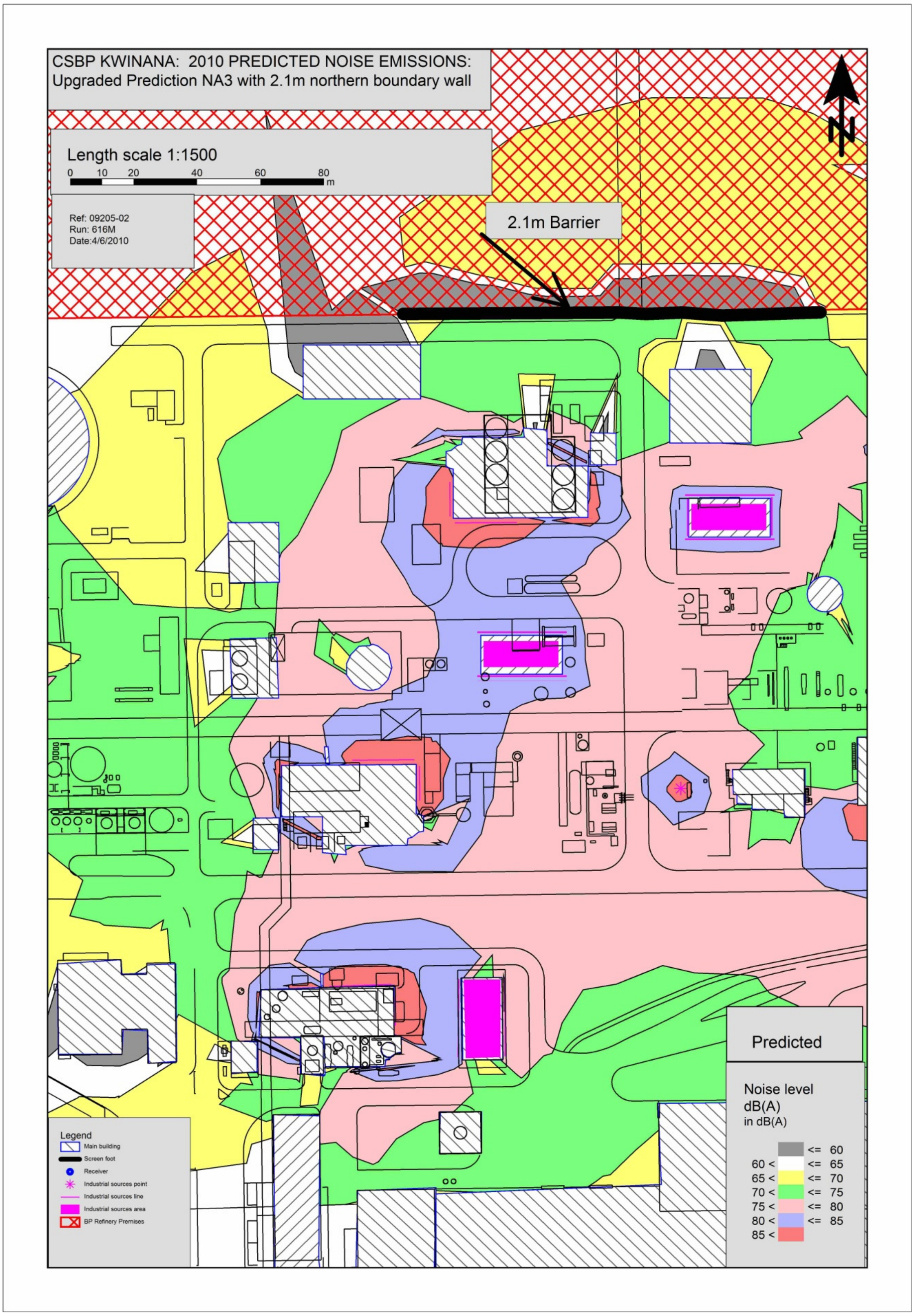


Figure 3.21 Noise contours for industrial receivers

12 PUBLIC RISK

12.1 ENVIRONMENTAL OBJECTIVE, APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

The environmental objective for public risk is:

- to ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria (EPA 2009a).

12.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

The EPA stipulates acceptable risks to which individuals in Western Australia can be subjected. To meet these criteria, proponents must ensure that risk is as low as reasonably achievable and complies with the requirements in EPA *Guidance for the Assessment of Environmental Factors No. 2: Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA 2000).

For Land Use Safety Planning (LUSP) purposes, individual risk results are compared against the criteria established in the EPA Guidance (EPA 2000). Table 3.30 presents a summary of the individual fatality risk criteria.

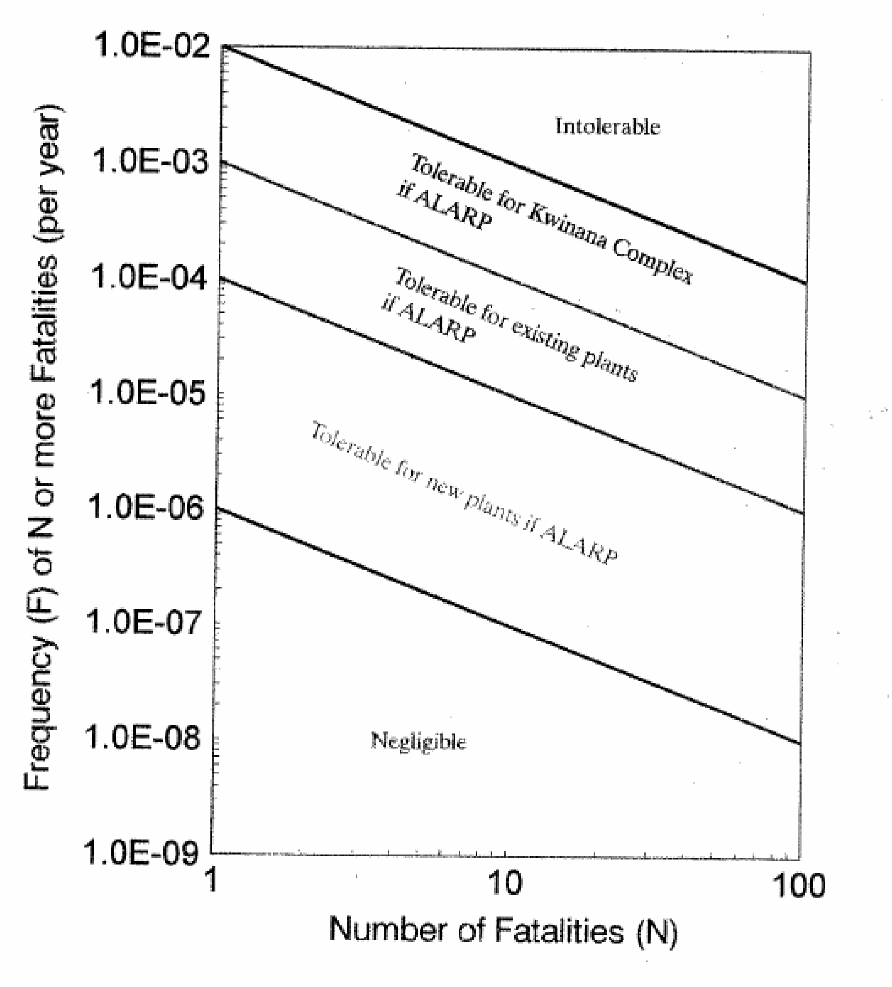
Table 3.30 Individual fatality risk criteria

Land Use	Criteria
Plant Boundary & Maximum Risk	Risk levels from industrial facilities should not exceed a target of fifty-in-a-million per year ($5x10^{-5}$) at the site boundary for each individual industry, and the cumulative risk level imposed upon an industry should not exceed a target of one hundred in a million per year ($1x10^{-4}$).
Active Open Space	A risk level for any non-industrial activity or active open spaces located in buffer areas between industrial facilities and residential areas of ten-in-a-million per year ($1x10^{-5}$), or less, is so small as to be acceptable to the EPA.
Commercial	A risk level for commercial developments, including offices, retail centres, showrooms, restaurants and entertainment centres, located in buffer areas between industrial facilities and residential areas, of five-in-a-million per year ($5x10^{-6}$), or less, is so small as to be acceptable to the EPA.
Residential	A risk level in residential areas of one-in-a-million per year ($1x10^{-6}$), or less, is so small as to be acceptable to the EPA.
Sensitive	A risk level in "sensitive developments", such as hospitals, schools, child care facilities and aged care housing developments, of one-half-in-a-million per year ($5x10^{-7}$), or less, is so small as to be acceptable to the EPA.

Societal risk is also considered in public risk assessments. There are two components to societal risk:

- The number of people exposed to levels of risk is important.
- Society is more averse to incidents which involve multiple fatalities or injuries than to the same number of deaths or injuries occurring through a large number of smaller incidents.

There are no government published societal risk criteria for Western Australia. Planning studies tend to rely on the Interim Societal Risk Criteria (Figure 3.22) that were developed by DNV (then Technica) following the 1987 Kwinana Cumulative Risk Assessment (Technica 1990). This was revised and released in the Cumulative Risk Assessment for Kwinana completed in 1995 (AEA Technology 1995).



ALARP: As Low As Reasonably Practical

Figure 3.22 Societal risk criteria

12.3 DESCRIPTION OF FACTOR

The CSBP Kwinana Industrial Complex is located in the KIA, approximately 40 km south of Perth. The immediate neighbours to the CSBP site are the BP Kwinana Refinery to the north, Coogee Chemicals to the southeast, Bramble Logistics Sulphur Storage to the southwest and Air Liquide Air Separation Plant to the northeast. The Fremantle Port Authority Bulk Cargo Jetty is to the west.

The nearest residential zones are Medina and Calista, in the Town of Kwinana, located approximately three kilometres east of the CSBP site. To the south, the nearest residential area is East Rockingham, located approximately three and a half kilometres from the site.

The nearest Active Open Space is Wells Park, located approximately one kilometre to the south of CSBP on the coast.

The following components (or component parts) of the CSBP Kwinana Industrial Complex contribute to the on-site risk:

- ammonia plant
- sodium cyanide plant
- gas purification plant
- ammonium nitrate solution plants
- nitric acid plants.

A revised Quantitative Risk Assessment (QRA) for the entire CSBP site was completed in May 2007. The purpose of this QRA was to consolidate past QRA reports and to present a comprehensive risk profile for the entire site which included the previous ammonium nitrate production expansion (GHD 2007), The CSBP risk model encompasses all CSBP activities at the site with the potential to cause harm to offsite populations. Using the following steps, the risks associated with equipment failures were assessed:

1. **Hazard identification**; identification of the range of events that could occur at the site.
2. **Frequency analysis**; frequency of each event based on relevant or specific (industry-average) historical records.
3. **Consequence assessment**; different events or scenarios are analysed to determine the scale of consequences in order to measure the impact to people.
4. **Risk analysis**; the frequency and consequence of the scenarios are input into a model that calculates the risk and graphically presents this risk in risk contour diagrams.
5. **Risk criteria**; comparison of the calculated risk to the risk criteria (Table 3.30).

