Annex A

DEWHA and OEPA Level of Assessment and Guidance

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

The Atrium,
Level 8, 168 St George's Terrace,
Perth, Western Australia 6000
Phone: (08) 6467 5000
Fax: (08) 6467 5557

Postal address: Locked Bag 33,
Cloisters Square, Perth, Western Australia 6850
Website: www.epa.wa.gov.au

Assistant Secretary
Policy and Compliance Branch
Department of the Environment, Water, Heritage and the Arts
GPO Box 787
CANBERRA ACT 2601

Attention: Kara DeFay

NOTICE OF REFERRAL: TECHNICAL AMMONIUM NITRATE PRODUCTION FACILITY WITHIN KING BAY / HEARSON COVE INDUSTRIAL PRECINCT, SHIRE OF ROEBURNE, EPBC 2008/4546

I refer to the decision of 20 November 2008 determining that the above proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Western Australian Environmental Protection Authority (EPA) advises that the above proposal has been previously referred. The level of assessment has been set at Public Environmental Review with an 8 week public review period. Appeals against this level of assessment were recently dismissed by the Western Australian Minister for Environment.

Therefore, I consider that the bilateral agreement between the Commonwealth and Western Australia (*Agreement between the Commonwealth of Australia and Western Australia under section 45 of the EPBC Act Relating to Environmental Impact Assessment*) is applicable and that the proposed action will be assessed by the EPA in a manner consistent with the Agreement.

If you require further information please contact Richard Sutherland of the EPA Service Unit on (08) 6467 5446.

Colin Murray
DIRECTOR
ENVIRONMENTAL IMPACT ASSESSMENT DIVISION

22 May 2009

02 DEC 2008

Environmental Protection Authority

The Atrium,
Level 8, 168 St Georges Terrace,
Perth, Western Australia 6000.
Telephone: (08) 6364 6500.
Facsimile: (08) 6467 5557.

Postal Address: Locked Bag 33,
Cloisters Square, Perth, Western Australia 6850.
Website: www.epa.wa.gov.au

Mr W Jovanovic
Director-Corporate & Company Secretary
Burrup Nitrates Pty Ltd
Level 8, 225 St George's Terrace
PERTH WA 6000

Our Ref CRN221884
Enquiries Richard Sutherland

Dear Mr Jovanovic

PROPOSAL: **Technical Ammonium Nitrate Production Facility (Assessment No. 1764)**
LOCATION: **within King Bay/Hearson Cove Industrial Precinct**
LOCALITY: **Shire of Roebourne**
PROPONENT: **Burrup Nitrates Pty Ltd**
ASSESSMENT: **Public Environmental Review (PER) with an 8 week public review period**

Thank you for your letter of 1 November 2008 referring the above matter to the Environmental Protection Authority (EPA).

The EPA has determined that the likely environmental impacts are sufficient to warrant formal assessment of the proposal under the provisions of the *Environmental Protection Act (1986)* (EP Act). The level of assessment has been set at Public Environmental Review (PER) with an 8 week public review period.

The information received regarding your proposal will be made publicly available on request. At the referral stage of the environmental impact assessment process, your attention was drawn to section 39(2) of the *Environmental Protection Act (1986)* (EP Act), which provides for a proponent to request that matters of a confidential nature not be kept on the public record. If you believe any part of the proposal information relates to a manufacturing process or trade secret which is commercially confidential and should not be publicly available, please contact Anna Bogdanowski on 6467 5418 no later than 3 working days after the date of this letter. Any such request should be confirmed in writing.

There is a 14 day appeal period on this decision, closing 15 December 2008. During this period anyone may lodge an appeal with the Minister for the Environment, accompanied by the required $10 fee, requesting the Minister to consider directing the EPA to increase the level of assessment or the length of the public review period.

Please contact the Appeals Convenor's office on 9221 8711 after the closing date of appeals to check whether any appeals against level of assessment or the length of the public review period were received.

A formal assessment means that you are required to interact with the EPA to identify potential environmental impacts, and then submit to the EPA plans for managing those impacts. The EPA will then assess the proposal and report to the Minister. The EPA report will be available on the EPA website at the following web address: www.epa.wa.gov.au and you will be notified prior to its release.

The next stage of the formal assessment of this proposal requires that the proponent prepares an Environmental Scoping Document, unless this was provided as part of the referral to the EPA. Guidelines for the Environmental Scoping Document can be obtained at the EPA's website

(www.epa.wa.gov.au). Please consult with the EPA Service Unit's assessment officer and relevant stakeholders during the drafting of this document.

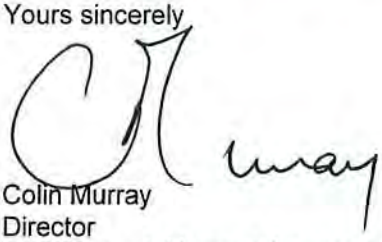
In considering proposals being assessed, the EPA works through a committee system. Should you wish to present your views or seek further information please contact the assessment officer in the first instance.

The EP Act requires that no decision should be made to allow or action taken to implement this proposal until the EPA has reported to the Minister for the Environment, and the Minister has authorised implementation or otherwise.

It is necessary for the Minister to nominate a company, agency or person responsible for the project. Accordingly, would you please advise by return mail the full name and title of the registered company, or if not a registered company, the full name and title of the agency or person responsible for the project.

The EPA Service Unit's assessment officer for this proposal is Richard Sutherland whose direct telephone number is 6467 5446.

Yours sincerely



Colin Murray
Director
Environmental Impact Assessment Division

1 December 2008

Environmental Protection Act 1986

Hon Donna Faragher JP MLC
Minister for Environment

MINISTER'S APPEAL DETERMINATION

APPEAL AGAINST LEVEL OF ASSESSMENT: TECHNICAL AMMONIUM NITRATE PRODUCTION FACILITY – BURRUP NITRATE PTY LTD.

Purpose of this document
This document sets out the Minister's decision on appeals lodged against the decision of the Environmental Protection Authority (EPA) to set a level of assessment at Public Environmental Review (PER) with an eight week public review period. This document is produced by the Office of the Appeals Convenor for the Minister but is not the Appeals Convenor's own report, which can be downloaded from the Appeals Convenor's website at www.appealsconvenor.wa.gov.au

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Appellants:	Mr Robin Chapple Mr Alex Leach Mr Robert G Bednarik Mr Daniel James Varney Dr Carol Warren
Proponent:	Burrup Nitrate Pty Ltd
Proposal description:	Burrup Nitrate Pty Ltd propose to construct a Technical Ammonium Nitrate Production Facility within the King Bay/Hearson Cove Industrial Precinct, located approximately 13km north west of Karratha.
Minister's Decision:	The Minister dismissed the appeals
Date of Decision:	15 April 2009

REASONS FOR MINISTER'S DECISION

Pursuant to section 106 of the *Environmental Protection Act 1986* (the EP Act), the Minister obtained a report from the EPA on the matters raised in the appeal. The Minister also received a report from the Appeals Convenor. This report sets out the background and other matters relevant to the appeal.

Five appeals were received in relation to this matter.

The Minister was provided with the following as part of her consideration of the appeal:

- The proponent's Referral of a Proposal to the Environmental Protection Authority;
- The letters of appeal;
- The EPA's response to the appeals;
- The proponent's response to the appeal; and
- The Appeals Convenor's report.

The EPA set the level of assessment at Public Environmental Review with an eight week public review period.

The Minister was informed that in appealing the level of assessment, the appellants are seeking for the proposal to be rejected outright or assessed at a higher level. Most of the appellants were particularly concerned with the cultural heritage aspects on the Burrup Peninsula, and the potential for ancient rock art to be directly destroyed, or impacted by the deposition of acidic atmospheric pollutants.

The appellants also raised the matter of industrial risk, suggesting that it is inappropriate to locate several industrial facilities with explosive inventories in close proximity to each other. One appellant incorrectly assumed that the Technical Ammonium Nitrate Production Facility would manufacture fertiliser, and therefore not be subject to explosives regulations. The Minister was advised, however, that the proposed Production Facility would manufacture explosive grade ammonium nitrate for the mining industry and be subject to the Dangerous Goods Safety regulations.

The grounds of the appeals are summarised as follows, together with the Minister's determination:

1. Level of Assessment should be set at "Proposal Unlikely to be Environmentally Acceptable" or at a minimum "Public Enquiry".

Under this ground of appeal, the Minister noted that appellants contend that the level of assessment for this proposal had been inappropriately set at a Public Environmental Review and that the level should be either "Proposal Unlikely to be Environmentally Acceptable" or "Public Enquiry".

In determining an appropriate level of assessment, the Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002 (Administrative Procedures) set out the criteria for the various levels of assessment. For example, a Public Environmental Review is set for proposals that are:

> *"...of local or regional significance that raise a number of significant environmental factors, some of which are considered complex and require detailed assessment to determine whether, and if so how, they can be managed".*

In relation to the level of assessment of Public Inquiry, the EPA may initiate a Public Inquiry, with the approval of the Minister for Environment, to

> *"...assist in the assessment of a proposal which is very complex and of intense public interest or such other reason determined by the Authority".*

The Administrative Procedures also state that a level of assessment of "Proposal Unlikely to be Environmentally Acceptable" is applied to projects that are clearly in

contravention of established or applicable environmental policy, standards or procedures, and could not be reasonably modified to meet the EPA's environmental objectives, or are proposed in a special environmental area.

With regards to the level of assessment for the Production Facility, the Minister understood that the EPA has undertaken a number of assessments of industrial proposals on the Burrup Peninsula and surrounding areas at the PER or similar level, including an Ammonia Plant, an Ammonia-Urea Plant, a Synthetic Hydrocarbon Plant, and a Methanol Complex.

These proposals are similar to the Technical Ammonium Nitrate Production Facility in that they are of regional significance and raise a number of significant environmental factors, some of which are considered complex, such as the protection of cultural heritage, and require detailed assessment to determine whether, and if so how, they can be managed.

Most importantly, the Minister believed the PER process provides an opportunity for proponents to demonstrate that their projects can be managed to meet environmental objectives and for the public to make comment to the EPA.

The Minister considered that the Technical Ammonium Nitrate Production Facility proposal is not of a scale, nor are the environmental issues so complex or the public interest so great, such that assessment would warrant a Public Inquiry. Similarly, a PUEA was not considered appropriate as the proposal is not in contravention of established or applicable environmental policy, standards or procedures.

The appellants' very strong views on the cultural significance of the Burrup Peninsula were acknowledged and these values are more broadly recognised. In response to concerns about the possible adverse impacts of industrial emissions on the rock art, the Minister understood that the Department of State Development commissioned a series of environmental investigations and established the Burrup Rock Art Monitoring Committee to independently oversee these studies.

The Minister was informed that the results to date of the scientific studies on the rock art indicate that air pollutants and dust levels were generally very low, and that there was no measurable difference in colour contrast and microbial diversity on the rock art surfaces between remote sites and sites located closer to industry.

Against this background, the Minister was of the view that the PER is an appropriate level for assessing the potential impacts of the proposed Technical Ammonium Nitrate Production Facility and determining how they can be managed. The eight week public review period also provides ample opportunity for interested members of the community to comment on the details of the proposal and the proponent's proposed management measures.

The Minister therefore dismissed this ground of appeal.

2. High risk of explosion.

The Minister noted that some appellants contend that explosive inventories should not be co-located since there is potential for "knock-on" effects to result in a massive explosion, impacting on Dampier and Karratha and perhaps causing tsunamis.

In response, the Minister was advised by the EPA that the proposal would be required to meet the safety criteria for a Major Hazard Facility and as such the risk of explosion would be assessed by the Department of Mines and Petroleum, which is the responsible agency for the assessment and regulation of these types of facilities.

The Minister was also informed that the EPA no longer reports on risk as an environmental factor and, consequently, it was not a relevant consideration in setting the level of assessment. However the Department of Mines and Petroleum would be invited to make a submission on the PER and, if necessary, the EPA can provide comment in the "Other Advice" section of its report and recommendations.

The Minister therefore dismissed this ground of appeal.

3. Other concerns regarding the suitability of the site.

The Minister noted that the appellants also raised concerns about the suitability of the site with respect to: zoning, flood impact associated with cyclonic tidal surge and climate change induced sea level rise; the risks to heritage values; status of heritage studies; and the potential to contaminate groundwater.

The Minister understood that the proponent recognised the importance of these issues and has committed through the environmental assessment process to undertake all measures necessary, including aboriginal heritage surveys, to ensure the impact on the environment and cultural heritage of the area is minimised.

The Minister was advised by the EPA and the Appeals Convenor that the PER process was considered adequate to assess the environmental aspects related to the suitability of the proposed site, and the assessment of heritage and groundwater factors. It is during this assessment process that the Minister expects that the EPA will have regard to the precautionary principle and the principle of intergenerational equity.

In response to appellants' concerns regarding the zoning of the proposal, the Minister noted that the proposed land use for this site is consistent with the Shire of Roebourne Town Planning Scheme (TPS) No. 8, under which the site is zoned 'Strategic Industrial.' Furthermore, the EPA is obliged to assess the proposal as referred, which in this case was for the location on the Burrup Peninsula.

The Minister therefore dismissed this ground of appeal.