From the GHD (2007) study, the ammonia plant and the sodium cyanide plant (including the associated storage and loading activities) were found to have the highest risk rankings.

Figure 3.23 shows the 'base case' risk contours for the existing CSBP Kwinana Industrial Complex as described by GHD (2007). As these risk contours included the now decommissioned chlor-alkali plant, these base-case risk contours are a conservative representation of the actual base case for the existing CSBP Kwinana Industrial Complex.

In 2007, the QRA showed that the CSBP Kwinana Industrial Complex conforms to Sensitive and Active Open Space individual fatality risk criteria as outlined in Table 3.30. With one exception, the risk profiles for the ammonium nitrate plant, and associated facilities, are within the EPA guideline requirements. The exception is the historical exceedance onto the neighbouring industrial land owned by the BP Refinery immediately to the north of CSBP facilities. This issue dates back to when BP was a joint venture of the original ammonia plant KNC (Kwinana Nitrogen Company) and the neighbouring fence line between BP and CSBP was positioned in a different location which reflected the original land ownership. This fence line has since changed however various prevailing risk contours remain as a legacy issue.

Personnel working at the BP Refinery in this area may be subject to exposure of ammonia releases from the ammonia plant and refrigerated storage tanks. CSBP and BP liaise with regards to site emergency plans.

Figure 3.23 Existing CSBP Kwinana Industrial Complex base case risk contours

12.4 POTENTIAL SOURCES OF IMPACT

The main risk contributors are release gases from streams containing ammonia or mixed nitrous oxides. The ammonium nitrate solution storage tank provides the only potential for an explosion event with offsite effects.

As there is no new technology being proposed for the expansion, the potential hazard sources for the expanded ANPF will be the same as those identified during the GHD (2007) study. The following hazardous outcomes associated with handling ammonium nitrate have the potential to occur at the site:

1. **Toxic vapour cloud**: Spills of material that is poisonous by inhalation can disperse downwind from a release point.
2. **Explosive detonation**: Under certain conditions, ammonium nitrate stored at the ANPF can detonate.
3. **Shrapnel Impact**: High-pressure vessel, plant or equipment failures may generate shrapnel (i.e. fragments).
4. **Electrical fires**: Fires arising as a result of arcing or similar electrical phenomena.
5. **Cellulosic fires**: Fires that involve wood or paper-based materials.

12.5 ASSESSMENT OF POTENTIAL IMPACT

As a full QRA was undertaken in 2007 and the proposed expansion does not involve the introduction of new technology, a full QRA for the Phase 2 Expansion was not deemed necessary for this PER. However, the cumulative total site risk contours have been updated to include the proposed expansion and a technical summary of this is presented in Appendix 6.

As the detailed design of the proposed expansion is still under development, a fully revised and updated QRA for the CSBP site will be prepared. The DMP will be invited to provide input into the development of the updated QRA.

12.5.1 Individual fatality risk

The ammonia plant (associated production, storage and loading activities) and the sodium cyanide plant have the highest risk rankings and dominate the risk profile. As there will be no significant change to the risk profile associated with the other components involved in the proposed expansion, it is expected that these plants will continue to dominate the risk profile, and the risk for the site will be similar to the base case as described in Section 12.3.

Two risk scenarios have been investigated for the expansion. The first scenario describes risk associated with importing ammonia (typically 14 shipments per year, up from the current licensed 9 shipments per year), the inclusion of the ANPF expansion facility and producing ammonia at the CSBP site for the proposal. The second scenario describes risk associated with the maximum proposed shipping rate of 25 shipments per year, the inclusion of the ANPF expansion facility and the cessation of ammonia production on site. This scenario would eventuate primarily for contingency, such as in the event of ammonia not being produced on site. These scenarios and the modelled risk results are described in the following sections.

Scenario 1

Figure 3.24 shows the updated contours for Scenario 1 of the proposed expanded CSBP Kwinana Industrial Complex, provided by GHD, where it can be seen that these contours are similar to the base-case (Figure 3.23). The main differences are at the northern boundary of the site where some of the contours have widened slightly. There is a slight increase from the base-case in the $5x10^{-5}$ contour extending onto BP land (approximately 75 to 85 m into the BP Refinery site).

Scenario 2

Figure 3.25 shows the updated contours for Scenario 2 of the proposed expanded CSBP Kwinana Industrial Complex, provided by GHD, where it can be seen that these contours are similar to the base-case (Figure 3.23). The main differences are at the northern boundary of the site where some of the contours have widened slightly. There is a slight increase from the base-case in the $5x10^{-5}$ contour extending onto BP land (approximately 75 to 85 m into the BP Refinery site) and an increase of risk at the shipping berths (Fremantle Port Authority Bulk Cargo Jetty). The increase in the $5x10^{-5}$ contour at the jetty is related to the increase in ammonia shipments and resides wholly within the immediate vicinity of the Fremantle Port Authority Bulk Cargo Jetty. Scenario 2 will have a very slightly reduced risk at the northern boundary in comparison to Scenario 1.

No increase in risk onto public land has been measured as a result of the increased risk at the jetty for Scenario 2. Wells Park is approximately 830 m from the jetty, with the $1x10^{-7}$ contour extending approximately 250 m from the jetty (the criteria for Active Open Space being $1x10^{-5}$). Furthermore, under this scenario the ammonia plant would not be in operation (creating the need to import), thus there is a significant reduction in the magnitude and contour of risk profile in the associated geography around the ammonia plant.

For both scenarios, the following applies:

- as the CSBP ammonia import infrastructure is situated entirely within CSBP/Fremantle Port Authority privately owned industrial land, the infrastructure is well controlled and is not exposed to other influences that may occur if it were to be situated in public space
- there is no net increase in ammonia static inventory, and thus no increase in potential consequence.

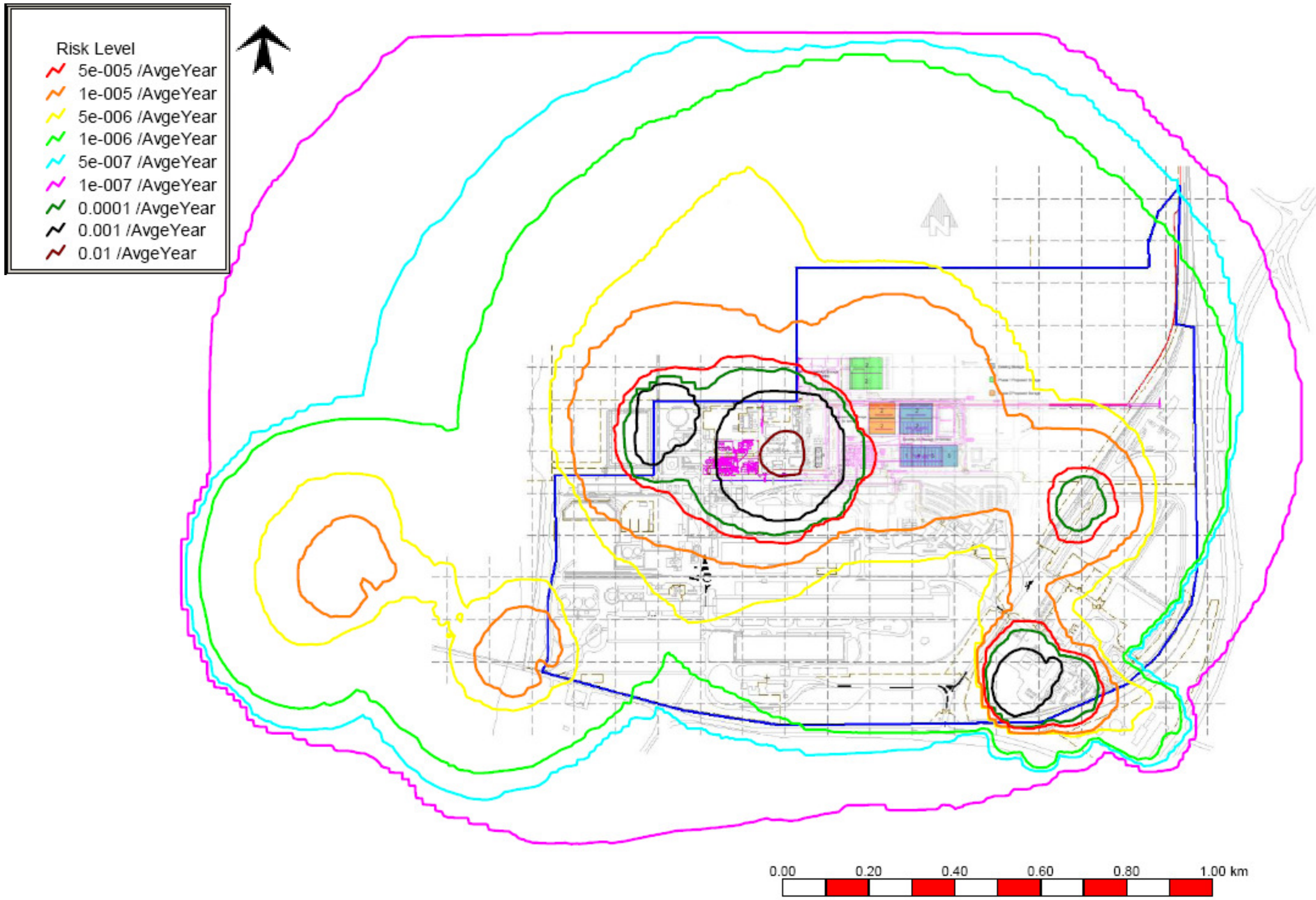


Figure 3.24 Risk contours for the proposed expanded CSBP Kwinana Industrial Complex (14 shipments of ammonia, production of ammonia on site)

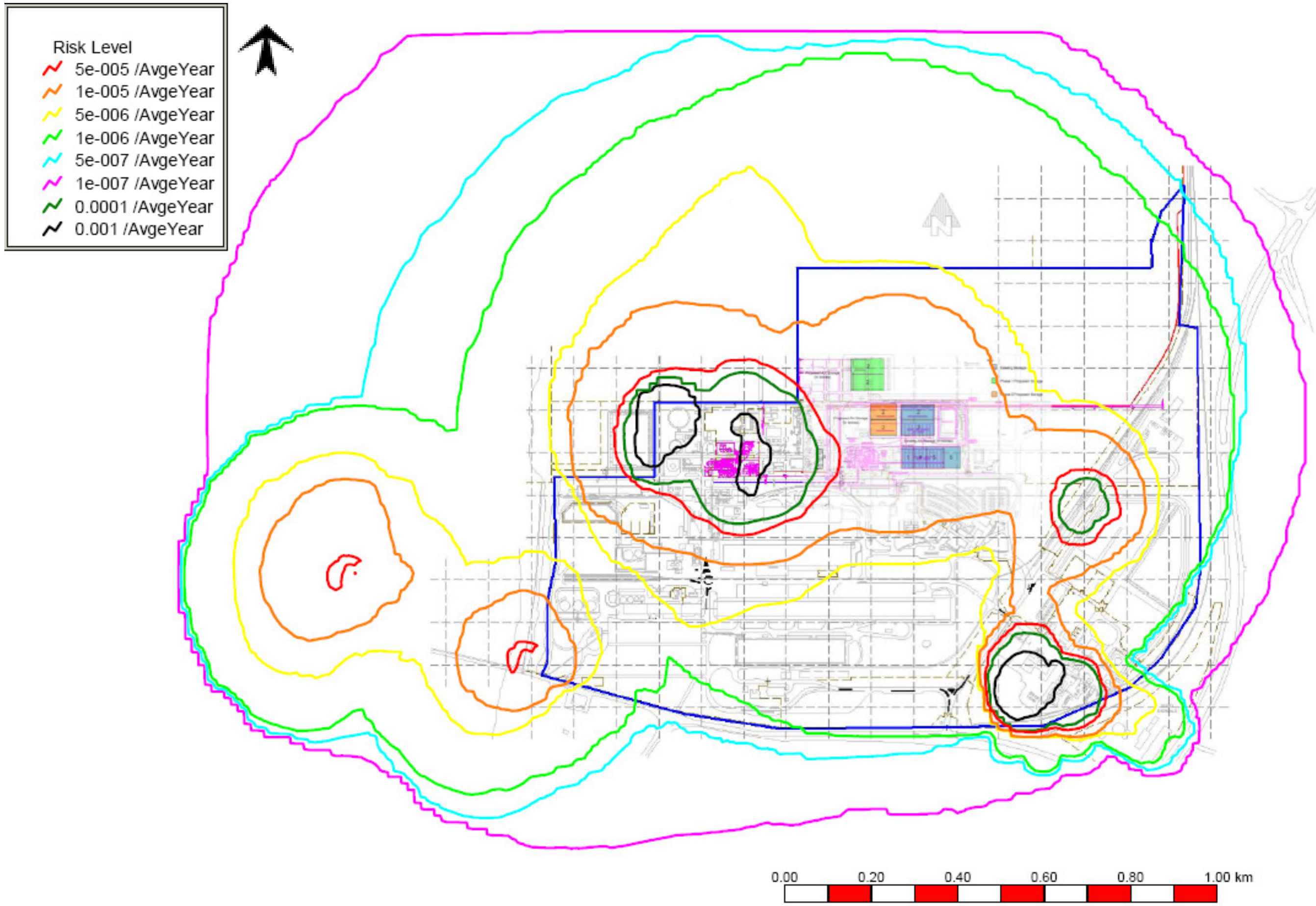


Figure 3.25 Risk contours for the proposed expanded CSBP Kwinana Industrial Complex (25 shipments of ammonia, no production of ammonia on site)

Risk results

The risk profiles for both scenarios are very similar to each other and to the base case. The risk posed by the scenarios for proposed development of a third nitric acid ammonium nitrate plant, debottlenecking of existing nitric acid ammonium nitrate plants, and debottlenecking of the existing 2008 prilling plant have been assessed against the EPA individual fatality risk. Table 3.31 provides an overview of the results.

Table 3.31 Individual fatality risk results

Land Use	Criteria	Results
Plant Boundary and Maximum Risk	$5x10^{-5}$ at the site boundary for each individual industry. $1x10^{-4}$ cumulative risk level imposed upon an industry	Existing ANPF exceeds the CSBP Kwinana Industrial Complex boundary criteria at one location (in the vicinity of the BP facility). Proposed expansion results in a slight increase in risk in this area.
Active Open Space	$1x10^{-5}$ for any non-industrial activity or active open spaces located in buffer areas between industrial facilities and residential areas.	Modelling indicates the proposed expansion does not exceed the criterion. Wells Park is located over 1 km from the proposed development and 850 m from the CSBP Jetty. The CSBP ammonia import infrastructure is situated entirely within CSBP/ Fremantle Port Authority privately owned industrial land.
Commercial	$5x10^{-6}$ for commercial developments, including offices, retail centres, showrooms, restaurants and entertainment centres, located in buffer areas between industrial facilities and residential areas.	Modelling indicates the proposed expansion does not exceed these criteria. The nearest commercial operation would be the take away facility on Rockingham Road (corner Beach Road) which is over 1 km south-east from the proposed development. The commercial development contour extends some 50 m outside the CSBP Kwinana Industrial Complex boundary in a south easterly direction.
Residential	$1x10^{-6}$ in residential areas.	Modelling indicates the proposed expansion does not exceed the criterion. There is no change in the $1x10^{-6}$ contour from the proposed development; it continues to extend outside the site boundary by 50 m on the western boundary. The nearest residential area is in Medina which is approximately 3 km from the proposed development.
Sensitive	$5x10^{-7}$ in "sensitive developments", such as hospitals, schools, child care facilities and aged care housing developments.	Modelling indicates the proposed expansion does not exceed the criterion.

As presented in Table 3.31, the proposed expansion should not significantly affect the LUSP aspects associated with the CSBP Kwinana operations.

The historical exceedance of risk extending onto BP Refinery land is managed by BP and CSBP. The area is utilised for soil remediation by BP and therefore is not normally populated; however, management will continue with the proposed development.

12.5.2 Societal risk

Societal risk results are taken from the Kwinana Cumulative Risk and Land Use Plan (DMP 2008) and are shown in Figure 3.26. Two curves are shown, one for the potential impact on the surrounding residential population. This is placed well within the 'negligible' section of the societal risk curve. The second curve shows the potential impact of the CSBP activities on the populations of surrounding industrial developments, including BP and Coogee Chemicals. For less than one fatality, the curve resides in the 'Tolerable for existing plant if ALARP' region.

Societal risk results (Figure 3.26) indicate that the proposed development, when considered with the existing facility, is negligible on the surrounding residential population and tolerable for the neighbouring industrial facilities. The ALARP assessment is included in the CSBP Ammonia, Ammonium Nitrate Production Facility Safety Report currently being revised for DMP. This Safety Report does not include the proposed expansion; however, the Safety Report will be revised to include this in the event the proposal receives the appropriate approvals. Any revision of the Safety Report will also include changes to the number of ammonia imports.

12.5.3 Emergency events

Process Plant Events

As discussed in Section 12.4, a number of different unwanted events have the potential to occur at the ANPF. In relation to the proposed new nitric acid ammonium nitrate plant, the unwanted events are associated with toxic gas releases (ammonia and nitrous oxides) and explosive detonation (ammonium nitrate solution). As part of CSBP obligations under the *Dangerous Goods Safety Act 2004*, the requirement exists to ensure that the risks associated with the facility are reduced so far as reasonably practicable. To facilitate the achievement of this reduction, all unwanted events that have the potential to cause serious harm to persons have been fully risk-assessed. The risk assessment has identified the means by which the unwanted events can be prevented, as well as how the magnitude and severity of the unwanted events can be mitigated.

The mitigation of the events is achieved through the further enhancement of existing appropriate emergency response plans to reflect the proposed expanded plant, which encompass incident response by appropriately trained and equipped personnel.

A contingency plan for the accidental release of large amounts of gaseous ammonia is included within the existing CSBP Kwinana Emergency Management Plan.

Potential shipping accidents

The management of shipping movements within the Fremantle Outer Harbour falls under the responsibility of Fremantle Ports Authority. Currently, the Fremantle Ports Authority manages the risks associated with the movement of a large number of ships within the Outer Harbour through appropriate management of ship movement in the channel. The physical limitation of the shipping channel, together with the limitation on berthing utilisation, provides an effective barrier, and reduces the risks associated with ship movement in the outer harbour.

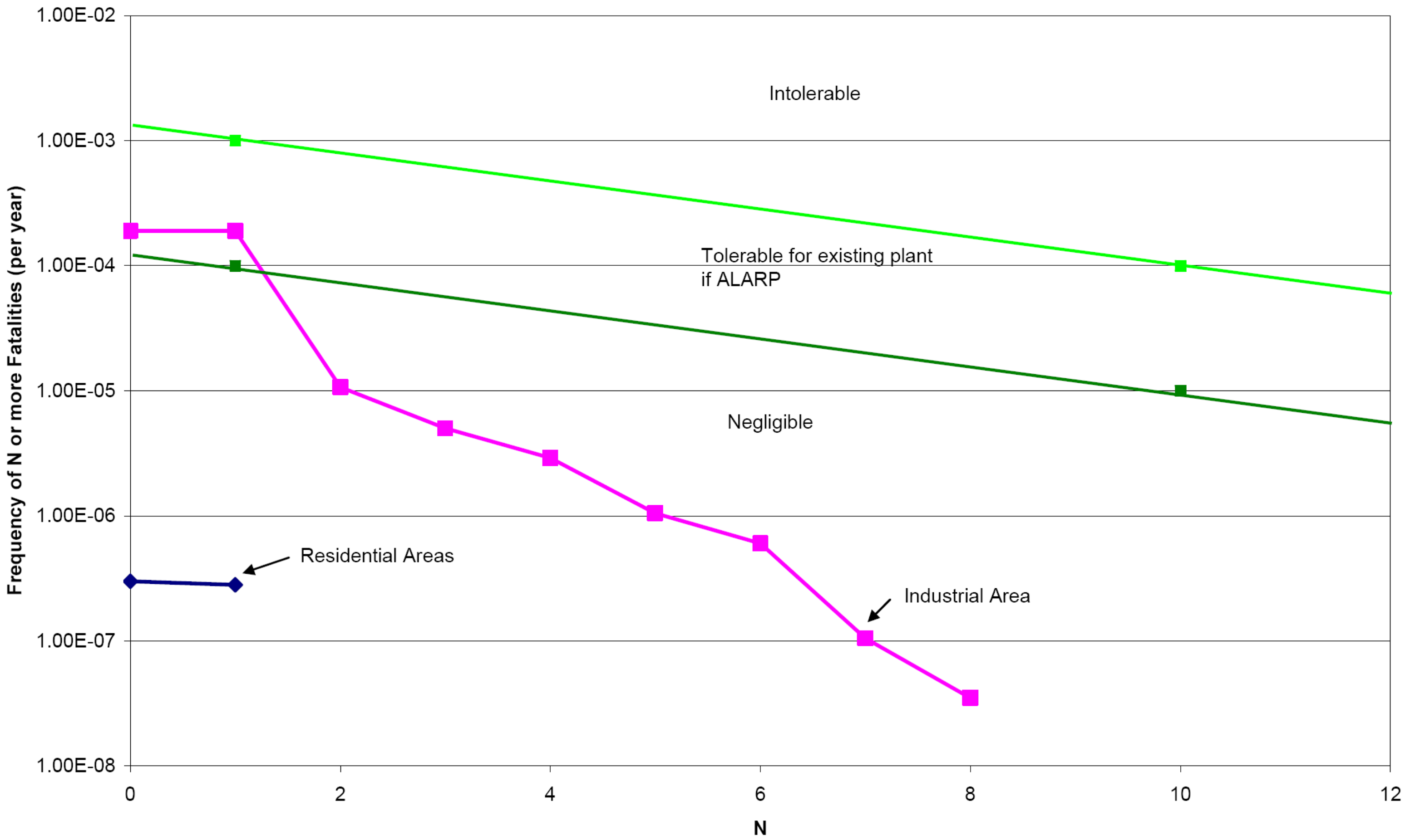


Figure 3.26 Societal Risk Results

12.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

CSBP will continue to maintain a Safety Report as described under the *Dangerous Goods Safety Act 2004* (and subordinate legislation such as MHF Regulations), as required by the ANPF dangerous goods licence or other relevant legislation, with the advice of the DMP to provide the framework to ensure that emergency response is appropriate to respond to all scenarios.