Overall, the Minister was of the view that the Public Environmental Review, with the maximum eight weeks public review period, is an appropriate level for assessing the potential impacts of the proposed Technical Ammonium Nitrate Production Facility and determining how the impacts can be managed.

The Minister noted, however that the appellants feel very strongly about the issues of emissions on the rock art and the potential flooding of the site associated with cyclonic tidal surge and climate change induced sea level rise. In response, the Minister has written to the EPA requesting that these important issues be dealt with thoroughly through the assessment process.

Note: this decision is published pursuant to the terms of section 110 of the *Environmental Protection Act 1986* and regulation 8 of the *Environmental Protection Regulations 1987*.

Prepared by: Mandy Cross

Office of the Appeals Convenor
Level 13, 77 St George's Terrace
Perth WA 6000
Tel: (08) 9221 8711
Fax: (08) 9221 8244
www.appealsconvenor.wa.gov.au

Australian Government

Department of the Environment, Water, Heritage and the Arts

Notification of REFERRAL DECISION AND DESIGNATED PROPONENT

Controlled Action

DECISION ON ASSESSMENT APPROACH

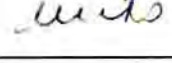
Proposed technical ammonium nitrate production facility (EPBC 2008/4546)

This decision is made under Section 75 and Section 87 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed action	
proposed action	The construction of an ammonium nitrate production facility within the King Bay/Hearson Cove Industrial Precinct, which is located within the National Heritage listed Burrup Peninsula, Western Australia.

Referral decision: Controlled action	
status of proposed action	The proposed action is a controlled action. *The project will require assessment and approval under the Environment Protection and Biodiversity Conservation Act 1999 before it can proceed.*
relevant controlling provisions	The project is likely to have a significant impact on: • National Heritage listed place (sections 15B & 15C); • Listed threatened species and communities (sections 18 & 18A) • Listed migratory species (sections 20 & 20A)
designated proponent	Wolfgang Jovanovic, Director – Corporate & Company Secretary, Burrup Nitrates Pty Ltd

Decision on assessment approach	
assessment approach	The project will be assessed by preliminary documentation.

Person authorised to make decision	
Name and position	Michelle Wicks A/g Assistant Secretary Environment Assessment Branch
signature	
date of decision	**20 November 2008**

Australian Government

Department of the Environment, Water, Heritage and the Arts

Wolfgang Jovanovic
Director – Corporate & Company Secretary
Burrup Nitrates Pty Ltd
Level 8, 225 St Georges Terrace
Perth WA 6000

EPBC Ref: 2008/4546
EPBC contact: Kara DeFay
(02) 6274 2114
kara.defay@environment.gov.au

Dear Mr Jovanovic

Request for additional information: Proposed technical ammonium nitrate production facility

On 20 November 2008, it was decided that the Burrup Nitrates Pty Ltd proposal for a technical ammonium nitrate production facility on the Burrup Peninsula (WA) required approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). At that time, it was also determined that the assessment of the proposal would be on preliminary documentation. This means that we will be assessing your project using:

- The information contained in your referral;
- Any other relevant information on the matters protected by the EPBC Act; and
- The additional information requested by the Department in this letter.

The preliminary documentation assessment process involves publishing referral information, plus any additional information, for a specified period of time to allow the public to comment. Before the Department issues you with a direction to publish, further information is required to allow us to consider all the relevant issues.

The Department requires further information regarding emissions from the facility, and increased access to and from the facility, as these have the potential to impact upon the rock art sites in the surrounding National Heritage area of Dampier Archipelago, including Burrup Peninsula.

The Department is also of the view that some listed threatened, migratory and marine species may be present on or in proximity to the project site, so that significant impacts are possible, including indirect impacts from waste water discharge at King Bay. These species are:

- Ruddy Turnstone (*Arenaria interpres* – Migratory)
- Oriental Plover or Oriental Dotterel (*Charadrius veredus* – Migratory)
- Oriental Pratincole (*Glareola maldivarum* – Migratory)
- Little Curlew or Little Whimbrel (*Numenius minuts* – Migratory)
- Whimbrel (*Numenius phaeopus* – Migratory)
- Humpback Whale (*Megaptera novaeangliae* – Vulnerable)
- Loggerhead Turtle (*Caretta caretta* – Endangered)
- Green Turtle (*Chelonia mydas* – Vulnerable)
- Hawksbill Turtle (*Eretmochelys imbricata* – Vulnerable)
- Flatback Turtle (*Natator depressus* – Vulnerable)
- Dugong (*Dugong dugon* – Migratory)

We are writing to request that you provide the following information.

National Heritage

1. The location of National Heritage rock art sites surrounding the proposed project area, including a map clearly marking the locations.
2. The possible impacts upon these rock art sites of emissions that will be produced by the proposed facility, including possible discoloration and corrosion.

3. The possible impacts upon these rock art sites from increased access by people to and from the project site during construction and operation of the facility, such as graffiti or other damage, including a risk assessment of those impacts.
4. An assessment of the likelihood of an upgrade of the main access road, Village Road (which runs through the National Heritage area), as a result of construction and operation of the proposed facility, including possible impacts upon the rock art sites.

Listed threatened, migratory and marine species

5. Details of the final location of the proposed facility and associated infrastructure, including access tracks, within the project area.
6. Details of how waste water will be treated onsite, transferred to the treatment plant at Dampier, treated at the WA Water Corporation facility and released into King Bay.

In any correspondence with the Department please quote the title of the action and EPBC reference, as shown on the beginning of this letter. You can send information to us:

by letter Western Australia and South Australia Section
Environment Assessment Branch
Department of the Environment, Water, Heritage and the Arts
GPO Box 787
CANBERRA ACT 2601

by email kara.defay@environment.gov.au
by fax (02) 6274 1620

In your letter of 3 December 2008, you requested that the Department reconsider the decision on assessment approach. As noted earlier, the assessment approach has been set at the level of preliminary documentation and, at this stage, is not covered under the WA bilateral agreement (*Agreement between the Commonwealth of Australia and Western Australia under section 45 of the EPBC Act Relating to the Environmental Impact Assessment*). However, it should be noted that WA can advise at any time during the assessment process that they wish to invoke the WA bilateral agreement. If this occurs, the WA bilateral agreement can then be used to assess this project.

If the WA EPA notifies the Department that the bilateral agreement is considered suitable, the information requested in this letter can be provided as part of that bilateral assessment process, effectively suspending a separate preliminary documentation assessment. The timeframe in which requested information is provided rests with you, as the timing for us to make a decision on approval of the proposed project stops on the date of this letter, and restarts once we have received satisfactory information.

If you have any questions about the process please contact the EPBC assessment officer and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

Wicks

Michelle Wicks
A/g Assistant Secretary
Environment Assessment Branch

4 December 2008

Cc. Ms Megan Lawson, Team Leader – Environment and Planning, Environmental Resources Management Australia (ERM)
Mr Richard Sutherland, Assessment Officer, EPA Service Unit

Annex B

Yara and BNPL Environmental Policies

Policy – Safety, Environment & Social Responsibility

Vision

Burrup Fertilisers as a company is committed to environmental protection and the health and safety of its people contractors and the public.

Mission

- Provide leadership, coordination and support with respect to environment, health and safety management in all operations and administrative functions and undertake the appropriate due diligence consistent with Burrup Fertilisers' shareholders' best interest.

Beliefs

We believe that:

- Management and staff commitment to safety, environment and social responsibility is essential to ensure a safe and environmentally acceptable operating environment.
- Safety shall be uppermost in the minds of all personnel at facilities which we operate.
- All personnel have a responsibility to perform their jobs in a safe and environmentally acceptable manner.
- Excellence in the performance of our environmental, health and safety responsibilities adds value, and is critical to our business.
- Public perception and attitudes are a valuable component to the successful management of our business.
- Then environment and the economy can co-exist.
- Community consultation is the preferred mechanism to resolve safety, environment and social responsibility issues of concern to the public.

Values

We Value:

- Our People are our most important asset and we will not compromise our safety standards to achieve other corporate goals.
- The experience and professionalism of our people.
- The commitment, leadership and accountability of all personnel for safety, environment and social responsibility performance.
- On-going and open dialogue with our stakeholders.

Principles

We Will:

- Maintain high standards of environment, health and safety performance consistent with the well being of Society.
- Meet or exceed regulatory compliance.
- Strive to meet industry codes, guidelines and practices.
- Proactively participate in the formulation of public policy.
- Integrate environment health and safety planning and management into our day-today activities, and define individual responsibilities, authority and accountability.
- Ensure that emergency response capability is in place and periodically tested for all company operations and facilities.
- Establish measurable performance targets and assess, document, report and continuously improve out environment, health and safety performance.
- Apply science-based assessment and cost-benefit analysis to safety, environment and social responsibility decision-making.
- Recognise and reward environment, health and safety excellence.
- Strive to optimize the safety of all work sites, by hiring only contractors who have superior safety performance and management systems.
- Adopt a "Pollution Prevention" approach to project planning and strive towards the reduction of emissions and wastes.
- Strive to prevent injury to people and damage to equipment, material and the environment.
- Inform stakeholders of our safety, environment and social responsibility performance.
- Address stakeholder concerns when examining risk.

Pankaj Oswal, Chairman and Managing Director

YARA's POLICY FOR HEALTH, ENVIRONMENT, SAFETY, QUALITY AND PRODUCT STEWARDSHIP

OUR COMMITMENT

Yara's aim is to establish sustainable growth and the creation of shareholder and societal value. We affirm to our stakeholders, including employees, customers and the public, our commitment to continuously improve and reach standards of excellence in Health, Environment, Safety, Quality and Product Stewardship throughout our operations.

HEALTH AND SAFETY

Injuries and occupational illnesses, as well as safety and environmental incidents, are preventable, and our goal for all of them is zero. We will encourage our employees to adopt a healthy, safe life-style for themselves and their families.

We will be prepared for emergencies and co-operate with local authorities to establish and improve their emergency preparedness.

ENVIRONMENT

We will manage our businesses in a life cycle perspective. In our operations we will contribute to eco-efficiency by continuously improving energy consumption and reducing waste, emissions and discharges. Where waste is generated, it will be handled and disposed of safely and responsibly.

We will design our products and develop product applications to have the minimum adverse effect on the environment throughout their life.

QUALITY

We will, with the involvement of our employees, seek to continuously improve the quality of our work and manufacturing processes to maximize efficiency and eliminate waste.

We will manufacture and supply products and services that are fit for purpose and valued by our customers.

PRODUCT STEWARDSHIP

We will, in co-operation with suppliers, distributors and customers, work according to the principles that our products and their raw materials, additives and intermediates, are processed and manufactured, handled, stored, distributed and used in a safe way with regard to health, occupational and public safety, environment and security.

Our plant nutrients shall always satisfy society's requirements to safe food production and animal feed.

We will continuously analyze and improve our practices, processes and products to reduce their risk and impact throughout the product life cycle.

MANAGEMENT AND EMPLOYEE COMMITMENT

The Board of Directors will be informed about pertinent safety, health, environmental and product stewardship issues and will ensure that policies and steering documents are in place and actions taken to achieve this Commitment.

Management in each business area is responsible to educate, train and motivate employees to understand and comply with this Commitment and applicable laws.

COMMUNICATIONS

We will promote open communications with all stakeholders about Health, Safety, Environmental and Product Stewardship issues. We will work with governments, policy makers and businesses to shape regulations and practices that work to achieving this commitment.

ACCOUNTABILITY

We will measure and regularly report to our stakeholders our progress in meeting this Commitment.

Annex C

Legislation

Relevant Acts, Policies and Guidelines

Key State Legislation

Key State legislation, and associated regulations, that are likely to apply to the TANPF Project, include, but is not limited to:

- *Aboriginal Heritage Act 1972*;
- *Agriculture and related Resources Protection Act 1976*;
- *Bush Fires Act 1954*;
- Clean Air (Determination of Air Impurities in Gases Discharged to the Atmosphere) Regulations 1983;
- *Conservation and Land Management Act 1984*;
- *Contaminated Sites Act 2003*;
- *Dampier to Bunbury Pipeline Act 1997*;
- *Dangerous Goods Safety Act 2004*;
- Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007;
- Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007;
- Dangerous Goods Safety (Road and Rail Transport of Non-Explosives) Regulations 2007;
- Dangerous Goods Safety (Explosives) Regulations 2007;
- Dangerous Goods Safety (Security Risk Substances) Regulations 2007;
- Dangerous Goods Safety (Goods in Ports) Regulations 2007;
- Dangerous Goods Safety (General) Regulations 2007;
- *Environmental Protection Act 1986*;
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004;
- Environmental Protection (Controlled Waste) Regulations 2004;
- Environmental Protection (NEPM -NPI) Regulations 1998;
- Environmental Protection (Noise) Regulations 1997;
- Environmental Protection (Recovery of Vapours From the Transfer of Organic Liquids) Regulations 1995;
- Environmental Protection (Unauthorised Discharges) Regulations 2004;
- *Fire and Emergency Services Authority of Western Australia Act 1998*;
- *Health Act 1911*;
- *Heritage of Western Australia Act 1990*;
- *Land Administration Act 1997*;
- *Local Government (Miscellaneous Provisions) Act 1960*;
- *Occupational Safety and Health Act 1984*;
- *Pollution of Waters by Oil and Noxious Substances Act 1987*;
- Schedule of General Requirements for Occupational Health and Safety 1993
- *Soil and Land Conservation Act 1945*; and,
- *Wildlife Conservation Act 1950*.