CSBP will obtain and maintain the relevant Dangerous Goods Licences for the ANPF.

A full QRA will be presented to the DMP for their consideration in line with the requirements of the Dangerous Goods Licence.

12.7 ENVIRONMENTAL OUTCOME

Considering the updated risk contours show compliance with all but one of the applicable risk criteria (an historical exceedance relating to change of land ownership), and that there is existing management in place and liaison with BP regarding the incursion of risk from CSBP over the BP Refinery site, CSBP believes the environmental objective for this factor will be met.

13 TRAFFIC AND SHIPPING

13.1 ENVIRONMENTAL OBJECTIVE

The environmental objective for traffic and shipping is:

- to ensure that any increases in traffic and shipping do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

13.2 DESCRIPTION OF FACTOR

13.2.1 Road traffic

The CSBP Kwinana Industrial Complex is located adjacent to other industries in the KIA and shares roads in the area with these industries. Current monitoring of vehicles undertaken in April 2009 by the Town of Kwinana on Kwinana Beach Road to the west of Patterson Road (which is close to the CSBP site) shows that an average of 4700 vehicles use the road per day (Town of Kwinana, pers. comm., 24 June 2010).

Site vehicle movements have components that are seasonal (i.e. when agricultural consumers require fertiliser), but ammonium nitrate purchasing and associated transportation is not seasonal. Over the last financial year, an average, 25 trucks per day visited the CSBP site to load ammonium nitrate products for transport per week.

13.2.2 Shipping

Cockburn Sound is the outer harbour of the Port of Fremantle. The annual average shipping arrivals in Cockburn Sound (outer harbour) for 2007 to 2009 is shown in Table 3.32 and average approximately 750 per year (Fremantle Ports, pers. comm., 1 June 2010). This suggests that about 1500 shipping movements occur in Cockburn Sound each year.

Table 3.32 Ship arrivals to Cockburn Sound (Fremantle Port outer harbour) in 2007 to 2009

	2007/08	2008/09
Commercial	655	755
Fishing	2	1
Non Commercial	23	29
Naval	26	10
Total	**706**	**795**

Currently, there are around 120 shipping movements into or out of Cockburn Sound as a result of the operation of the CSBP Kwinana Industrial Complex. In 2009/10, 38 were ANPF related. This included 28 shipping movements from 14 export shipments of prilled ammonium nitrate and 10 shipping movements were from 5 import shipments for ammonia feedstock (CSBP currently has Ministerial approval for up to 9 ammonia imports).

13.3 POTENTIAL SOURCES OF IMPACT

13.3.1 Road traffic

Both employees and movements of feedstock and manufactured products in and out of the CSBP Kwinana Industrial Complex generate traffic movements. The main increase to road traffic will be an increase in trucking of ammonium nitrate prill.

It is estimated that, initially, around 12 extra trucks would be loaded per day and that the CSBP loading days would increase from six to seven days a week. This would result in a total of 37 trucks per day, seven days a week.

It is also anticipated that export shipping of the ammonium nitrate prill would cease over time as the domestic demand for ammonium nitrate prill increases, eventuating in a further 11 trucks per day hauling ammonium nitrate, giving a total of up to 48 trucks per day seven days a week.

During periods of construction activity, there are periods of increased traffic movements as a result increased workforces on the site and movements of equipment and waste to and from the CSBP Kwinana Industrial Complex.

13.3.2 Shipping

As a result of the implementation of this proposal there will be an overall increase from 120 to approximately 192 shipping movements per year in Cockburn Sound.

The increase will be comprised as follows:

- ammonium nitrate export, 40 shipping movements per year (20 shipments/yr)
- ammonia import, maximum 32 shipping movements per year (up to 16 shipments/yr in addition to the nine shipments currently approved).

This increase in ammonium nitrate exports will occur over the next four years as it is anticipated that, thereafter, domestic demand for ammonium nitrate will outstrip export demand and will be transported by truck to domestic users.

13.4 ASSESSMENT OF POTENTIAL IMPACT

13.4.1 Road traffic

In terms of general light vehicle traffic, the proposal will not generate a substantial increase in traffic during operation. During the construction phase, which will extend over approximately 15 months, there will be an increase of approximately 150 light vehicles per day.

During operation, the increase in vehicle movements for ammonium nitrate transport to about 37 trucks per day, seven days a week, will be a 48 per cent increase from current truck movements at the site. When the increase in truck movements from CSBP and the other users on Kwinana Beach Road are taken into consideration (approximately 4700 users per day), this increase is around 0.8 per cent, which is not considered to be significant in the long-term.

13.4.2 Shipping

The current level of ship movement in Cockburn Sound will marginally increase as a result of increased prilled ammonium nitrate exports and ammonia imports.

The increase in shipping movements from CSBP to a total of about 192 movements/yr is not regarded as significant in the context of the overall annual average number of shipping movements in Cockburn Sound of 1500 movements/yr (increase of 13 per cent). Ammonium nitrate export shipping is expected to be phased out within the next four years due to high domestic demand, which will decrease shipping movements by about 70 movements/yr.

CSBP will seek the appropriate approvals for an increase in ammonia imports, to allow for capacity constraints in the ammonia plant. This will allow the ongoing operation of the nitric acid plants in the event that domestic natural gas supply is inadequate to maximise the on-site manufacture of ammonia.

13.5 PROPOSED MITIGATION/MANAGEMENT MEASURES

No additional management measures are proposed for road traffic or shipping movements.

13.6 ENVIRONMENTAL OUTCOME

The increase in the number of road traffic and shipping movements as a result of this proposal will be relatively small in the context of existing traffic or shipping movements. As a result, implementation of this proposal is not expected to adversely impact on environmental values.

14 VISUAL AMENITY AND LIGHT OVERSPILL

14.1 ENVIRONMENTAL OBJECTIVE

The environmental objectives for visual amenity and light overspill are:

- to ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonable practicable (EPA 2009a)
- to avoid or manage potential impacts from light overspill and comply with acceptable standards (EPA 2009a).

14.2 APPLICABLE STANDARDS, GUIDELINES OR PROCEDURES

There are no applicable standards for visual amenity as this factor is specific to individual community concerns.

The applicable standard for light overspill is Australian Standard (AS) 4282-1997: Control of the obtrusive effects of outdoor lighting (Council of Standards 1997).

14.3 DESCRIPTION OF FACTOR

The existing ANPF is located in the north-west portion of the CSBP Kwinana Industrial Complex (Figure 1.4). The premises are not visible from publicly accessible areas other than for the nitric acid plant stacks and prilling plant towers. A range of industries that surround the site also add to the visual amenity.

The CSBP Kwinana Industrial Complex operates 24 hours per day and requires adequate lighting at night to allow for safe working practices. The current lighting regime complies with AS 4282-1997.

14.4 POTENTIAL SOURCES OF IMPACT

The proposed expansion includes the addition of a nitric acid plant which will include a stack less than 64 m high. This stack height is comparable to that of the existing nitric acid plant stacks.

New light sources will be required for safe operation of the proposed expanded ANPF.

14.5 ASSESSMENT OF POTENTIAL IMPACT

The potential for visual impact from the proposed expansion is considered minimal given that all new facilities will be located on the existing premises and within close proximity to each other (Figure 1.4). The visual impact of the expanded ANPF will be minimal in the context of the surrounding land use.

As the proposed expansion is within close proximity to existing ANPF, the need for extra lighting will be minimal and unlikely to be noticeable in the context of the surrounding land use.

14.6 PROPOSED MITIGATION/MANAGEMENT MEASURES

To improve the visual amenity of the proposed expansion, the following management strategies will be undertaken:

- good housekeeping practices will be maintained at all times.

To minimise the potential for light overspill, the following management strategies will be undertaken:

- impacts will be minimised through strategic positioning of light poles and towers, and utilisation of directional lighting
- where any additional light sources are installed, these will be in accordance with AS 4282-1997 for the control of light overspill.

14.7 ENVIRONMENTAL OUTCOME

Given that this proposal has a relatively small footprint (compared to existing industrial facilities at the CSBP Kwinana Industrial Complex) and screening with vegetation will be implemented where possible, the environmental objective in relation to visual amenity is considered to be met.

Given that CSBP currently complies with the Australian standard AS 4282-1997 for the control of light overspill and any additional lighting sources will be installed in accordance with this standard, the environmental objective in relation to light overspill is considered to be met.

Chapter 4 Proposed environmental management program and environmental outcomes of the project

1 ENVIRONMENTAL MANAGEMENT FRAMEWORK

1.1 ENVIRONMENTAL MANAGEMENT SYSTEM

CSBP has in place an Environmental Management System (EMS), which is consistent with the international standard ISO 14001. The EMS details the operational environmental management for the CSBP Kwinana Industrial Complex.

Table 4.1 provides an overview of the key CSBP EMS procedures.

Table 4.1 CSBP environmental management system procedures

Procedure	Purpose
Environmental Management System – CSBP WA	Details EMS systems and processes
Development and Management of Environmental Action Plans	Environmental Programs
Environmental Risk Identification and Assessment	Describes procedure for identification, assessment and management of environmental risks
Environmental Legal Obligations and Management	Describes environmental approval and licensing requirements and management
Environmental Training, Skills and Competence	Describes procedure for skill analysis and requirements and training requirements and management of training
Control of Records	Describes document and record management requirements
Management of Emergencies	Describes emergency management
Internal Audit Methodology	Internal systems auditing
Internal Auditing of Management Systems	Internal systems auditing
Incident and Illness Investigation	Describes management of non-conformance, corrective and preventive action
Kwinana Environmental Quality Assurance Program	Details procedures for environmental management and monitoring

The CSBP Kwinana Environmental Quality Assurance Program details procedures for environmental management and monitoring of the CSBP Kwinana Industrial Complex. The procedures included in the Kwinana Environmental Quality Assurance Program that are directly relevant to the Ammonium Nitrate Production Facility (ANPF) are presented in Table 4.2.

Table 4.2 Environmental procedures relating to the ANPF

Procedure	Process
Water pollution control	
Operating Strategy for Groundwater Extraction and Use	Use of Groundwater
Collecting groundwater samples from monitor bores	Describes collection and preservation of groundwater samples

Procedure	Process
Spill response guideline	Pollution prevention
Marine pollution control	
Maintenance and Calibration of Licensed Wastewater Point Monitoring Systems	Data reliability and equipment maintenance
Management of Licensed Wastewater Sampling and Monitoring Points	Outline appropriate operation of the monitoring points
Management of Non-Licensed Wastewater Sampling and Monitoring Points	Outline appropriate operation of the monitoring points
Marine Pollution Control (Bulk cargo Jetty)	Pollution prevention
Monitoring Station Actions and Alarms	Response to Abnormal Conditions
Nitrogen Load Monitoring	Licence compliance
Sampling Licensed Wastewater Monitoring Points	Understanding of sampling techniques
Wastewater Management	Guide to site water management
Sample handling	
Collection of surface water samples	Sampling and handling of surface water
Cleaning and labelling of sample bottles	Sample handling techniques
Preservation of environmental water samples	Describes appropriate type and method of sample preservation
Waste management	
Waste management plan	Overview of waste management system
Solid waste management	Management, disposal and storage of solid waste
Liquid waste management	Management, disposal and storage of liquid waste
Integrated nitric acid and ammonium nitrate plant	
NOx monitoring on the nitric acid plant stack during start-up	Describes the conditions, monitoring and calculations for NOx monitoring at start-up
Continuous NOx monitoring on the nitric acid plant stack	Describes the instrumentation and maintenance of the NOx monitors
Ammonium nitrate prilling plant	
Use of auto-isokinetic sampler on the 2008 prilling plant exit stack	Describes the procedure for the measurement of particulate ammonium nitrate
Data reliability and reporting	
Analytical Services Laboratory – Environmental Sample Management	Collection, analysis & reporting of samples
Calibration & Maintenance of Process Control Measuring Equipment	Data reliability and equipment maintenance
Calibration and Maintenance of Environmental Equipment	References equipment calibration procedures
Environmental Reporting	Data reporting
Incident and Illness Investigation	Incident internal reporting ad investigation
Notification of Incidents to External Authorities	Incident reporting to external authorities

The EMS and associated procedures are reviewed when changes occur which affect specific procedures, and as required by the CSBP document management system.

CSBP will also, to the satisfaction of the Department of Mines and Petroleum (DMP), continue to maintain a Safety Report for CSBP Kwinana major hazard facilities as approved under the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007. This provides the framework to ensure that emergency response and management systems are appropriate to maintain public safety.

1.2 ENVIRONMENTAL POLICY

Environment Policy

IF0428 Version 11.0

CSBP Limited, the Chemicals and Fertiliser division of Wesfarmers (incorporating CSBP, Australian Vinyls, ModWood and Australian Gold Reagents) will manage all its activities to ensure the protection of the environment, and the health and wellbeing of our employees and the community.

We will:

- comply with statutory requirements and apply Responsible Care® standards;
- develop, manufacture, source, store, despatch, transport and market products that provide benefits to customers without unacceptable risks to employees, the community or the environment;
- recognise the principles of sustainable development, resource use efficiency and life cycle in all aspects of our business;
- maintain systems to identify, monitor, manage and reduce environmental risk, and act at all times to prevent pollution from our operations;
- liaise with our stakeholders and consider their views in our decision making, and contribute to the development of effective laws, regulations and standards;
- set, measure and strive to meet targets for continuous improvement in our environmental performance;
- train, involve and encourage all employees and contractors to understand and participate in environmental care;
- communicate information on our environmental goals and performance to all stakeholders; and,
- require every employee and contractor engaged by us to comply with relevant legislation and to be committed to this Policy.

Our commitment is to conduct our business in a way which benefits society without compromising the rights and needs of future generations.

Ian Hansen, Managing Director

26 March 2009

Dated

2 KEY MANAGEMENT ACTIONS AND PROPOSED ENVIRONMENTAL CONDITIONS

This section outlines the controls that exist, or will be in place to ensure environmental compliance and appropriate environmental management of the proposal in regard to each environmental factor and aspect. Key environmental requirements or controls are drawn from the following:

- commitments and requirements under legislation other than Part IV of the *Environmental Protection Act 1986* (EP Act)
- Environmental Conditions and Key Management Actions proposed for the Ministerial Statement under Part IV of the EP Act.

2.1 COMMITMENTS AND REQUIREMENTS UNDER LEGISLATION OTHER THAN PART IV OF THE EP ACT

The major proponent management commitments and requirements under legislation other than Part IV of the EP Act are detailed in Table 4.3. These are accordingly not considered to be appropriate for regulation under the provisions of the Ministerial Statement.

Table 4.3 Major management commitments and requirements under legislation other than the EP Act

Factor	Management commitments and requirements	Applicable legislation
Greenhouse gas emissions	CSBP will comply with the reporting requirements of the *National Greenhouse and Energy Reporting Act 2007* with respect to GHG emissions, reductions, removals and offsets, and energy consumption and production.	*National Greenhouse and Energy Reporting Act 2007* (Commonwealth)
	CSBP will comply with any future relevant legislated GHG emission requirements.	
Aboriginal heritage	CSBP will comply with the requirements of the *Aboriginal Heritage Act 1972* (WA).	*Aboriginal Heritage Act 1972* (WA)
Noise	CSBP will comply with the Environmental Protection (Noise) Regulations 1997 (WA) as proposed to be amended.	Environmental Protection (Noise) Regulations 1997 (WA)
Air emissions	CSBP will comply with the conditions of the EP Act Part V Environmental Licence for the emission of potentially polluting substances into the atmosphere.	*Environmental Protection Act 1986* (WA)
Marine discharge	CSBP will comply with the conditions of the EP Act Part V Environmental Licence for the discharge of wastewater to the marine environment.	
Waste disposal	CSBP will comply with the requirements of the *Health Act 1911* (WA) and the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 (WA) for the disposal of sewage.	*Health Act 1911* (WA) and the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 (WA)
	CSBP will comply with the requirements of the Environmental Protection (Controlled Waste) Regulations 2004 (WA) in relation to the transportation and disposal of 'controlled' (generally hazardous) wastes.	Environmental Protection (Controlled Waste) Regulations 2004 (WA)
Unauthorised discharges	CSBP will comply with the requirements of the Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA) with respect to materials that must not be burnt or discharged into the environment.	Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)

Factor	Management commitments and requirements	Applicable legislation
Water supply	CSBP will comply with the requirements of the *Rights in Water and Irrigation Act 1914* (WA).	*Rights in Water and Irrigation Act 1914* (WA)
Fire management	CSBP will comply with requirements of the *Bush Fires Act 1954* (WA) through implementation of the Fire Management Plan in the CEMP (Appendix 1).	*Bush Fires Act 1954* (WA)
Dangerous goods	CSBP will obtain a Licence issued by the Department of Mines and Petroleum (WA) under the *Dangerous Goods Safety Act 2004* (WA) prior to storage of dangerous goods. The Hazardous Materials Storage and Spill Response Management Plans contained within the CEMP (Appendix 1) and existing onsite procedures will be implemented.	*Dangerous Goods Safety Act 2004* (WA)
Major Hazard Facility	CSBP will comply with the requirements of the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007 (WA) for the control and management of MHF.	Dangerous Goods Safety (Major Hazard Facility) Regulations 2007 (WA)
Security Risk Substances	CSBP will comply with the requirements of the Dangerous Goods Safety (Security Risk Substances) Regulations 2007 (WA) for the storage and use of explosives.	Dangerous Goods Safety (Security Risk Substances) Regulations 2007 (WA)
Mosquitoes	Mosquito management for existing and new infrastructure will be undertaken through compliance with the Health Act 1911 and through participation in any appropriate Town of Kwinana initiatives. CSBP will manage new infrastructure in the same fashion as existing infrastructure and CSBP will make staff aware of mosquito-borne diseases.	*Health Act 1911* and Town of Kwinana bylaws

2.2 ENVIRONMENTAL CONDITIONS AND KEY MANAGEMENT ACTIONS PROPOSED UNDER PART IV OF THE EP ACT

Key Management Actions have been developed to address the key environmental aspects of the proposal. The proposed Key Management Actions are not intended to duplicate management requirements that may be imposed through other regulatory controls (e.g. EP Act Part V Environmental Licences for prescribed premises).

CSBP proposes the Environmental Conditions presented in Table 4.4 for inclusion in the Ministerial Statement. These conditions incorporate the Key Management Actions.

Table 4.4 Proposed environmental conditions – EP Act Ministerial Statement

Factor	Objective	Action	Timing
Compliance reporting	To report environmental compliance and performance.	A compliance report shall be submitted to the Chief Executive Officer of the Office of the Environmental Protection Authority prior to 1 December each year, that identifies compliance with each Ministerial Condition (including monitoring data collected under any condition) of the Statement for the preceding period of 1 July to 30 June. The compliance report shall address: • the status of implementation of the proposal as defined in Schedule 1 of the statement • evidence of compliance with the conditions and commitments • performance of environmental management plans and programs.	Annually following issue of the Ministerial Statement
		A performance review report shall be submitted every five years which addresses: 1. The major environmental issues associated with implementing the project; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives. 2. The level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best practicable measures available. 3. Significant improvements gained in environmental management, including the use of external peer reviews. 4. Stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed. 5. The proposed environmental objectives over the next five years, including improvements in technology and management processes.	Five yearly following issue of the Ministerial Statement
Preliminary Decommissioning Plan	To minimise environmental impacts from decommissioning	Within six months following the date of publication of the Statement, the proponent shall prepare a Preliminary Decommissioning Plan for the Ammonium Nitrate Production Facility, which provides the framework to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority. The Preliminary Decommissioning Plan shall address: 1. Conceptual plans for the removal or, if appropriate, retention of plant and infrastructure. 2. A conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders. 3. A conceptual plan for a care and maintenance phase. 4. Management of noxious materials to avoid the creation of contaminated areas.	Within six months following commencement of construction
Final Decommissioning Plan	To minimise environmental impacts from decommissioning	At least 12 months prior to the anticipated date of decommissioning, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Decommissioning Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority. The Final Decommissioning Plan shall address: 1. Removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders. 2. Rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s). 3. Identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities.	At least 12 months prior to the anticipated date of decommissioning

Factor	Objective	Action	Timing
		The proponent shall implement the Final Decommissioning Plan until such time as the Minister for the Environment determines, on advice of the Environmental Protection Authority, that the proponent's decommissioning responsibilities have been fulfilled.	During decommissioning
		The proponent shall make the Final Decommissioning Plan publicly available.	During decommissioning
Construction	To inform the public of the management of construction activities	The proponent shall make the Construction Environmental Management Plan publicly available on the CSBP website.	Prior to and during construction
Nitric Acid Plant	To ensure that air emissions from the ongoing operation of the ANPF are minimised to as low a level as is practicable.	The proponent shall design and construct the new nitric acid plant with selective catalytic reactor technology for abatement of oxides of nitrogen emissions, such that oxides of nitrogen emissions from the exit stack are maintained nominally at 100 mg/Nm^3 during steady state operation.	During design and construction
	To ensure that high quality data are available to model and verify ambient air quality.	The proponent shall design and construct the new nitric acid plant to incorporate continuous monitoring of oxides of nitrogen emissions from the exit stack.	During design and construction
Greenhouse gases	To ensure that best practicable measures and technologies are used to minimise Western Australia's GHG emissions.	At least three months prior to commissioning of the new third nitric acid plant, the proponent shall update and submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the Greenhouse Gas Abatement Program to: 1. Ensure that the plant is designed and operated in a manner which achieves reductions in "greenhouse gas" emissions as far as practicable. 2. Provide for ongoing "greenhouse gas" emissions reductions over time. 3. Ensure that through the use of available proven technology, the total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product from the proposal are minimised. 4. Achieve continuous improvement in "greenhouse gas" intensity through the periodic review, and where feasible, the adoption of advances in technology and process management.	Three months prior to commissioning
		The proponent shall make the Greenhouse Gas Abatement Program publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.	Prior to commissioning
		Annually until new technology is adopted for the plant, or until the Minister for the Environment advises that updating the Greenhouse Gas Abatement Program is no longer required, the proponent shall update this Program to the requirement of the Minister for the Environment on advice of the Environmental Protection Authority.	Annually
		The above conditions will continue to have effect and condition the implementation of the proposal until such time as it is determined by the Chief Executive Officer of the Office of the Environmental Protection Authority that they are non-complementary to any Commonwealth GHG emissions trading scheme in force in Western Australia and the Minister provides notice in writing of concurrence with this determination.	During design and construction
		The proponent shall design and construct the new nitric acid plant to incorporate nitrous oxide abatement technology.	During design and construction

3 SUMMARY OF POTENTIAL IMPACTS AND MANAGEMENT MEASURES

Table 4.5 presents a summary of potential impacts and proposed management measures applicable to the key environmental factors considered in this environmental impact assessment, together with an outline of the expected environmental outcome.