Key Commonwealth Legislation

Key Commonwealth legislation, and associated regulations, that are likely to apply to the TANPF Project, include, but is not limited to:

- *Aboriginal and Torres Straight Islander Heritage Protection Act 1984*;
- *Australian Heritage Council Act 2003*;
- *Environment Protection and Biodiversity Conservation Act 1999*;
- *Native Title Act 1993*;
- *National Greenhouse and Energy Reporting Act 2007*;
- *Quarantine Act 1908*;
- Quarantine Regulations 2000; and,
- *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*.

Applicable Policies and Guidelines

A number of international agreements, conventions and standards, Commonwealth and State policies, EPA position statements, EPA guidance statements, environmental guidelines and Codes of Practice are applicable to the TANPF Project, and include, but are not limited to:

International

- Convention on Biological Diversity 1992 (ratified by Australia in 1993);
- Convention on the Conservation of Migratory Species of Wild Animals (The Bonn Convention, 1979);
- Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (The Basel Convention, 1989);
- European Fertilizer Manufacturers Association (EFMA)'s Product Stewardship program;

- EFMA Best Available Techniques 2000 – No. 2 of 8 (Nitric Acid) and No.6 of 8 (Ammonium Nitrate);
- Japan-Australia Migratory Bird Agreement (JAMBA);
- China-Australia Migratory Bird Agreement (CAMBA); and,
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Commonwealth

- Air Quality and Air Pollution Modelling Guidance Notes, DEC 2006;
- Australian Code for the Transport of Explosives by Road and Rail, Second Edition, March 2000 (AE Code);
- Australian Standard AS 2187.1:1998, Explosives – Storage, transport and use, Part 1 – Storage (AS 2187 Part 1);
- Australian Standard AS 2187.2:2006, Explosives – Storage and use, Part 2 – Use of explosives (AS 2187 Part 2);
- Adopted National Exposure Standards For Atmospheric Contaminants In The Occupational Environment [NOHSC: 1003 (1995)];
- Intergovernmental Agreement on the Environment 1992;
- National Code of Practice for the Storage and Handling of Dangerous Goods – National Occupational Health and Safety Commission 2001;
- National Greenhouse Strategy 1998;
- National Model Regulation for the Control of Workplace Hazardous Substances;
- National Standard for the Control of Major Hazard Facilities [NOHSC: 1014 (2002)];
- National Standard for the Storage and Handling of Workplace Dangerous Goods NOHSC: 1015 (2001)];
- National Strategy for Conservation of Australia's Biological Diversity 1996; and,
- National Strategy for Ecologically Sustainable Development 1992.

State

- 1987 State Conservation Strategy;
- DEC Pilbara Coastal Waters Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives;
- DEC Air Quality and Air Pollution Modelling Guidance Notes;
- Guidance Statement 1: Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline;
- Guidance Statement 2: Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant;
- Guidance Statement 3: Separation Distances between Industrial and Sensitive Land Uses;
- Guidance Statement 6: Rehabilitation of Terrestrial Ecosystems;
- Draft Guidance Statement 8: Environmental Noise;
- Draft Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes, DEC, 2009;
- Draft Identification and Investigation of Acid Sulfate Soils, DEC, 2006;
- Guidance Statement 12: Minimising Greenhouse Gases;
- Guidance Statement 18: Prevention of Air Quality Impacts from Land Development Sites;
- Guidance Statement 40: Management of Mosquitoes by Land Developers;
- Guidance Statement 41: Assessment of Aboriginal Heritage;
- Guidance Statement 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia;
- Guidance Statement 55: Implementing Best Practice in Proposals Submitted to the Environment Impact Assessment Process;
- Guidance Statement 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia;
- Western Australia State Sustainability Strategy 2003; and,
- Western Australia Greenhouse Strategy 2004.

Annex D

TANPF Information Sheet Example

Step one of the production process involves combining oxygen (air) and ammonia to form nitric acid. This is done through a number of reactions. Step two involves combining the nitric acid and ammonia to form the ammonium nitrate solution. The final step of this process involves concentration of the ammonium nitrate solution, and further processing to form droplets of crystallised ammonium nitrate. These solidified droplets, referred to as prills are then dried and cooled to form the end product of TAN.


Technical Ammonium Nitrate Prills

How will the final product be stored?

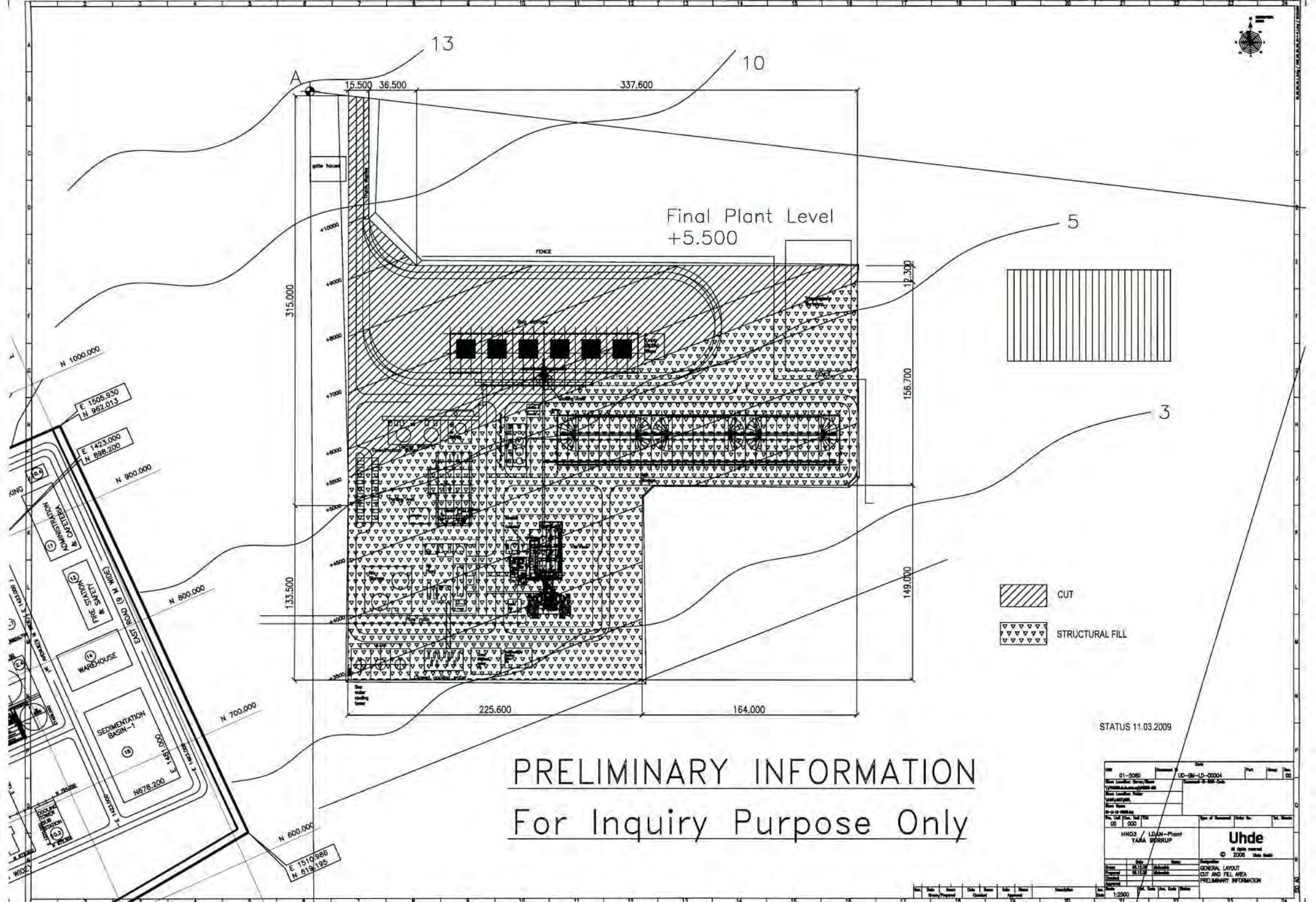
Two types of storage facilities will be used for TAN: a bagged product storage facility and a bulk storage facility. Product that is to be bagged will be conveyed to an intermediate bulk storage silo, that provides a buffer between production and bagging. In the event that the buffer is full or the bagging operation is stopped for any reason, the product will be diverted to the bulk storage facility.

Forklifts will be used to transport bagged product to the product storage building. Bagged product will be transported to customers using trucks.

Bulk material will be transported to the consumers by trucks, which will be loaded using front end loaders, bucket elevators and silos in combination with a truck weighing system.

Annex E

TANPF Site Elevation


13
10
5
3
A
15.500
36.500
337.600
Final Plant Level
+5.500
FENCE
315.000
133.500
156.700
149.000
12.300
225.600
164.000
N 1000.000
N 900.000
N 800.000
N 700.000
N 600.000
E 1505.930
N 962.013
E 1423.000
N 898.200
E 1510.986
N 619.195
E 1481.000
N678.200
ADMINISTRATION
FIRE STATION
WAREHOUSE
SEDIMENTATION BASIN-1
EAST ROAD (6 M WIDE)
CUT
STRUCTURAL FILL
STATUS 11.03.2009
PRELIMINARY INFORMATION
For Inquiry Purpose Only
HNO3 / LDAN-Plant
YARA BORRUP
Uhde
GENERAL LAYOUT
CUT AND FILL AREA
PRELIMINARY INFORMATION
1:2500

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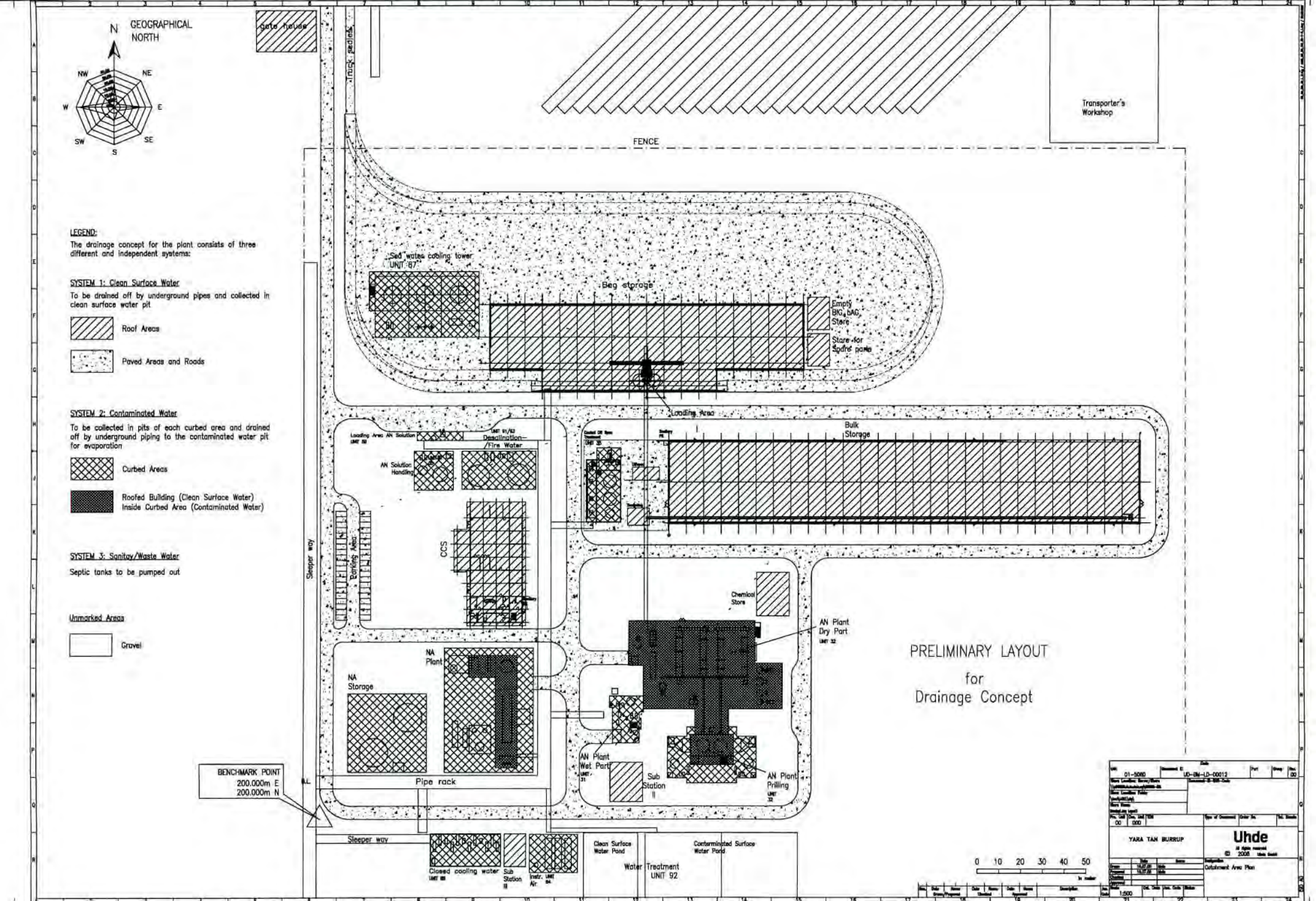
Annex F

Proposed Drainage Design



LEGEND:

The drainage concept for the plant consists of three different and independent systems:

SYSTEM 1: Clean Surface Water

To be drained off by underground pipes and collected in clean surface water pit

Roof Areas

Paved Areas and Roads

SYSTEM 2: Contaminated Water

To be collected in pits of each curbed area and drained off by underground piping to the contaminated water pit for evaporation

Curbed Areas

Roofed Building (Clean Surface Water) Inside Curbed Area (Contaminated Water)

SYSTEM 3: Sanitay/Waste Water

Septic tanks to be pumped out

Unmarked Areas

Gravel

PRELIMINARY LAYOUT for Drainage Concept

01-5060	UD-EN-LD-00012	Part	00
YARA TAN BURRUP	Uhde		
	Containment Area Plan		

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Annex G

Preliminary Management Plans

Preliminary Environmental Management Plans

Potential environmental impacts of the TANPF Project will be managed primarily through the development and implementation of Environmental Management Plans (EMPs), as discussed in *Chapter 9*. These will be consolidated into a Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP) and Decommissioning Environmental Management Plan (DEMP) which will be prepared prior to the respective stages of the projects life. They will be developed to comply with:

- BNPL's corporate standards/ requirements;
- Yara's Technical and Operational Standards (TOPS);
- Commonwealth and State regulatory requirements; and,
- Accepted industry standards.