Table 4.5 Summary of relevant environmental factors relating to the proposal

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Biophysical				
Marine Environment	Ensure that any impacts on marine communities are avoided and to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	The proposed expansion will result in generation of additional liquid wastes during both the construction and operations phases. Around 360 kL/day is expected to be generated from cooling water blowdown for the new nitric acid and ammonium nitrate solution plant. Stormwater may increase marginally as the proposed area of construction is on previously developed land in close proximity to pre-existing stormwater collection. The proposed average discharge to the SDOOL from the CSBP Kwinana Industrial Complex following the implementation of this Proposal is expected to be about 2.4 ML/day. The generation of additional liquid wastes during the proposed expansion is considered to be a manageable impact and the additional liquid waste volumes will be handled using the existing liquid waste management system. There is adequate capacity in the existing wastewater management system including the nutrient-stripping wetland for increased wastewater storage and only minor additions to the stormwater collection system in the proposal footprint are required. The discharges from the CSBP Kwinana Industrial Complex will continue to comply with the CSBP EP Act Licence Marine Pollution Control Conditions. Treatment through the nutrient-stripping wetland and other CSBP water recycling initiatives will aid this endeavour.	CSBP will continue to manage wastewater discharges to the marine environment in accordance with EP Act Licence requirements, and the Environmental Management System for the site. CSBP will continue to discharge to the SDOOL, however the Cockburn Sound outfall remains as a licensed discharge point, maintained as an emergency back-up for the discharge to SDOOL. The emergency beach outfall is maintained in the event of overflows caused by extreme stormwater flows. Current operations are such that overflows to the beach and discharges to Cockburn Sound via the diffuser are no longer part of CSBP normal operations. CSBP will continue to explore methods for optimising the efficiency of the nutrient-stripping wetland. CSBP will continue to contribute to the State ambient monitoring program of Cockburn Sound waters.	The amount of additional wastewater generated is not expected to be substantial and will be able to be managed within the existing liquid waste management system.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Water Resources	To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected (EPA 2009a).	The preferred outcome for meeting the increased process water demands resulting from the proposal is to use recycled water from the KWRP. In the event that this source is not available and/or is inadequate to meet the project demands, CSBP considers there is sufficient access to sustainable groundwater (superficial and artesian aquifers) to supply water for this proposed project within the allocation limit on the current RWI Act licence. Scheme water from the Water Corporation reticulated system is available to the site if needed to supplement the other sources, however is the least preferred alternative. While the preference would be to use KWRP, CSBP is confident that alternative water sources are available to satisfy projected ANPF water demands if required.	CSBP will source water for this project from KWRP, sustainable ground water supplies within existing licence allocations or other sustainable and appropriate sources as they are identified. Water Corporation scheme water will not be used extensively for process purposes except in emergency or supply disruption situations. CSBP will continue its internal programs directed at increasing water use efficiency and source protection.	CSBP will use recycled water from the KWRP or sustainable ground water supplies under licence, and the proposal is not expected to adversely impact on environmental values.
Pollution Management				
Air Quality - Oxides of Nitrogen	To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	Modelling indicates that direct and cumulative NOx emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to the NEPM standards. Monitoring trends indicate that ozone production in the KIA is not a dominant driver of photochemical smog in Perth; hence, the relative impact from the contribution to the generation of photochemical smog from the proposed expanded ANPF will be minimal.	CSBP will continue to manage emissions in accordance with EP Act Licence conditions, and the Environmental Management System for the site. The proposed nitric acid plant will include best available technology for controlling NOx emissions to levels comparable to the existing nitric acid plants. This will include the installation of a selective catalytic reactor and monitoring control as installed in the existing plants. CSBP considers that this factor can be managed through conditions applying to works approvals and licences under Part V of the EP Act.	As the modelling indicates that direct and cumulative NOx emissions will comply with the NEPM standards, the proposal is not expected to adversely impact on environmental values. As the contribution to the generation of photochemical smog from the proposed expanded ANPF will be minimal, the proposal is not expected to adversely impact on environmental values.
Air Quality - Particulates	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	Modelling indicates that PM (as $PM_{2.5}$) emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to the NEPM advisory standards. PM (as $PM_{2.5}$) emissions from the debottlenecked 2008 prilling plant are expected to be a relatively minor contributor to the total load of nitrogen entering Cockburn Sound from the CSBP site. Note: $PM_{2.5}$ has been modelled to represent all particulate matter as a conservative approach.	CSBP will continue to manage particulate emissions in accordance with EP Act Licence conditions, and the Environmental Management System for the site. CSBP considers that this factor can be managed through conditions applying to works approvals and licences under Part V of the EP Act.	As the modelling indicates that PM emissions will comply with the NEPM advisory standards, the proposal is not expected to adversely impact on environmental values. As PM emissions are expected to be a relatively minor contributor to the total load of nitrogen entering Cockburn Sound, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Air Quality – Ammonia	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2009a).	Modelling indicates that direct and cumulative ammonia emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to the UKEA standards.	No further mitigation measures are proposed for ammonia other than the technology currently installed in the 2008 prilling plant.	As the modelling indicates that direct and cumulative ammonia emissions will comply with the UKEA standards, the proposal is not expected to adversely impact on environmental values.
Greenhouse Gases	The documented environmental objective for greenhouse gas (GHG) emissions is: • minimise GHG emissions in absolute terms and reduce emissions per unit of product to as low as reasonably practicable • mitigate GHG emissions, mindful of Commonwealth and State GHG strategies and programs (EPA 2010).	The proposed third nitric acid plant will match the capacity and technology of the second nitric acid plant assessed in the previous proposal by CSBP (2005) with the exception of the inclusion of tertiary N_2O abatement technology. The N_2O abatement technology is conservatively estimated to reduce GHG emissions due to nitrous oxide from the third nitric acid plant by approximately 90 per cent. To reduce GHG emissions, CSBP commits to fitting secondary abatement technology to Nitric Acid Plants 1 and 2 should trialling of secondary abatement technology in Nitric Acid Plant 2 in 2011 be successful.	Abatement of N_2O emissions from the nitric acid plants is expected to represent the single largest potential reduction in GHG emissions from the CSBP site. CSBP will implement the following management measures to mitigate the emissions of GHG: 1 CSBP will design and construct the new third nitric acid plant with a reactor boiler of similar size to that installed in the Nitric Acid Plants one and two. 2 CSBP will design and construct the new third nitric acid plant to include tertiary N_2O abatement technology. Tertiary abatement technology will mitigate a minimum of 90 per cent of the total N_2O produced from this nitric acid plant. 3 CSBP commits to trialling secondary abatement technology in Nitric Acid Plant 2 in 2011 and, if the trial is successful, CSBP commits to the installation of secondary abatement technology in Nitric Acid Plant 1 later in 2011. To be considered successful, N_2O reduction efficiencies must meet secondary abatement technology supplier specifications and have no adverse impact to current nitric acid plant performance; specifically, ammonia conversion to nitric acid must remain within current design guidelines and production rates unaffected. Abatement technology installed will mitigate a minimum of 80 per cent of the total N_2O produced from these plants. 4 Notwithstanding the above commitments, CSBP commits to ensuring abatement technologies are in place in the existing Nitric Acid Plants 1 and 2 when their combined production reaches 480 000 tpa nitric acid: that is, fully debottlenecked. 5 CSBP will submit an updated Greenhouse Gas Abatement Program report to the EPA three months prior to the commissioning of the new third nitric acid plant which will review the	The increase in GHG from this proposal is estimated to be in the order of 184 000 tonnes CO_2-e per annum. This will result from construction and debottlenecking of a third nitric acid plant with tertiary N_2O abatement technology and from debottlenecking of the two existing nitric acid plants to a maximum production rate of 480 000 tonnes per annum nitric acid without the installation of secondary abatement. If trialling of secondary abatement technology in Nitric Acid Plant 2 in 2011 is successful and, then, Nitric Acid Plant 1 is retrofitted with secondary abatement technology, along with tertiary N_2O abatement technology fitted to the third nitric acid plant, there will be a decrease in GHG emissions estimated to be in the order of 661 000 tonnes CO_2e per annum. As the third nitric acid plant will be designed and constructed to include tertiary N_2O abatement technologies and through CSBP commitments to the minimisation of GHG, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
			current state of testing of low N_2O emission catalysts. An update of this report will be submitted annually to the OEPA until the new technology is adopted or the EPA advises that the report is no longer required. 6 The Greenhouse Gas Abatement Program will be based on a template understood to be under development by the EPA. 7 CSBP expects to be an obligatory participant in any legislated national carbon emissions reduction scheme when operational, and will be required to conform with the legislated requirements to reduce national GHG emission rates.	

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Noise	To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards (EPA 2009a).	The monitored and predicted noise emissions at residential premises show that the proposal will not have a significant impact in residential receiver locations. The noise emissions to the adjacent BP Refinery premises are expected to comply with the proposed Regulation Review industrial 'assigned level' of 70 dB(A) if noise attenuation is undertaken within the CSBP Kwinana Industrial Complex. This attenuation will be finalised during the design phase of the expansion.	CSBP will, where necessary, fit noise attenuation features to new equipment installed as part of the expansion to ensure that the overall noise impact from the expanded ANPF complies with the Regulations, as they are proposed to be amended. CSBP will implement noise control measures in the proposed third nitric acid ammonium nitrate plant to match the second nitric acid ammonium nitrate plant noise attenuation measures. CSBP will ensure the engineering changes to be implemented for the debottlenecking of the nitric acid ammonium nitrate plants and the 2008 prilling plant will be reviewed by an acoustic consultant to allow identification of any potential increases in noise emission and implementation of appropriate noise control. CSBP will implement appropriate noise attenuation measures within the CSBP Kwinana Industrial Complex to ensure compliance with the noise regulations as they are proposed to be amended. The noise mitigation measures for the proposal will be incorporated into the noise management plan for the site. In the event of the proposed Regulation Review not increasing the industry-industry assigned levels as expected, then CSBP will comply with the existing Regulations within twenty four months of the Regulation review process ceasing (it is relevant that the small area of the BP Refinery currently potentially subject to exceedance is not a permanent workplace for any person).	As CSBP is not expected to significantly contribute to noise levels at sensitive residential receivers, the proposal is not expected to adversely impact on environmental values. As noise monitoring and modelling results show that noise levels will meet statutory requirements and acceptable standards with appropriate noise attenuation measures implemented, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Solid Wastes	To ensure that land uses and activities that may emit or cause pollution are managed to maintain: • physical and biological environment and the natural processes that support life • the health, welfare and amenity of people and land uses (EPA 2008). To ensure that pollutants emitted are as low as reasonably practicable, and comply with all statutory requirements and acceptable standards (EPA 2008).	The proposed expansion will result in the generation of additional wastes during the construction phase; however, solid waste from the operational phase is expected to be negligible. During construction, it is likely that the general wastes will increase to levels similar to those previously experienced at CSBP Kwinana Industrial Complex during the previous ANPF expansion; however, these increases will be temporary. It is expected that levels of general waste will reduce to close to current levels during operation. Solid waste generation on site is considered a minor impact and the additional waste volumes will be managed under the CSBP Waste Management Plan.	CSBP will continue to review and implement the existing CSBP Waste Management Plan and related Solid Waste Procedure.	As there will only be a slight increase in the generation of solid waste as a result of this proposal, and CSBP has existing management procedures for managing waste, the proposal is not expected to adversely impact on environmental values.
Social Surrounds				
Risk	To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria (EPA 2009a).	The risk posed by the scenarios for proposed development of a third nitric acid ammonium nitrate plant, debottlenecking of existing nitric acid ammonium nitrate plants, increased ammonia shipments, and debottlenecking of the existing 2008 prilling plant have been assessed against the EPA individual fatality risk criteria. The proposed expansion should not significantly affect risk levels with the exception of the historical exceedance of risk extending onto BP Refinery land. Societal risk results indicate that the proposed development, when considered with the existing societal risk, is negligible on the surrounding residential population and tolerable for the neighbouring industrial facilities if risk is maintained As Low As Reasonably Practicable (ALARP).	The historical exceedance of risk extending onto BP Refinery land is managed by BP and CSBP. The area is utilised for soil remediation by BP and therefore is not normally populated; management will continue with the proposed expansion. CSBP will continue to maintain a Safety Report as required by the MHF regulations, with the advice of the DMP. CSBP will obtain and maintain the relevant Dangerous Goods Licences for the expanded ANPF. A full QRA will be presented to the DMP for their consideration.	Considering the updated risk contours show compliance with all but one of the applicable risk criteria and that there is existing management in place and close liaison with BP regarding the incursion of risk from CSBP over the BP Refinery site, the proposal is not expected to adversely impact on environmental values.

Environmental Factor	Environmental Objective	Potential Environmental Impacts	Key Management Measures	Expected outcome
Traffic and Shipping	To ensure that any increases in traffic and shipping do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	In terms of general light vehicle traffic, the proposal will not generate a substantial increase in traffic during operation. There will be a 48 per cent increase in truck movements for ammonium nitrate transport; however, when the increase in truck movements from CSBP and the other users on Kwinana Beach Road are taken into consideration, this increase is around 0.8 per cent, which is not considered to be significant in the long-term. The current level of ship movement in Cockburn Sound will marginally increase as a result of increased prilled ammonium nitrate exports and ammonia imports. An expected increase of 13 per cent in the context of the overall annual average number of shipping movements in Cockburn Sound is not considered to be significant in the long-term.	No additional management measures are proposed for road traffic or shipping movements.	The increase in the number of road traffic and shipping movements as a result of this proposal will be relatively small in the context of existing traffic or shipping movements. As a result, implementation of this proposal is not expected to adversely impact on environmental values.
Visual Amenity and Light Overspill	Ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable (EPA 2009a). To avoid or manage potential impacts from light overspill and comply with acceptable standards (EPA 2009a).	The potential for visual impact from the proposed expansion is considered minimal given that all new facilities will be located on the existing premises and within close proximity to each other. The visual impact of the expanded ANPF will be minimal in the context of the surrounding land use. As the proposed expansion is within close proximity to existing ANPF, the need for extra lighting will be minimal and unlikely to be noticeable in the context of the surrounding land use.	To improve the visual amenity of the proposed expansion, the following management strategies will be undertaken: • good housekeeping practices will be maintained at all times. To minimise the potential for light overspill, the following management strategies will be undertaken: • impacts will be minimised through strategic positioning of light poles and towers, and utilisation of directional lighting • where any additional light sources are installed, these will be in accordance with AS 4282-1997 for the control of light overspill.	Given that this proposal has a relatively small footprint (compared to existing industrial facilities at the CSBP Kwinana Industrial Complex), the proposal is not expected to adversely impact on environmental values. Given that CSBP currently complies with the Australian standard AS 4282-1997 for the control of light overspill and any additional lighting sources will be installed in accordance with this standard, the proposal is not expected to adversely impact on environmental values.

4 CONCLUSIONS

CSBP Limited (CSBP), part of the Wesfarmers Limited group, proposes to expand its Kwinana ANPF, located within the CSBP Kwinana Industrial Complex approximately 40 km south of Perth. The Ammonium Nitrate Production Expansion Project: Phase 2 (the proposal) comprises the addition of components to the existing ANPF, with some existing components being re-engineered to enable increased throughput to increase ammonium nitrate production capacity from 520 000 tonnes per annum to 936 000 tonnes per annum.

The additional components comprise the installation of an additional nitric acid ammonium nitrate plant (for a total of three similar nitric acid plants ammonium nitrate plants at the ANPF) and debottlenecking (increasing capacity) of the current and proposed nitric acid ammonium nitrate plants and the 2008 prilling plant to increase the production of ammonium nitrate prill.

The level of assessment of the proposal has been set by the Environmental Protection Authority (EPA) as Public Environmental Review (PER) with an eight week public comment period, under Part IV of the *Environmental Protection Act 1986*.

The environmental factors associated with this project have been discussed in detail in this PER (Chapter 3). This PER describes the potential impacts of the proposal and discusses the following for each factor:

- the EPA objective for that factor
- any applicable standards, guidelines or procedures know for that factor
- a description of the factor
- the potential sources of impact
- the assessment of the potential impact
- proposed mitigation/management measures
- the expected environmental outcome.

Key environmental factors that require management to ensure impacts are small and/or temporary, have been identified by CSBP, Government agencies and the community in relation to the proposal, and are:

- air quality
- greenhouse gas emissions
- noise
- public risk.

Assessment of the key environmental factors is discussed in detail in Chapter 3 and is summarised in the following sections.

4.1 AIR QUALITY

The proposal will involve the addition of a new nitric acid ammonium nitrate plant. The proposal also involves debottlenecking the proposed and existing nitric acid ammonium nitrate plants and the 2008 prilling plant. These activities will result in the increase in air emission from the ANPF, consisting primarily of oxides of nitrogen (NOx), particulate matter (PM) and ammonia.

The main sources of NOx will originate from the nitric acid plants, in the form of unabsorbed NO and NO_2, and from the auxiliary boiler from the combustion of natural gas. Debottlenecking of the 2008 prilling plant will increase the amount of PM and gaseous ammonia emitted to the surrounding environment.

Air emission modelling was undertaken for the proposed expansion. Point sources from activities managed under EP Act Licence L6107/1967 have been considered in the expansion modelling. The modelling results indicate the following:

Direct impacts of NOx emissions:

- the maximum offsite 1-hour average NO_2 Ground Level Concentration (GLC) predicted during normal operation is 34 per cent of the 1-hour average NEPM criterion for NO_2
- the maximum offsite annual NO_2 GLC predicted during normal operation is under 5 per cent of the annual average NEPM criterion for NO_2
- the maximum offsite 1-hour average NO_2 GLC predicted during start-up conditions is 83 per cent of the 1-hour average NEPM criterion for NO_2
- the maximum offsite 1-hour average NO_2 GLC predicted during shutdown conditions is 76 per cent of the 1-hour average NEPM criterion for NO_2
- the air dispersion modelling assessment indicates that atmospheric emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to NO_2, and hence, NOx, emissions.

Cumulative impacts of NOx emissions:

- the cumulative 1-hour average NO_2 GLC predicted at the Hope Valley reference site is equal to 76 per cent of the 1-hour average NEPM criterion for NO_2[7]
- the cumulative 1-hour average NO_2 GLC predicted at the North Rockingham reference site is equal to 52 per cent of the 1-hour average NEPM criterion for NO_2[8]
- the cumulative annual average NO_2 GLC predicted at the Hope Valley reference site is equal to 30 per cent of the annual average NEPM criterion for NO_2
- the cumulative annual average NO_2 GLC predicted at the North Rockingham reference site is equal to 44 per cent of the annual average NEPM criterion for NO_2
- the cumulative concentrations are considered highly conservative as the assessment assumes that the monitored and predicted maximum concentrations occur at the same time, which is unlikely to occur in reality; hence, cumulative emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to NO_2, and hence, NOx, emissions.

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[7] This is primarily driven by the maximum 1-hour NO_2 GLC measured at Hope Valley.
[8] This is primarily driven by the maximum 1-hour NO_2 GLC measured at North Rockingham.

NOx contribution to photochemical smog:

It is unlikely that emissions from the current operations and the proposal will add to photochemical smog production as photochemical smog levels are greatest in areas where vehicle emissions are concentrated and the monitoring stations closest to the KIA show a lower level of ozone compared to stations closer to the Perth CBD.

Direct impacts of PM emissions:

- the maximum offsite 24-hour average PM (as $PM_{2.5}$) GLC predicted for both the existing and expansion emissions scenarios is 54 per cent of the 24-hour average NEPM advisory standard for $PM_{2.5}$[9]
- the maximum offsite annual average PM (as $PM_{2.5}$) GLC predicted for both the existing and expansion emissions scenarios is 27 per cent of the annual average NEPM advisory standard for $PM_{2.5}$
- analysis of the predicted PM (as $PM_{2.5}$) GLCs indicates that emissions from the 2008 prilling plant contribute less than 6 per cent to the maximum predicted 24-hour and annual average PM (as $PM_{2.5}$) GLCs
- the results of the air dispersion modelling assessment indicate that atmospheric emissions associated with the expansion project are unlikely to result in unacceptable air quality impacts with respect to PM emissions.