The following Preliminary EMPs have been drawn up in accordance with the management actions presented in *Table 9.3, Chapter 9* of the PER. The Preliminary EMPs will be finalised following detailed design and any ministerial conditions set as part of the approval process. The EMPs will describe the procedures proposed to prevent, monitor and manage possible environmental impacts.

Preliminary EMPs are presented below and include the following:

- Preliminary Terrestrial Fauna Management Plan
- Preliminary Terrestrial Vegetation and Flora Management Plan
- Preliminary Weed Management Plan
- Preliminary Erosion Control and Stormwater Management Plan
- Preliminary Water Quality Management Plan
- Preliminary Greenhouse Gas Management Plan
- Preliminary Air Quality and Dust Management Plan
- Preliminary Noise Management Plan
- Preliminary Waste Management Plan
- Preliminary Aboriginal Heritage Management Plan
- Preliminary Traffic Management Plan
- Preliminary Hazardous Materials Management Plan
- Preliminary Health and Safety Management – To be utilised for all phases and will include:
  - Mosquito and Other Nuisance Insects Management Plan; and
  - Pest Management Plan (once plan is finalised).
- Preliminary Emergency Response Management Plan

Where relevant, the above will be incorporated into the CEMP, OEMP or be prepared as a stand alone EMPs.

The Preliminary EMPs below will be developed further in more detail once detailed design information is available and the construction contractors are commissioned. Some EMPs will be specifically developed for certain phases or as stand alone EMPs and many of the EMPs, for example, the Waste Management and Aboriginal Heritage Management Plan, will be amended as required when moving between construction and operation.

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Aboriginal Heritage Management Plan

Document Number: 250-200-PLN-BNP-0001

Date: 23 December 2009

PROJECT NUMBER 0086269 OR 114942				BURRUP NITRATES PTY LTD			
REV	DESCRIPTION	ORIGIN	CHECKED	DATED	BNPL APPROVAL	SIGNED	DATED
A	Issued for Review	ERM	TW	23/12/09	Y		
0	Approved for Use	BNPL	WJ/ FA	23/12/09	Y		

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TABLE OF CONTENTS

1 PURPOSE

This Preliminary Aboriginal Heritage Management Plan (PAHMP) lays down the actions required to avoid disturbance of Aboriginal Heritage sites (including Aboriginal listed sites within the National Heritage listed site (ID: 105727)). This plan also addresses the actions required if an Aboriginal Heritage site within the BNPL TANPF site is required to be disturbed as a result of the development. Where appropriate, this plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Although the final AHMP will be a stand alone management plan.

This plan is at a preliminary stage, with Aboriginal Heritage onsite walkovers still to be undertaken prior to site access for intrusive works. Consultation is underway between BNPL and the Traditional Owners of the area to gain access to the Site and to determine the exact location of Aboriginal Heritage sites within the lease area. The claimant groups will be consulted when finalising this PAHMP prior to construction.

This plan will be updated to encompass relevant Commonwealth and Western Australian (WA) Ministerial conditions following environmental approval from the Commonwealth Department of Environment, Water, Heritage and the Arts and the WA Office of the Environmental Protection Authority.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PAHMP	Preliminary Aboriginal Heritage Management Plan

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Construction and operation activities from the TANPF have the potential to impact upon Aboriginal heritage sites within the site, and surrounding the site, as follows:

- Site clearance, construction and earthworks potentially disturbing current or unknown heritage sites.
- Vandalism from workforce on Aboriginal heritage areas in close proximity to the Site, including within the National Heritage listed site (Place ID: 105727).
- Impacts on Aboriginal heritage sites from unplanned events such as accidental spills etc.

5 OBJECTIVES

- To ensure continued liaison with Aboriginal Groups and compliance with *Aboriginal Heritage Act 1972* (AHA) requirements.
- Ensure project works serve to protect and preserve existing and yet to be indentified Aboriginal Heritage and National Heritage sites within the TANPF site and that where required, if disturbance of site is unavoidable within the project lease this will be undertaken in accordance with conditions pursuant to Section 18 of the AHA.
- To identify, record and assess the significance of all Aboriginal heritage sites within the Site.
- To protect rock art sites.

6 PERFORMANCE INDICATORS

- Conformance with AHA.
- If required, conformance with AHA Section 18 requirements.
- Manage impacts, if any, on rock art sites.
- Construction activities conform to all PAHMP requirements.
- No entries are logged on the project environmental and Aboriginal Heritage complaint log.
- If complaints are made, satisfactory close-out of any environmental and Aboriginal Heritage complaints is achieved.
- Maintain the condition of integrity of known Aboriginal Heritage sites within and adjacent to the TANPF site, except those being subject of any AHA Section 16 permit to disturb (if required).
- Cultural awareness training is to be attended by all staff, including a briefing of visitors/subcontractors to the Site.
- Cultural awareness training be evaluated regularly such that recommendations on content can be amended accordingly and as appropriate.

7 DETAILED RESPONSE AND MANAGEMENT ACTIONS

Detailed actions for management of Aboriginal and National Heritage sites, and responses in the case of a breach of criteria are contained in Table 1.

Table 1 Aboriginal Heritage and National Heritage Management Actions

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PAHMP-1	Cultural heritage awareness induction will be undertaken by all workforce, including sub-contractors, to highlight areas of significance, ways to behave and areas to avoid. The Code of Conduct, which be enforced for all employees and contractors, will include severe disciplinary measures for anyone found interfering with rock art. The training will also cover the obligations for the protection of heritage areas under both state and Commonwealth environment legislation.	CEMP OEMP	Construction: Prior to earthworks commencement and ongoing Operations: Within two months following commencement of work on site	Construction manager or delegate Operations manager
PAHMP-2	BNPL is committed to the employment of traditional owners representatives during project works to monitor all ground disturbances and earthworks.	CEMP	Construction: Ongoing as required during ground disturbance works	Construction manager or delegate
PAHMP-3	Disturbance to site will be minimised as far as possible – where disturbance to site cannot be avoided, archaeological material will be potentially relocated under supervision of traditional owner representative to designated conservation areas wherever practicable (in accordance with AHA requirements and approvals).	CEMP	Prior to disturbance of a site (if required)	Project Archaeologist
PAHMP-4	Staff will be bussed in and out from Karratha to the TANPF, reducing traffic volume on Burrup Peninsula, and acting as a means for controlling staff movement and thus reducing any human impacts on the local rock art from BNPL employees and contractors.	CEMP OEMP	Ongoing	Proponent
PAHMP-5	Any proposed disturbance to cultural heritage sites will be subject to a Section 18 Application under the *Aboriginal Heritage Act 1972* (WA).	CEMP	Prior to disturbance of a site (if required)	Project Archaeologist
PAHMP-6	Blasting will be avoided where practicable and kept to a minimum where required. If necessary, controlled blasting will be employed during construction earthworks and blasting mats will be used if required.	CEMP	As required	Construction manager or delegate
PAHMP-7	A heritage management plan is prepared an implement conditions set by AHA Ministerial consent as required. This plan is to be further revised following detail site assessment for Aboriginal heritage, in particular any actions relating to disturbance of heritage sites within the TANPF site.		Prior to earthworks commencement and ongoing	Construction manager or delegate
PAHMP-8	Monitoring of air emissions at the Site and providing support to the Burrup Rock Art Monitoring Management Committee as required.	PAQMP OEMP	Ongoing	Section Manager

PAHMP-9	Implement the PAHMP contingency plan if additional sites are located during earthworks.	*Section 11* of this PAHMP	As may be necessary during construction earthworks	Construction manager or delegate

8 MONITORING PROGRAM

- Conformance with any conditions pursuant to the Aboriginal Heritage Act 1972, including, if required, conformance with conditions pursuant to the AHA Section 18 and Section 16 Ministerial consent conditions.
- BNPL to monitor air emissions and greenhouse gases from the TANPF to ensure they are within predicted limits (see PAQMP) and provide support and liaise with the Burrup Rock Art Monitoring Management Committee where appropriate.

9 REPORTING

Adherence to this PAHMP is to be reported in Site Compliance Reports and submitted to the DIA by BNPL on an annual basis.

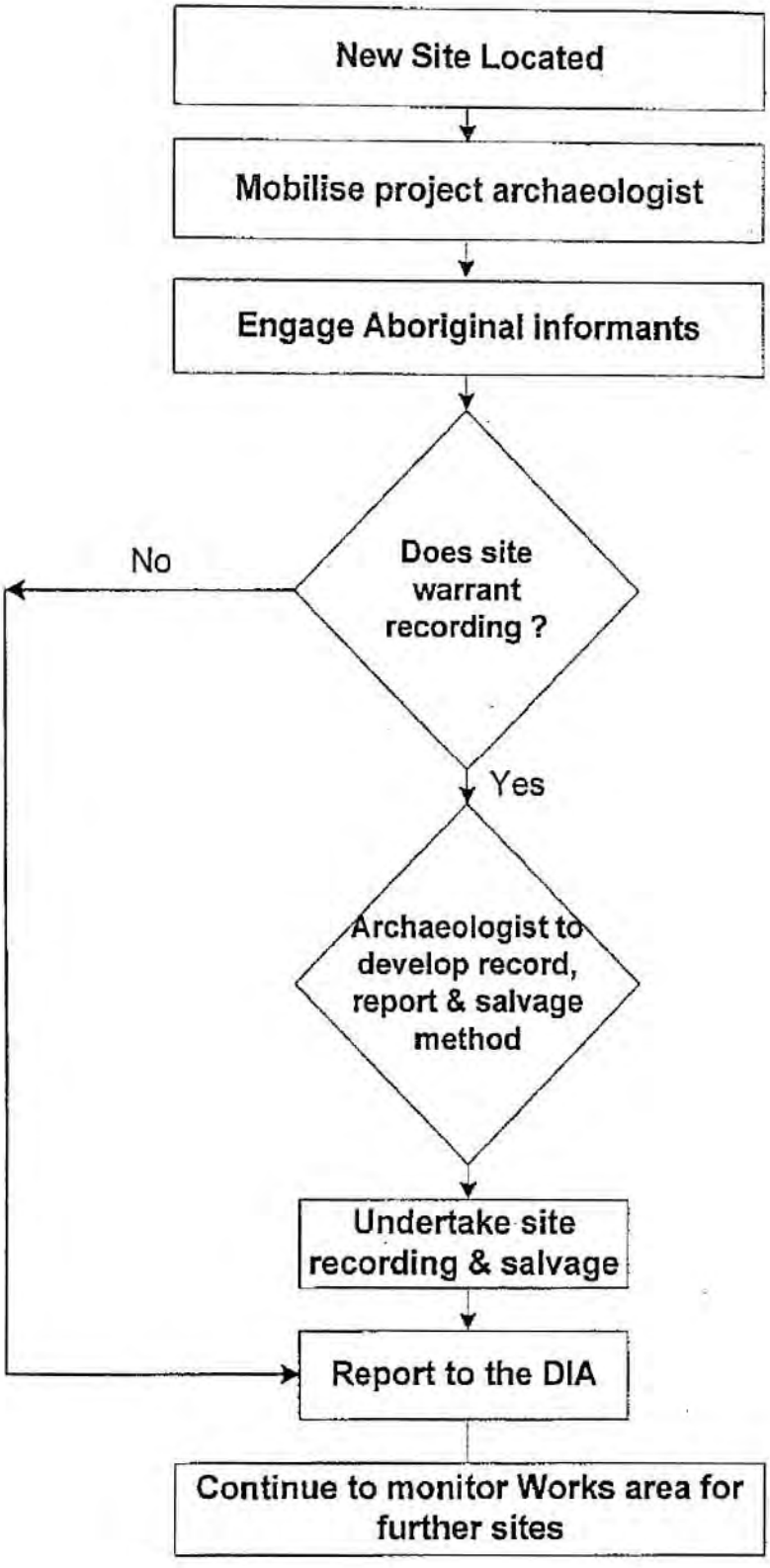
Further details on reporting will be provided following finalisation of this plan prior to construction.

10 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)

11 ABORIGINAL HERITAGE SITE CONTINGENCY PROCEDURE



Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Air Quality and Dust Management Plan

Document Number: 250-200-PLN-BNP-0002

Date: 23rd December 2009

PROJECT NUMBER 0086269 OR 114942				BURRUP NITRATES PTY LTD			
REV	DESCRIPTION	ORIGIN	CHECKED	DATED	BNPL APPROVAL	SIGNED	DATED
A	Issued for Review	ERM	TW	23/12/09	Y		
0	Approved for Use	BNPL	WJ/ FA	23/12/09	Y		

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TABLE OF CONTENTS

1 PURPOSE

This Preliminary Air Quality and Dust Management Plan (PAQDMP) provides a framework for mitigating and managing identified impacts of the BNPL TANPF operations on atmospheric emissions and dust generation. This management plan will form part of the overall Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) which will be developed prior to construction and operation.

The objective of the PAQDMP is to ensure that the potential effects of dust generation and the TANPF air emissions on sensitive receptors are managed to 'As Low As Reasonably Practicable' (ALARP). This PAQDMP also outlines a future air quality monitoring program to be implemented during operations.

2 DEFINITIONS

In this procedure, the following definitions apply:

Atmospheric emissions means the gases and particulates that are discharged to the atmosphere as a result of processing activities and the facilities subsidiary installations in the course of normal operations, start-up, upset and maintenance periods.

Dust emissions means the generation of air-borne particulates, either through process operations, wind erosion from the site or the movement of machinery and vehicles.

3 ABBREVIATIONS

AS	Australian Standards
BNPL	Burrup Nitrates Proprietary Limited
CO	Carbon monoxide
EO	Environmental Officer
NH_3	Ammonia
NO_x	Nitrogen oxides
PAQDMP	Preliminary Air Quality and Dust Management Plan
PEERP	Preliminary Emergency Response Management Plan
PGHGMP	Preliminary Greenhouse Gas Emissions Management Plan
OEMP	Operations Environmental Management Plan
PM_{10}	Particulate matter (less than 10 microns in diameter)
TANPF	Technical Ammonium Nitrate Production Facility
tph	Tonnes per hour
USEPA	United States Environmental Protection Authority

4 OVERVIEW OF PROJECT EMISSIONS

Site Preparation and Construction

Emissions to atmosphere associated with site preparation and construction are anticipated to be predominately particulate emissions. These emissions will be short term with construction anticipated to last 30 months.

If required, monitoring of dust emissions at the Site boundary will be implemented in accordance with an appropriate Australian Standard approved method (eg. The PM_{10}-high-volume sampler with size-selective inlet AS 3580.9.6-2003). Visual monitoring of all sites and access routes and construction sites will be undertaken.

Commissioning

Commissioning of the TANPF is anticipated to last approximately six months. Emissions to atmosphere will not be constant throughout this period, though when they occur, may exceed normal operational emissions for short periods.

Operation and Maintenance

Emissions to ambient air quality were assessed against NEPM criteria which are prescribed to ensure adequate protection of human health and well-being. As such these criteria are applicable only in areas of human habitation such as residential or recreational areas.

Emissions of NO_x and NH_3 have been assessed at five receptor locations which representative of areas of human habitation.

The maximum ground level concentration at each sensitive receptor resulting from routine plant operation is presented in Table 1.

This table shows that the conservatively predicted incremental emissions from the facility represent less than 5% of the NEPM criteria for NO_2 at all sensitive receptors. Background emissions have conservatively been estimated at 112.9µg/m^3 to allow a cumulative assessment of emissions.

The maximum ground level concentration of NO_x recorded at a sensitive receptor is 5.06 µg/m3, with an estimated background of 112.9 µg/m^3 the cumulative concentration at Hearson Cove is estimated at 117.96 µg/m3 or 48% of the NEPM 1 hour NO_2 criterion.

The maximum ground level concentration of NH_3 recorded at a sensitive receptor is 7.68 µg/m^3 which represents 2.3% of the NH_3 criterion. No hourly background data was available for ammonia concentrations on the Burrup, however given the low magnitude of incremental emissions, and the small number of existing sources of ammonia, it is not considered that cumulative emissions will exceed the criterion of 330 µg/m^3.

Table 1 Maximum Predicted Ground Level Concentrations – Routine Operations

	Incremental Concentration (µg/m^3)	Background Concentration (µg/m^3)	Cumulative Concentration (µg/m^3)	Criterion (µg/m^3)	% of Criterion
NO_x – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	2.5	112.9	115.4	246	46.9%
2. Balmoral Road, Nickol	2.6	112.9	115.5	246	47.0%
3. Dampier	3.2	112.9	116.1	246	47.2%
4. Hearson Cove	4.1	112.9	117.0	246	47.6%
5. Deep Gorge	3.3	112.9	116.3	246	47.3%
NO_x – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	2.5	112.9	115.4	246	46.9%
2. Balmoral Road, Nickol	2.6	112.9	115.5	246	47.0%
3. Dampier	3.0	112.9	115.9	246	47.1%
4. Hearson Cove	5.1	112.9	118.0	246	48.0%
5. Deep Gorge	4.7	112.9	117.6	246	47.8%
NH_3 – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	0.81	NA	NA	330	0.24%
2. Balmoral Road, Nickol	0.90	NA	NA	330	0.27%
3. Dampier	1.1	NA	NA	330	0.33%
4. Hearson Cove	3.7	NA	NA	330	1.1%
5. Deep Gorge	3.0	NA	NA	330	0.92%
NH_3 – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	1.7	NA	NA	330	0.50%
2. Balmoral Road, Nickol	1.9	NA	NA	330	0.56%
3. Dampier	2.5	NA	NA	330	0.76%
4. Hearson Cove	7.7	NA	NA	330	2.3%

	Incremental Concentration (µg/m^3)	Background Concentration (µg/m^3)	Cumulative Concentration (µg/m^3)	Criterion (µg/m^3)	% of Criterion
5. Deep Gorge	6.9	NA	NA	330	2.08%

1. Increment: Concentration resulting from site activities at modelled sensitive receptor

Non-routine Operation Emissions

Non-routine operations can result in short term changes in concentrations of emissions released to atmosphere. Non-routine emissions have been modelled for NO_x and NH_3.

The maximum ground level concentration at each sensitive receptor resulting from non-routine plant operation is presented in Table 2.

This table shows that the change emissions from the facility represent less than 15% of the NEPM criteria for NO_2 at all sensitive receptors. Background emissions have conservatively been estimated at 112.9µg/m^3 to allow a cumulative assessment of emissions.

The maximum ground level concentration of NO_x recorded at a sensitive receptor is 34 µg/m^3, with an estimated background of 112.9 µg/m^3 the cumulative concentration at Hearson Cove is estimated at 146.9 µg/m^3 or approximately 60% of the NEPM 1 hour criterion.

The maximum ground level concentration of NH_3 recorded at a sensitive receptor is 20.5 µg/m^3 which represents 6.2% of the NH_3 criterion.

Table 2 Maximum Predicted Ground Level Concentrations – Upset (non-routine) Conditions

	Incremental Concentration (µg/m^3)	Background Concentration (µg/m^3)	Cumulative Concentration (µg/m^3)	Criterion (µg/m^3)	% of Criterion
NO_x – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	15	112.9	128	246	52%
2. Balmoral Road, Nickol	16	112.9	129	246	53%
3. Dampier	20	112.9	133	246	54%
4. Hearson Cove	29	112.9	142	246	58%
5. Deep Gorge	22	112.9	135	246	55%
NO_x – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	14	112.9	127	246	51.7%
2. Balmoral Road, Nickol	16	112.9	128	246	52.2%
3. Dampier	17	112.9	130	246	52.8%
4. Hearson Cove	34	112.9	147	246	59.7%
5. Deep Gorge	32	112.9	145	246	58.8%
NH_3 – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	2.2	NA	NA	330	0.65%
2. Balmoral Road, Nickol	2.4	NA	NA	330	0.73%
3. Dampier	2.9	NA	NA	330	0.89%
4. Hearson Cove	9.9	NA	NA	330	2.9%
5. Deep Gorge	8.1	NA	NA	330	2.5%
NH_3 – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	4.4	NA	NA	330	1.3%
2. Balmoral Road, Nickol	5.0	NA	NA	330	1.5%
3. Dampier	6.7	NA	NA	330	2.0%
4. Hearson Cove	21	NA	NA	330	6.2%
5. Deep Gorge	18	NA	NA	330	5.5%

1. Increment: Concentration resulting from site activities at modelled sensitive receptor

5 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Air quality impacts from the routine operation of the BNPL TANPF may result from the generation of emissions including, CO, NO_x (including NO_2), NH_3 and PM_{10}; and by the generation of dust from the wind and construction activities such as the movement of vehicles on the site.

Changes in emissions may be expected during non-routine operations such as start-up, shutdown and emergency shutdown.

Conservatively predicted changes emissions of NO_x from the TANPF represent less than 5% (routine operations) and 15% (non-routine operations) of the adopted NEPM (ambient air) NO_2 criteria at all sensitive receptors (in particular Hearson's Cove and Deep Gorge).

The predicted concentrations of NO_x and NH_3 from the TANPF are not expected to have an impact on local rock art and surrounding vegetation. Predicted NO_x and NH_3 concentrations will be below the thresholds of impact identified by the CSIRO during the 2008 Burrup Peninsula Air Pollution Study.

Dust emissions have the potential to adversely affect the condition of the surrounding vegetation and fauna, human health and safety and public amenity. Dust impacts on vegetation and fauna is possible during operations.

Due to the distance of the Site from the nearest residential areas of Dampier and Karratha it is not anticipated that atmospheric emissions will have any impact on residential areas. The nearest sensitive receptor is the beach at Hearson's Cove. Impacts on air quality in the plant area will be monitored and managed during operations.

Construction and Operation of the BNPL TANPF has the potential to impact air quality due to the following activities:

- Combustion of gas;
- Discharge of process air emissions; and
- Movement of vehicles on site, generating dust and combustion products.

Potential emissions associated with incidents or emergencies on the Site, such as bushfire, plant shutdown or pipeline rupture have not been considered in this procedure, but will be addressed via the PERMP and incident reporting procedure (yet to be finalised).

6 OBJECTIVES

The objectives of this PAQDMP are to:

- Avoid and limit impact on human health and the environment by avoiding or limiting air pollution from TANPF activities;
- Minimise community complaints in relation to air quality impacts including dust generation;
- Avoid the release of atmospheric pollutants and when avoidance is not feasible, limit or control emissions to reduce the intensity or load of their release; and
- Ensure the release of atmospheric pollutants will meet stakeholder expectations and not exceed relevant ambient air quality guidelines.

7 PERFORMANCE REQUIREMENTS

Assessment of the PAQDMP will be based upon the following key performance indicators:

- No breaches of environmental legislative or regulatory requirements;
- Absence of community complaints regarding dust or other air quality nuisances;
- Timely calibration of any air quality monitoring equipment; and
- Verification of training of staff and contractors in this PAQDMP.

8 RESPONSE AND MANAGEMENT ACTIONS

8.1 Management Triggers

BNPL will implement a process to guide and report on appropriate management responses to detected changes in ambient air quality elements. Three management triggers will be implemented during the point source monitoring program:

- **Alert trigger for management (reflected as 60% of the NEPM criterion):** Investigation of the causes for the exceedance of the particular element.
- **Review trigger for management (reflected as 90% of the NEPM criterion):** Investigation and implementation of short-term mitigation measures for the element.
- **Action trigger for management (exceed NEPM criterion):** Stop work if it is safe to do so, investigate and implement mitigation measures before recommencing work.

The specific air quality element values for triggering the above management responses are detailed in Table 3

Table 3 Management Trigger Levels – Point Source

Pollutant	Criterion (NEPM[1])	Trigger Value 60% of NEPM	Trigger Value 90% of NEPM	Exceed NEPM
	µg/m^3	µg/m^3	µg/m^3	µg/m^3
NO_2 – 1 hour	246	147.6	221.4	246 +
NO_2 – Annual	62	37.2	55.8	62 +
PM_{10} – 24 hour	50	30	45	50 +
Ammonium – 1 hour	330	198	297	330 +
Carbon Monoxide	10,000	6000	9000	10,000 +

1. Criterion for pollutants are NEPM standards; criterion for Ammonium 1 hour is from NSW DECC

8.2 Atmospheric Emission Management

Personnel on site have limited opportunities to directly affect atmospheric emissions from the plant. Instead, air quality management has been implicitly addressed by developing features in the plant design, which minimise atmospheric emissions. These design features include:

- Use of Best Available Technology;

- Use of Yara's TOPS;
- Reducing NOx through catalytic abatement;
- Scrubbers on emission points;
- Enclosed storage and bagging area;
- Tail gas abatement; and
- Sealed onsite haulage roads.

As the plant design implicitly manages air quality, the management focus during the operations phase is on monitoring of emissions, as documented in Table 4.