PM deposition over Cockburn Sound:

Emissions from the debottlenecked 2008 prilling plant are expected to remain a relatively minor contributor to the total nitrogen load entering Cockburn Sound as the particulate load from the proposed expansion is estimated to be an order of magnitude lower than estimated for the previous assessment (which indicated nutrient addition from particulate ammonium nitrate was not significant when compared to the total load entering Cockburn Sound).

Direct impacts of ammonia emissions:

- the maximum offsite 1-hour average ammonia GLC predicted is 1 per cent of the 1-hour average UKEA criterion for ammonia and is 8 per cent of the 1-hour average Vic SEPP equivalent design criterion for ammonia
- the maximum offsite annual average ammonia GLC predicted is less than 1 per cent of the annual average UKEA criterion for ammonia
- the results of the air dispersion modelling assessment indicate that atmospheric emissions associated with the expansion proposal are unlikely to result in unacceptable air quality impacts with respect to ammonia emissions.

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[9] As all of the PM emissions were assumed to be $PM_{2.5}$, compliance with the $PM_{2.5}$ advisory reporting standard also demonstrates compliance with the 24-hour average PM_{10} NEPM standard of 50 $\mu g/m^3$.

Cumulative impact of ammonia emissions:

- the cumulative annual average ammonia GLC predicted at the Wells Park reference site is equal to under 10 per cent of the annual average UKEA criterion for ammonia
- the cumulative concentrations are considered highly conservative as the assessment assumes that the monitored and predicted maximum concentrations occur at the same time, which is unlikely to occur in reality; hence, cumulative emissions associated with the expansion project are not likely to result in unacceptable air quality impacts with respect to ammonia.

4.2 GREENHOUSE GAS EMISSIONS

The manufacture of ammonium nitrate contributes to the overall greenhouse inventory of the CSBP site. GHG emissions are currently generated directly from emissions of nitrous oxide (N_2O) from the nitric acid plant component of the ANPF and indirectly from the consumption of electricity.

The proposed third nitric acid plant will be similar in capacity and technology to that of the second nitric acid plant assessed in the previous proposal by CSBP (2005) with the exception of the inclusion of tertiary N_2O abatement technology. It is conservatively estimated that GHG emissions due to N_2O from the third nitric acid plant, following debottlenecking, are expected to be in the order of 53 000 tonnes CO_2-e per annum (0.71 kg N_2O/tonne HNO_3), approximately 90 per cent lower than N_2O emissions from the existing nitric acid plants per tonne of nitric acid (7.1 kg N_2O/tonne HNO_3).

As debottlenecking of these plants will increase output of nitric acid by up to 20 per cent for each plant, output of N_2O will potentially increase.

To reduce the amount of N_2O emissions, CSBP commits to trialling secondary abatement technology in Nitric Acid Plant 2 in 2011 and, if the trial is successful, CSBP commits to installation of secondary abatement technology in Nitric Acid Plant 1 later in 2011. To be considered successful, N_2O reduction efficiencies must meet secondary abatement technology supplier specifications and ammonia conversion to nitric acid must remain with current design guidelines and production rates unaffected. Abatement technology will mitigate a minimum of 80 per cent of the total N_2O produced from these nitric acid plants, reducing the emissions from Nitric Acid Plant 1 and 2 to less than 106 000 tonnes CO_2-e per annum per plant (based on a N_2O emission rate of 1.42 kg N_2O/tonne HNO_3 and a total production from the two plants of 480 000 tonnes HNO_3).

The existing nitric acid/ammonium nitrate plants are considered best available technology in terms of energy efficiency. The nitric acid plant is a net producer of electricity as a result of the exothermic nature of many of the chemical reactions occurring in the production of nitric acid.

Taking into account power consumption for each component, the ammonium nitrate plants, prilling plants and nitric acid plants combined are expected to result in a net power generation of approximately 95 000 MWhr from the expanded facility under the maximum expected production. This represents a credit in terms of plant GHG accounting of almost 80 000 tonnes CO_2-e per annum, based on maximum production rates. As a result, the ANPF exports energy to other areas of the CSBP industrial complex and offsets the GHG impact of CSBP business units overall.

4.3 NOISE

The proposed expansion is expected to contribute to noise impacts at the premises during both the construction and operation phases. The major sources of noise impacts from this proposal are expected to be from the construction and operation of the proposed nitric acid ammonium nitrate plant.

The predicted noise emissions show that the proposal will not have a significant impact in residential receiver locations. The operational noise impact is considered to be relatively insignificant as the predicted net increase in noise received at residential areas is less than 0.5 dB(A) and would not be detected by the human ear. In terms of compliance with Regulations, noise emission contributions of 30 dB(A) or less are not 'significantly contributing' and comply with the requirements.

The noise emissions to the adjacent BP Refinery premises are expected to comply with the proposed Regulation Review industrial 'assigned level' of 75 dB(A) with adjustment for tonal characteristic (design target of 70 dB(A)) if noise attenuation is undertaken within the CSBP Kwinana Industrial Complex. This attenuation will be finalised during the design phase of the expansion.

CSBP will comply with the existing Regulations within twenty four months of the Regulation Review process ceasing (it is relevant that the small area of the BP Refinery currently potentially subject to exceedance is not a permanent workplace for any person).

4.4 PUBLIC RISK

The risk posed by the proposed development of a third nitric acid ammonium nitrate plant, debottlenecking of the nitric acid ammonium nitrate plants, additional ammonia imports and debottlenecking of the existing prilling plant have been assessed against the EPA individual fatality risk criteria. The risk results show compliance with all but one of the applicable risk criteria (an historical exceedance relating to change of land ownership) and that there is existing management in place and liaison with BP regarding the incursion of risk from CSBP over the adjacent BP Refinery site

The proposed expansion should not significantly affect the Land Use Safety Planning aspects associated with the CSBP Kwinana operations. The historical exceedance of risk extending onto BP Refinery land is managed by BP and CSBP. The area is utilised for soil remediation by BP and is not normally populated; however, management will continue with the proposed development.

Societal risk results indicate that the proposed development, when considered with the existing facility, is negligible on the surrounding residential population and tolerable for the neighbouring industrial facilities.

Chapter 5 References and glossary

1 REFERENCES

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2 GLOSSARY

2.1 ACRONYMS

Acronyms	
ALARP	As Low As Reasonably Practical
ANPF	Ammonium Nitrate Production Facility
ANZECC	Australian and New Zealand Environment and Conservation Council
ARM	Ambient Ratio Method
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
AS	Australian Standard
BAT	Best Available Technology
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CO_2	Carbon Dioxide
CO_2-e	Carbon Dioxide Equivalents
COAG	Council of Australian Governments
CPRS	Carbon Pollution Reduction Scheme
CSBP	CSBP Limited
DEC	Department of Environment and Conservation
DEP	Department of Environmental Protection (now known as DEC)
DoW	Department of Water
DMA	Decision Making Authority
DMP	Department of Mines and Petroleum
DNV	Det Norske Veritas
EALs	Environmental Assessment Levels
EIL	Ecological Investigation Levels
EIPPCB	European Integrated Pollution Prevention and Control Bureau
EMS	Environmental Management System
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EQC	Environmental Quality Criteria
FESA	Fire and Emergency Services Authority
FOI Act	*Freedom of Information Act 1992*
GHG	Greenhouse Gas
GLC	Ground Level Concentration
HDPE	High Density Poly Ethylene
HIL-F	Health Investigation Levels for an industrial setting
HNO_3	Nitric Acid
ISC3	Industrial Source Complex 3 model
ISO	International Organisation for Standardisation
KCIF	Kwinana Communities & Industries Forum
KIA	Kwinana Industrial Area
KIC	Kwinana Industries Council
KIMA	Kwinana Industries Mutual Aid
KIPS	Kwinana Industries Public Safety
KWRP	Kwinana Water Reclamation Plant

Acronyms	
L_{A1}	An L_{A1} level is an A-weighted noise level, which is exceeded for 1 per cent of the representative assessment period. (An A-weighted noise level has been filtered to represent the way in which the human ear perceives sound. As the human ear is not very sensitive to lower frequencies, these frequencies are weighted more than the higher frequencies. An A-weighted sound pressure level is described using the units dB(A)).
L_{A10}	An L_{A10} level is an A-weighted noise level, which is exceeded for 10 per cent of the representative assessment period. An L_{A10} level is considered to represent the "intrusive" noise level.
L_{AMAX}	An L_{Amax} level is the maximum A-weighted noise level during the representative assessment period.
LUSP	Land Use Safety Planning
MRS	Metropolitan Regional Scheme
MHF	Major hazard facilities
NEPC	National Environment Protection Council
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
NGERS	National Greenhouse Gas Emissions Reporting Scheme
NOHSC	National Occupational Health and Safety Commission
NSESD	National Strategy for Ecologically Sustainable Development
N_2O	Nitrous Oxide
N_2O_2	Dinitrogen Dioxide
N_2O_3	Dinitrogen Trioxide
N_2O_4	Dinitrogen Tetroxide
N_2O_5	Dinitrogen Pentoxide
NH_3	Ammonia
NH_4NO_3	Ammonium Nitrate
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
O_3	Ozone
PER	Public Environmental Review
PLC	Programmable Logic Controller
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with an effective aerodynamic diameter of up to 2.5 µm associated primarily with fuel burning activities
PM_{10}	Particulate Matter with an effective aerodynamic diameter of up to 10 µm associated primarily with industrial and mining activities
QRA	Qualitative Risk Assessment
RWI Act	*Rights in Water and Irrigation Act 1914*
ROC	Reactive Organic Compounds
SCMF	Sodium Cyanide Manufacturing Facility
SCR	Selective catalytic reduction
SDOOL	Sepia Depression Ocean Outfall Landline
SRS	Security Risk Substances
TSP	Total Suspended Particulate
UKEA	United Kingdom Environmental Agency
UKHSE	UK Health and Safety Executive
UNIDO	United Nations Industrial development Organisation
Vic SEPP	Victorian State Environmental Protection Policy
WA	Western Australia
WAPC	Western Australian Planning Commission

Acronyms	
WAPS	Western Australian Police Service
WET	Whole of Effluent Toxicity

2.2 UNITS

Units	
℃	degrees Celsius
d	day
dB	decibels
dB(A)	decibels (A-weighted)
g	grams
g/m^3	grams per cubic metre
g/s	grams per second
ha	hectares
K	Kelvin (ºC + 273)
kg	kilograms
kg/yr	kilogram per year
kL/day	kilolitre per day
km	kilometres
kt	kilotonne
m	metres
mm	millimetres
m/d	metres per day
m/s	metres per second
m/yr	metres per year
m^3	cubic metres
ML	mega litres
ML/d	mega litres per day
ML/yr	mega litres per year
MW	megawatts
ppm	parts per million
s	seconds
t	tonnes
tCO_2-e	tonnes of CO_2 equivalent
TJ	terajoules
tpa	tonnes per annum
tph	tonnes per hour
μm	micrometres
$\mu g/m^3$	micrograms per cubic metre
w/w	weight per unit weight
yr	year

Appendices

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LIST OF APPENDICES