Table 4 Response and Management Actions

Reference Number	Response and Management Actions	Timing/ Critical Date	Responsible Person
PAQDMP-1	Monitor plant components in accordance with Table 4.	As detailed in Table	Relevant Section Manager
PAQDMP-2	Process controls will be in place to avoid accidental or excess venting, and avoid unnecessary shutdown thereby reducing non-routine emission events. These procedures will be finalised following Final Detailed Design and will be finalised prior to operations.	Ongoing following commissioning	Relevant Section Manager
PAQDMP-3	Air quality management has been implicitly addressed by developing features in the TANPF design, which minimise atmospheric emissions. These design features include: • Use of Best Available Technology; • Use of Yara's TOPS; • Reducing NOx through catalytic abatement; • Scrubbers on emission points; • Enclosed storage and bagging area; • Tail gas abatement; and • Sealed onsite haulage roads	To finalised through Final Detail Design	Proponent
PAQDMP-4	Depending on the efficiency of the reactionary process, shutdowns will be required to replace catalyst in the Nitric Acid Plant (however, other process components will remain in operation). This will allow the catalyst to work efficiently in significantly reducing emissions of NOx and other emissions from the TANPF.	Initially annually following commissioning	Relevant Section Manager
PAQDMP-5	Inform the workforce of the requirements to minimise dust generation through an induction programme.	Ongoing	Relevant Section Manager
PAQDMP-6	Maintain general housekeeping practices to ensure there is no accumulation of waste materials, within the lease area, that may generate dust.	Ongoing	Relevant Section Manager
PAQDMP-6	Implement Dust Contingency Response if unacceptable dust levels arise. this response is yet to be finalised, but is likely to include watering of exposed areas (with clean potable water) to reduce dust.	As required	Relevant Section Manager
PAQDMP-7	Manage all vehicles delivering or removing material from the site so there is minimal spillage or windblown material deposited on roads (eg covered loads).	Ongoing	Relevant Section Manager

PAQDMP-8	Revegetate/rehabilitate temporarily disturbed land as soon as practicable.	As required	Relevant Section Manager
PAQDMP-9	Restrict site traffic to designated internal roadways and suitably sealed to prevent disturbance of vegetated or natural areas.	Ongoing	Relevant Section Manager
PAQDMP-10	Submit report including: • Incidents where dust crossed the boundary; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	Annually	EO

8.3 Monitoring Program and Methods

The TANPF components that are monitored, the methods used and the emissions that are measured are summarised in Table 5.

Table 5 Monitoring Summary

Plant Component/ Site Area	Emissions to be Monitored	Methodology	Monitoring Interval
Continuous Sources			
Nitric Acid plant	NOx, N_2O, CH_4	Online gas analyser	Monitoring will occur for at least 90% of the stable plant operating conditions for every monthly period. Monitoring will occur for at least 95% of the stable plant operating conditions over every 12 month period.
Prilling Tower	NH_3, NH_4 NO_x, Ammonium Nitrate	Stack sampling	Periodically, after a minimum 10 days stable operating conditions.

8.3.1 Air Quality

The air quality monitoring standard methods are summarised in Table 6. The prescribed monitoring methods change from time to time and monitoring personnel must ensure that the procedures used are current. The methods in Table 6 were valid at December 2009.

Table 6 Prescribed Standard Methods

Issue	Appropriate Standard
Determining the location of sampling ports and the traverse points	AS 4323.1-1995
Determining velocity and volumetric flow rate	USEPA Method 2 or 2c (2000)
Determining in-stack CO2 concentrations	USEPA Test Method 3A (1990)
Determining in-stack CO concentrations	USEPA (1996) Method 10
Determining in-stack total particulate matter	AS 4323.2-1995
Determining in-stack NOx concentrations	USEPA (2000) Method 7 or 7A or 7B or 7C or 7D or USEPA (1990) Method 7E or USEPA (1996) Method 20 or ISO (1993) Method 10396 (as appropriate). NOx analysers may be substituted in Method 7E provided the performance specifications of the method are met. Both NO and NOx must be directly measured.

Note: A useful source for rapidly checking the up-to-date monitoring procedures is via the NSW EPA "Approved Methods for Sampling and Analysis of Air Pollutants in NSW", 2001 which can be accessed online from http://www.epa.nsw.gov.au/air/amsaap/index.htm

8.3.2 Dust Emissions

If required, monitoring of dust emissions at the lease boundary will use one or more of the following approved methods:

- The suspended matter-filter paper soiling method AS 2724.2-1987;
- The TSP-high-volume sampler method AS 2724.3-1984;
- The light scattering-integrating nephelometer method AS 2724.4-1987;
- The impinged matter-directional dust gauge method AS 2724.5-1987; and
- The PM10-high-volume sampler with size-selective inlet AS 3580.9.6-1990.

9 REPORTING

Air Quality Monitoring results will be documented by the EO and reported in the BNPL Annual Environmental Report. Any exceedance of the emissions levels specified in Section 6 will be reported to the General Manager, who has the responsibility of reporting to the DEC if any pollution has been caused or is likely to be caused.

Reporting of greenhouse gas emissions are documented in the Greenhouse Gas Reporting Plan.

10 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0003 Preliminary Emergency Response Management Plan (PERMP)
- 250-200-PLN-BNP-0004 Preliminary Greenhouse Gas Management Plan (PGHGMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Emergency Response Management Plan

Document Number: 250-200-PLN-BNP-0003

Date: 23rd December 2009

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1 PURPOSE

This Preliminary Emergency Response Management Plan (PERMP) provides a framework for mitigating and managing risks of potential environmental impacts of emergencies that may arise in the BNPL TANPF site. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP. Detailed work instructions will be based on this plan once detailed design is finalised and this plan is updated, which will occur prior to construction and operation.

2 DEFINITIONS

In this procedure, the following definitions apply:

Environmental Emergency means an event that is triggered by Table 1 as an environmental emergency.

Offsite Impacts are environmental impacts in the undisturbed area or outside the lease area.

Major Accidental Event (MAE) is defined as an accidental event that can give rise to multiple fatalities or significant property damage.

The **Plant Site** refers to the area within the disturbance boundary.

Lease area is defined as the entire project lease, including the undisturbed area and the plant site.

Table 1 Events triggering an Environmental Emergency Response

Substance/Source	Nature of Event/ Release
Diesel Fuel	Release of >20 L outside TANPF area (spill event). Fire or explosion
Oxygen scavengers	Any uncontrolled release with the potential for offsite impacts.
Ammonia Solution	Uncontained release of >20L (spill event)
Anhydrous Ammonia	Any uncontrolled release with the potential for offsite impacts.
Boric acid	Uncontained release of >20L (spill event)
Di Ammonium Phosphate	Uncontained release of >20L (spill event)
Ammonium Sulphate	Uncontained release of >20L (spill event)
Sulphonated naphthalene	Uncontained release of >20L (spill event)
Coating Agent (Amine wax)	Uncontained release of >20L (spill event)
Methanol	Uncontained release of >20L (spill event)
Other Chemicals	Uncontained release of >20L (spill event)
Natural Gas	Fire or explosion
Saline Water Spill	Offsite release of >20L (spill event)
Clean surface water pond	Persistent discharge of wastewater with parameters more than10% greater than defined works approval criteria (to be determined).
Extraordinary air emissions	Persistent gaseous discharge with NOx levels more than 10% above works approval criteria, or with NH3 levels at more than 5% of gas by weight.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
STC	Safety and Training Coordinator
FESA	Fire and Emergency Services
MAE	Major Accident Event
PERMP	Preliminary Emergency Response Management Plan
OEMP	Operations Environmental Management Plan
TANPF	Technical Ammonia Nitrate Production Facility

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

This PERMP is a preliminary plan only and a complete Emergency Response Management Plan will be finalised following Final Detailed Design prior to construction and operation.

This PERMP describes how BNPL will respond to and minimise the potential environmental impact of incidents at the BNPL TANPF, with emergencies relevant to safety, but with no environmental impact, to be addressed in the Final Emergency Response Management Plan and Final Health and Safety Management Plan.

The Final Emergency Response Management Plan (FERMP) will include procedures to deal with the following events (as a minimum):

- Spills or release;
- traffic accidents involving company trucks;
- traffic accidents involving company trucks that cause spills;
- damage to production facility infrastructure;
- fires and explosions;
- medical evacuation; and
- theft/security threat of explosive materials.

The FERMP will follow industry best practice and legislative requirements and will satisfy the following key requirements:

- fit for purpose;
- FESA and the Australian Federal Police;
- accessible and appropriately communicated;
- staff trained in its activation and implementation;
- backed-up by the necessary equipment and facilities;
- have received the approval of the relevant authorities;

- known to be external agencies that may be called upon to respond; and
- drilled and evaluated.

The FERMP will be developed in consultation with the local authorities (eg. FESA) taking into account BNPL's knowledge and experience already establish via operation of the adjacent BFPL ammonia plant.

The FERMP will address potential environmental emergencies, outlining all the likely scenarios leading to an environmental emergency. It will also address any actions required to assist in the management of environmental incidents arising from adjacent facilities that may impact the BNPL site.

The environmental impacts of an environmental emergency include:

- Environmental degradation associated with spills;
- Environmental degradation associated with extraordinary emissions; and
- Fire or explosion.

Issues that require management during and subsequent to an environmental emergency include:

- Harm minimisation during the course of the emergency;
- Appropriate monitoring of any impacts and implementation of rehabilitation / remediation measures where appropriate; and
- Implementation of corrective actions and prevention of possible future environmental incidents.

Of the potential environmental hazards identified, those arising from dangerous goods are considered to be significant due to the potential for incidents to have impacts offsite. These goods will be shown in BNPL's Dangerous Goods Licence (to be obtained prior to operation), which will be updated annually. Additional hazardous materials, including ammonia gas, are also present onsite, and may also result in an environmental emergency if released in large quantities.

A number of emergency scenarios may arise from the storage and handling of dangerous goods, including spills, extraordinary emissions or fire/explosions. These are tabulated in Table 2, indicating the likely sources of the emergency, the areas that potentially may be affected, and the impacts that might result from the emergency.

Table 2 Environmental Emergency Scenarios

Event	Potential Sources	Environmental Areas Potentially Affected	Potential Environmental Impacts
Spill	Ammonia Hydrocarbons Acid/Base Nitric Acid	Salt flats Marine environment Groundwater Soil Terrestrial vegetation	Vegetation death Fauna death Chronic contamination Nutrient enrichment
Extraordinary Emissions	Wastewater – nutrients (P, N, ammonia, ammonium nitrate) Atmospheric – NOx, ammonia vapour	Marine environment Vegetation Heritage sites	Nutrient enrichment Vegetation death (acid deposition) Degradation of rock art (acid deposition)

Toxic release	Ammonia leak	Plant site Project lease Plant site	Vegetation death Fauna death Chronic toxicity
Fire or Explosion	Ammonium Nitrate Natural gas Diesel Fuel	Plant site Project lease	Vegetation death Fauna death Formation of toxic residues

In the event of an incident that could potentially impact off-site, a BNPL Site Response Team (SRT) will be called upon. Details of this team structure and responsibilities will be detailed in the FERMP. Minor incidents that do not have the potential to impact offsite will be managed by the FERMP.

5 OBJECTIVES

The objectives of the PERMP are to:

- Provide details and structure of FERMP.
- Highlight procedures to contain emissions that may lead to environmental harm during an emergency;
- Mitigate the environmental impacts of an emergency; and
- Monitor and rehabilitate affected environments subsequent to an emergency event.

6 PERFORMANCE REQUIREMENTS

Performance requirements following an environmental emergency will include:

- Minimisation of environmental harm as a result of an environmental incident or accident; and
- Implementation of specified emergency response contingency.

7 DETAILED RESPONSES AND MANAGEMENT ACTIONS

The FERMP will provide appropriate responses for incidents that are classified as Major Accident Events (MAEs). MAEs are defined as any facility rupture resulting in a spill of ammonia, or other toxic substances. It is recognised in all cases that the priority in any emergency response is to ensure the safety of personnel, and this will be mandated in the FERMP and Final Health and Safety Management Plan. Detailed work instructions will be based on the generic responses and management actions in Table 3, though these are likely to refined and added to following Final Detailed Design.

In the case where an incident is not classified as an environmental emergency then the management of the spill and subsequent clean-up and disposal will be managed under the Preliminary Hazardous Materials Management Procedure (PHMMP).

Table 3 Environmental Emergency Responses and Management Actions

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
Spill Response				
PERMP-1	Implement the FERMP if the emergency is a MAE.	CEMP OEMP	As required	Construction Manager Section Manager
PERMP-2	Isolate the source of any spill in accordance with the FERMP (eg by emergency bunding, plugging a hole, closing valves or directing the spill to a contained area).	CEMP OEMP	As required	Construction Manager Section Manager
PERMP-3	Contain any water or soil that is impacted by the spill, in accordance with the EMP.	CEMP OEMP	As required	Construction Manager Section Manager
PERMP-4	Isolate and remove any water or soil contaminated by the spill to prevent further environmental exposure.	CEMP OEMP	As required	Construction Manager/ EO Section Manager/ EO
PERMP-5	Monitor the area of impact, specifically for: • Residual concentrations of the spilled substance; and • Any biological response to the spill.	CEMP OEMP	As required	Construction Manager/ EO Section Manager/ EO
PERMP-6	Remediate/rehabilitate affected area(s).	CEMP OEMP	As required	Construction Manager/ EO Section Manager/ EO
PERMP-7	Submit report including: • Feedback on the cause of the incident; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	CEMP OEMP	As required	Area Manager/ EO/ STC
Extraordinary Emissions Response				
PERMP-8	Implement the FERMP	CEMP OEMP	As required	Construction Manager Section Manager
PERMP-9	Restore normal operating conditions as soon as possible;	OEMP	Immediately	Shift Supervisor
PERMP-10	Contain extraordinary emissions if possible (only feasible for wastewater emissions);	OEMP	Immediately	Area Manager
PERMP-11	Monitor the area of impact, specifically for: • Concentrations of the emitted substance; • Any physical response (eg degradation of rock art, flora or fauna) and • Any biological responses.	CEMP OEMP	Continue until background levels achieved	Area Manger/ EO/ STC
PERMP-12	Remediate/rehabilitate affected area(s).	CEMP OEMP	As required	Construction Manager/ EO Section Manager/ EO

PERMP-13	Submit report including: • Feedback on the cause of the incident; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	CEMP OEMP	As required	Area Manager/ EO/ STC
Toxic Release Response				
PERMP-14	Implement the FERMP	CEMP OEMP	As required	Construction Manager Section Manager
PERMP-15	Isolate the inventory of toxic substance to minimise emission in accordance with the EMP.	CEMP OEMP	Immediately	In accordance with Pre Incident Procedure
PERMP-16	Monitor the area of impact, specifically for Biological response.	CEMP OEMP	Continue until biota recover.	Area Manager/ EO/STC
PERMP-17	Remediate/rehabilitate affected area(s).	CEMP OEMP	As required	Construction Manager/ EO Section Manager/ EO
PERMP-18	Submit report including: • Feedback on the cause of the incident; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	CEMP OEMP	As required	Area Manager/ EO/ STC
Fire or Explosion Response				
PERMP-19	Implement the FERMP	CEMP OEMP	As required	Construction Manager Section Manager
PERMP-20	Isolate inventory of flammable/explosive substances to limit fuel source (if relevant).	CEMP OEMP	In accordance with Pre Incident Procedure	Construction Manager Section Manager
PERMP-21	Fight and contain the fire in accordance with the FERMP	CEMP OEMP	In accordance with Pre Incident Procedure	Area Manager/ EO/STC
PERMP-22	Protect environmentally sensitive areas from fire if safe to do so.	CEMP OEMP	Immediately	Leader of Site Response Team
PERMP-23	Monitor the area of impact, specifically to: • Characterise any residues from combustion; and • Monitor biological impact and recovery.	CEMP OEMP	Once safe to do so	Area Manager/ EO/STC
PERMP-24	Remediate/rehabilitate affected area(s).	CEMP OEMP	As required	Construction Manager/ EO Section Manager/ EO
PERMP-25	Submit report including: • Feedback on the cause of the incident; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	CEMP OEMP	As required	Area Manager/ EO/ STC

7.1 Environmental Emergency Situations Associated with Adjacent Plants

Adjacent facilities that may be impacted by an environmental incident at the TANPF will be notified as required (details of this procedure will be provided in the FERMP). Where appropriate, BNPL will work with adjacent facilities to monitor and rehabilitate environments disturbed by an emergency.

8 MONITORING PROGRAM

The Senior Support Manager will be responsible for ensuring that a monitoring program is implemented in the event of an emergency. The extent of monitoring required is dependent on both the size and nature of the environmental impacts, and the specific details of monitoring programs will be determined in consultation with the DEC.

Environmental parameters which may be monitored include:

- Soils, surfacewater and groundwater;
- Biological response including fatalities, presence of indicator organisms, recovery rate; and,
- Physical responses such as degradation of rock art and vegetation on the site.

9 REPORTING

All environmental incidents will be investigated and reported as required by BNPL's Incident Investigation and Reporting Procedure (to be finalised prior to operation).

Following an incident, a report will be prepared providing feedback on the cause of the incident and the response; the steps that are necessary to prevent a similar incident from occurring again; and any other opportunities for continued improvement. This report will be provided to management and disseminated throughout the operational personnel.

10 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0005 Preliminary Health & Saftey Management Plan (PHSMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Greenhouse Gas Management Plan

Document Number: 250-200-PLN-BNP-0004

Date: 23rd December 2009

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1 PURPOSE

This Preliminary Greenhouse Gas Management Plan (PGHGMP) provides a framework for mitigating and managing identified impacts associated with Greenhouse Gas (GHG) production arising from the BNPL TANPF site. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PGHGMP	Preliminary Greenhouse Gas Management Plan

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Emissions of GHG from activities associated with the TANPF will result from:

- process emissions from the TANPF.
- combustion of natural gas for the generation of electricity supplied to the TANPF from the adjacent Burrup Fertilisers Pty Ltd (BFPL) ammonia plant.

5 OBJECTIVES

The objectives of the PGHGMP are to:

- Minimise the TANPFs contribution on global warming; and
- To use BAT to design the TANPF to ensure greenhouse gases are minimised to ALARP.

6 PERFORMANCE REQUIREMENTS

Assessment of the PGHGMP will be based upon the following key performance indicators:

- No breaches of environmental legislative or regulatory requirements;
- Timely calibration of any air quality monitoring equipment; and

- Verification of training of staff and contractors in this PGHGP.

7 DETAILED RESPONSE AND MANAGEMENT ACTIONS

As the TANPF design implicitly manages GHG production, the management focus during the operations phase is on monitoring of emissions, as documented in Table 1.

Table 1 Responses and Management Actions for Greenhouse Gas

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PGHGMP-1	Monitor plant components in accordance with PAQDMP.	OEMP	As detailed in PAQDMP	Relevant Section Manager
PGHGMP-2	Process controls will be in place to avoid accidental or excess venting, and avoid unnecessary shutdown thereby reducing non-routine emission events. These procedures will be finalised following Final Detailed Design and will be finalised prior to operations.	OEMP	Ongoing following commissioning	Relevant Section Manager
PGHGMP-3	GHG management has been implicitly addressed by developing features in the TANPF design, which minimise production of GHGs. These design features include: • Use of Best Available Technology; • Use of Yara's TOPS; • Reducing NOx through catalytic abatement; • Scrubbers on emission points; • Tail gas abatement.	OEMP	To finalised through Final Detail Design	Proponent
PGHGMP-4	Depending on the efficiency of the reactionary process, shutdowns will be required to replace catalyst in the Nitric Acid Plant (however, other process components will remain in operation). This will allow the catalyst to work efficiently in significantly reducing emissions of NOx and other emissions from the TANPF.	OEMP	Initially annually following commissioning	Relevant Section Manager
PGHGMP-5	Measures to reduce the emissions from engines and equipment during construction where possible will be investigated	CEMP	Ongoing	Construction Site Manager/ Construction Contractor
PGHGMP-6	BNPL will ensure equipment is correctly maintained to minimise the production of GHGs	OEMP	Ongoing	Relevant Section Managers

8 MONITORING

Monitoring will be in line with the monitoring procedures provided in the PAQDMP.

All monitoring will be undertaken in accordance with relevant legislation and guidelines, including (but not limited to):

- National Greenhouse and Energy Reporting (NGER) Act
- National Pollutant Inventory (NPI)

9 REPORTING

Emissions will be reported annually as part of internal environmental reporting and National Greenhouse and Energy Reporting (NGER) System obligations. BNPL will also ensure compliance with required (eg. NPI) reporting agencies for greenhouse gases emitted from the TANPF Project.

Adherence to the PGHGMP will be reported in the annual Site Compliance Report and submitted to relevant agencies annually on specified dates. Reporting will identify opportunities for continuous improvement in GHG management on the Site.

10 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0002 Preliminary Air Quality and Dust Management Plan (PAQDMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Health and Safety Management Plan

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1 PURPOSE

This Preliminary Health and Safety Management Plan (PHSMP) provides a framework for mitigating and managing risks of health and safety at the BNPL TANPF. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be developed prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
PHSMP	Prelimianry Health and Safety Management Plan
TANPF	Technical Ammonium Nitrate Production Facility

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Potential health and safety risks from work involved in the TANPF Project will be managed to ALARP, during the final planning and construction phases of the TANPF project. This includes potential health and safety risks to the public utilising areas in close proximity to the TANPF, potential health and safety risks from the transport and delivery of TAN to customers and major accident risks from unplanned events.

5 OBJECTIVES

The objective of the PHSMP is to ensure that the risk to the public from construction and operation of the TANPF is as low as reasonably practicable and complies with acceptable standards. This includes reducing, where practicable, the risks of exposure to nuisance, insects and pests.

6 PERFORMANCE REQUIREMENTS

6.1 Response and Management Actions

BNPL will implement an integrated Mosquito and Other Nuisance Insects Management Plan and integrated Pest Management Plan to ensure the health and safety of the workforce and public are protected (stand alone management plans yet to be finalised). A Waste Management Plan has also been developed which includes vermin and pest management measures. These plans will be developed in coordination with the Department of Health Mosquito-borne disease control branch and other relevant departments.

The Mosquito and Other Nuisance Insects Management Plan will include:

- Base line mosquito / midge survey.
- On-going monitoring and education.
- Use of traps, larvicides and adult knock-down products.
- Pre-cyclone preparedness to reduce the potential for water traps.
- Post-cyclone preparedness to monitor previously identified breeding locations and apply control agents as necessary.

The Health and Safety Management Plan will ensure that risks to the health and safety of the workforce and public are minimised, through the measures detailed in *Table 6.1*.

Table 6.1 Health and Safety Response and Management Actions

Reference Number	Response and Management Actions	Refer to	Timing/ Critical Date	Responsible Person
PHSMP-1	BNPL will establish a Safety Management System and Safety Plan prior to commissioning.	OEMP	Prior to commissioning	General Manager (Operations)
PHSMP-2	BNPL will prepare an Emergency Response Management Plan prior to commissioning.	PERMP CEMP OEMP	Prior to commissioning	General Manager (Operations)
PHSMP-3	All staff working onsite (including contractors) will be inducted and trained in safety procedures and safety response.		In accordance with Safety Plan	Area Manager
PHSMP-4	An integrated Pest Management Plan will be developed and implemented in consultation with the Department of Health	CEMP OEMP	Prior to construction	EO
PHSMP-5	A Mosquito and Other Nuisance Insects Management Plan will be developed and implemented in consultation with the Department of Health	CEMP OEMP	Prior to construction	EO

6.2 Monitoring Program and Methods

Monitoring of health and safety at the TANPF site will include:

- Ensuring all staff working on site have been inducted and trained in safety procedures and safety response; and,
- Monitoring insects and pests in accordance with the Mosquito and Other Nuisance Insects Management Plan and integrated Pest Management Plan (yet to be finalised).

7 REPORTING

- Reporting procedures will be consistent with regulatory, local and internal requirements

8 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- Integrated Pest Management Plan (to be developed prior to construction)
- 250-200-PLN-BNP-0008 Preliminary Traffic Management Plan (PTMP)
- 250-200-PLN-BNP-0009 Preliminary Waste Management Plan (PWMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Hazardous Materials Management Plan

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1 PURPOSE

This Preliminary Hazardous Materials Management Plan (PHMMP) provides a framework for mitigating and managing potential hazardous materials impacts arising from the BNPL TANPF site. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be developed prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PHMMP	Preliminary Hazardous Materials Management Plan
MSDS	Material Safety Data Sheet

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

The storage, handling and transportation of hazardous materials, including TAN and associated chemicals.

5 OBJECTIVES

The objective of the PHMMP is to ensure the appropriate management measures for hazardous material over the life of the project, minise risk to public health and to maintain the protection of ecosystems.

6 PERFORMANCE REQUIREMENTS

Performance requirements to be included in the Final Hazardous Materials Management Plan (to be incorporated into the CEMP and EMP) will include the following:

- Minimisation of risk of impact to public health and environment as a result of storage, handling and transportation of hazardous materials.
- Monitoring and reporting of the management and control of Hazardous Materials.

7 RESPONSE AND MANAGEMENT ACTIONS

The potential impacts of Hazardous materials will be managed using the actions listed in Table 1.

Table 1 Hazardous Materials Response and Management Actions

Reference Number	Response and Management Actions	Refer to	Timing/ Critical Date	Responsible Person
PHMMP-1	Training staff in the appropriate storage, handling and transportation of hazardous materials.	CEMP OEMP	Prior to commissioning	EO
PHMMP-2	The storage, handling and transportation of hazardous materials will comply with the *Dangerous Goods Safety Act 2004* (WA) and associated *Dangerous Goods Safety Regulations 2007* (WA).	OEMP	As required	Section Manager
PHMMP-3	Purchasing and inventory records will be kept for all hazardous materials.	OEMP	As required	Section Manager
PHMMP-4	Incidents/accidents involving hazardous material will be handled through the Emergency Response Management Plan	PERMP	As per Emergency Response Management Plan	As per Emergency Response Management Plan

8 MONITORING

- Conformance with any conditions pursuant to the *Dangerous Goods Safety Act 2004* (WA) and associated *Dangerous Goods Safety Regulations 2007* (WA).
- Monitor all areas of storage of hazardous materials for compliance with applicable Material Safety Data Sheets (MSDS) and State regulatory requirements.
- Product security and stewardship.

9 REPORTING

- Reporting procedures will be consistent with regulatory, local and internal requirements.

10 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- Integrated Pest Management Plan (to be developed prior to construction)
- 250-200-PLN-BNP-0003 Preliminary Emergency Response Management Plan (PERMP)
- 250-200-PLN-BNP-0009 Preliminary Waste Management Plan (PWMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Noise Management Plan

Document Number: 250-200-PLN-BNP-0007

Date: 22nd December 2009

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1 PURPOSE

The Preliminary Noise Management Plan (PNMP) lays down the measures to be adopted to minimise noise generation from the BNPL Technical Ammonia Nitrate Production Facility. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be developed prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

In this procedure, the following definition applies:

Noise-sensitive premises – is defined in accordance with the *Environmental Protection (Noise) Regulations 1997* as premises occupied solely or mainly for residential or accommodation purposes; rural premises; or premises used for the purpose of:

- a caravan park or camping ground;
- a hospital having accommodation for less than 150 in-patients;
- child care;
- education - school, college, university, technical institute, academy or other educational centre, lecture hall or other premises used for the purpose of instruction;
- public worship;
- a prison or detention centre;
- a tavern, hotel, club premises, reception lodge or other premises which provides accommodation for the public;
- aged care;
- a sanatorium, home or institution for care of persons, a rehabilitation centre, home or institution for persons requiring medical or rehabilitative treatment; or
- Other non-industrial or commercial premises.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
dB(A)	Decibels
DEC	Department of Environment and Conservation
EPA	Environmental Protection Authority
EO	Environmental Officer
LA,Max	The loudest noise level measured during the 15 minute sampling period.
LA1	The noise level exceeded for 1% of the 15-minute period sampling period, equating to the loudest 9 seconds measured during the survey period.
LA10	The noise level exceeded for 10% of the 15-minute sampling period or the loudest 90 seconds. This is frequently referred to as the average-maximum noise level.
OEMP	Operations Environmental Management Plan
PNMP	Preliminary Noise Management Plan

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

The construction and operation of the BNPL Technical Ammonia Nitrate Production Facility (TANPF) will increase the noise levels within and immediately adjacent to the TANPF site, and therefore has the potential to impact upon the amenity of the public. No residential areas will be affected due to the distance (approximately 6 km) between the TANPF and the nearest residential areas in Dampier. The nearest noise sensitive premises are Hearson Cove, a recreational beach approximately 1.5 km from the TANPF and Deep Gorge, a popular petroglyphs/ rock art valley, is approximately 1.4 km from the TANPF site. Management of noise impacts at Hearson Cove and Deep Gorge is a key environmental issue addressed by this Management Plan.

Noise from the construction phase of the TANPF may be generated by:

- Bulldozer
- Excavator
- Dump Truck / Concrete Truck
- Rock breaker
- Concrete pump
- Concrete vibrator
- Crane
- Blasting (yet to be determined)
- Air and steam blowing of pipelines

Noise from the operational phase of the development will be generated by:

- Trucks for product shipment
- Compressors (air, gas)
- Pumps
- Fans (scrubber, cooling tower)
- Conveyors

5 OBJECTIVES

The objectives of the PNMP are to ensure that noise impacts emanating from the proposed TANPF comply with statutory requirements specified in the Environmental Protection (Noise) Regulations 1997 and do not adversely impact on the amenity of visitors to Hearson Cove and Deep Gorge.

6 PERFORMANCE REQUIREMENTS

Noise emissions from the TANPF will be required to meet criteria imposed by the following documents:

- *Environmental Protection (Noise) Regulations 1997*; and
- The EPA's "Aspirational Goal" for noise levels at Hearson Cove and Deep Gorge (2002).

The specific noise level criteria imposed by these documents are summarised in *Table 6.1*.

Table 6.1 Operations Noise Criteria

Type of premises receiving noise	Time of day	Assigned Level (dB(A))			Reference
		LA10	LA1	LA, Max	
Nearest Residential Dwelling[1]	Anytime – although criteria specifically applies to night-time operations	35	45	55	Noise Regulations
Industrial and utility premises	All hours	65	80	90	Noise Regulations
Hearson Cove & Deep Gorge	All hours	36	-	-	EPA Noise Levels

1 Note: No residential areas will be affected due to the distance (approximately 6 km) between the TANPF and the nearest residential areas in Dampier.

7 DETAILED RESPONSES AND MANAGEMENT ACTIONS

7.1 Noise Emission Management

Site personnel have limited opportunities to directly minimise the generation of noise. Instead, noise emissions management is implicitly addressed in the design by developing features to minimise noise generation. These design features include:

- Use of silencers on vents;
- Acoustic cladding on pipework;
- Provision of relief systems for flow/acoustically induced vibration and fatigue;
- Repair, modification or replacement of high noise generation items; and
- Selection of appropriate machinery.

The TANPF design conforms to an overall project noise control strategy and ensures that each process unit is in compliance with noise control basis of design. As the TANPF design addresses noise emissions reduction implicitly, the focus of the management efforts during operations is on monitoring.

BNPL will undertake a reassessment of the noise impacts from the TANPF during detailed design to ensure that noise from the TANPF complies with the assigned noise limits detailed in the Environmental Protection (Noise) Regulations 1997. The Facility will be designed to ensure noise levels at the boundary of the site will not exceed 65 dB(A) at ground level during operations. If blasting is required, BNPL will prepare a Blasting Management Plan in compliance with the Environmental Protection (Noise) Regulations 1997, AS 2187.2-2006 and the *Explosives and Dangerous Goods Act 1961* (WA) including the Explosives and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992 and Explosives and Dangerous Goods (Explosives) Regulations 1963.

For construction work, including blasting, outside the hours of 7am to 7pm, and for Sundays and public holidays, BNPL will advise all nearby occupants or other sensitive receptors who are likely to receive noise levels which fail to comply with the standard under Regulation 7 of the Environmental Protection (Noise) Regulations 1997.

8 MONITORING PROGRAM

The location of noise monitoring points, the methods to be used and the frequency of monitoring are summarised in Table 8.1.

Table 8.1 Noise Monitoring Response and Management Actions

Reference Number	Monitoring Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PNMP-1	Undertake periodic monitoring of noise at: • Strategic locations within the TANPF • Site boundary • Hearson Cove & Deep Gorge	OEMP	As required	EO
PNMP-2	Investigate all noise-related complaints by undertaking compliance monitoring at: • Strategic locations within the TANPF • Site boundary • Hearson Cove & Deep Gorge	OEMP	Following complaints. Monitor for at least 7 days.	General Manager (Operations)
PNMP-3	In the event that an exceedance of noise criteria is confirmed, implement the Noise Contingency Procedure which will be developed prior to construction.		Following Complaints	General Manager (Operations)
PNMP-4	Following any incident, submit a report including: • Feedback on the cause of the incident; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	OEMP	As required	Relevant Section Manager/EO
PNMP-5	Contribute to cumulative noise monitoring at Hearson Cove and Deep Gorge in conjunction with other industry located within the King Bay-Hearson Cove Industrial Area.	OEMP	As required	EO
PNMP-6	Monitor the noise control strategies to determine effectiveness.	OEMP	Ongoing	EO

9 REPORTING

All environmental incidents will be investigated and reported as required by BNPL's Incident Investigation and Reporting Procedure. This report will be provided to the General Manager (Operations), who has the responsibility of reporting the incident to the DEC if it has caused, or has the potential to cause noise level increases.

Following any incident, a report will be prepared providing feedback on the cause of the incident and the response; the steps that are necessary to prevent a similar incident from occurring again; and any other opportunities for continued improvement. This report will be provided to management and disseminated throughout the operational personnel.

10 REFERENCES

Other BNPL management plans related to this plan are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Traffic Management Plan

Document Number: 250-200-PLN-BNP-0008

Date: 23rd December 2009

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1 PURPOSE

This Preliminary Traffic Management Plan (PTMP) provides a framework for mitigating and managing risks of traffic at the BNPL TANPF. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be developed prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
PTMP	Preliminary Traffic Management Plan
TANPF	Technical Ammonium Nitrate Production Facility

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Potential traffic impacts resulting from the TANPF project include:

- Road closures due to transport of construction components.
- Increased traffic volumes on road network during construction and operation phases.
- Excess levels of dust produced from heavy vehicle movement.
- Threat to terrestrial fauna from increased vehicle movements.
- Impacts from increased noise levels from vehicle movements.
- Impact of vandalism on rock art from increased traffic levels to and from the area.

5 OBJECTIVES

The objective of the PTMP is to ensure site traffic is managed in such a way so as not to adversely impact on the community, road users, sensitive habitats, terrestrial fauna and rock art. This includes ensuring dust generation and incidents of potential vandalism on areas of rock art through traffic movements are as low as reasonably practicable.

6 PERFORMANCE REQUIREMENTS

- No complaints lodged.
- No impact on rock art sites or areas of Aboriginal cultural significance.
- Zero-incidents safety record.

6.1 Response and Management Actions

Traffic management actions that will be implemented for the TANPF site are included in *Table 6.1*.

Table 6.1 Traffic Responses and Management Actions

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PTMP-1	All workforce for both construction and operation will be bussed to the site to avoid significant traffic impacts.	CEMP OEMP	As required	Area Manager
PTMP-2	The coordination of major activities on the road network (such as movements of large loads) with Main Roads WA and the Shire of Roebourne.	CEMP OEMP	Ongoing throughout construction and operations	In accordance with CEMP and OEMP
PTMP-3	Transport slow moving heavy machinery and vehicles to site outside of road network peak periods.	CEMP OEMP	Ongoing throughout construction and operations	In accordance with CEMP and OEMP
PTMP-4	Operation shifts will be staggered to start before and end after peak hour traffic.	OEMP	As required	Area Manager
PTMP-5	All workforce will undertake cultural heritage awareness induction, including sub-contractors, to highlight areas of significance, ways to behave and areas to avoid.	CEMP OEMP	Prior to construction and within 2 months of beginning work at Operations	EO
PTMP-6	An Air Quality and Dust Management Plan has been developed and will be implemented.	PAQGMP	In accordance with PAQDMP	EO
PTMP-7	A Terrestrial Fauna Management Plan has been developed and will be implemented.	PTFMP	In accordance with PTFMP	EO
PTMP-8	A Noise Management Plan has been developed and will be implemented.	PNMP	In accordance with PNMP	EO

6.2 Monitoring Program and Methods

- Monitoring the impact of heavy vehicles on the road network.
- Ensuring all staff are inducted in cultural heritage awareness.

7 REPORTING

- Reporting procedures will be consistent with regulatory, local and internal requirements

8 REFERENCES

Other BNPL plans and procedures related to this procedure are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0002 Preliminary Air Quality and Dust Management Plan (PAQDMP)
- 250-200-PLN-BNP-0007 Preliminary Noise Management Plan (PNMP)
- 250-200-PLN-BNP-0011 Preliminary Terrestrial Fauna Management Plan (PTFMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Waste Management Plan

Document Number: 250-200-PLN-BNP-0009

Date: 22nd December 2009

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1 PURPOSE

The Preliminary Waste Management Plan (PWMP) lays down the detailed response to minimise the impacts of the BNPL TANPF Site operations on solid and liquid waste generation. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

In this procedure, the following definitions apply:

Controlled Wastes include all liquid wastes and any waste that cannot be disposed of to a Class I, II or III landfill facility. Likely sources of controlled waste from the BNPL site will include sewage sludge, contaminated pond sludge from the contaminated water pond, spent process chemicals, batteries, catalyst.

Process Wastes are the waste products generated from the TANPF production process.

Domestic Wastes are the wastes produced by people on the site, specifically putrescibles such as food scraps or wastewater solids.

Commercial Wastes are the wastes produced by commercial or office activities on the site, including paper, packaging and other forms of inert wastes.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
PWMP	Preliminary Waste Management Plan
TANPF	Technical Ammonium Nitrate Production Facility

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

This PWMP details the management and monitoring procedures for waste generated during construction, commissioning, operations and decommissioning at the BNPL TANPF.

Solid waste streams from the construction and operation of the TANPF are likely to include:

- Domestic waste;
- Construction waste, including green waste from vegetation clearing;

- Spent catalyst gauzes;
- NOx and N_2O catalysts from the NA plant;
- Sludge from cleaned heat exchangers, contaminated surface water pond and storage tanks; and
- Hazardous and non-hazardous waste.

Liquid waste streams from the construction and operation of the TANPF are likely to include:

- Sewage;
- Process condensate (water);
- Rainwater runoff from process and storage areas; and
- Wash water.

Wastes generated on the Site have the potential to:

- Contaminate groundwater and surface water via generation of leachate, leading to contamination of groundwater and surface water;
- Contribute to pressure on landfill facilities;
- Pose a risk to human health through the introduction of vermin;
- Have adverse impacts upon plant amenity through the spread of litter and odour;
- Pose risk to marine life; and
- Create fire hazards.

Critical management issues include:

- Minimisation of waste generation;
- Segregation of wastes;
- Storage of wastes;
- Reuse or recycling of waste where possible; and
- Disposal of waste.

This PWMP outlines BNPL's actions in relation to the *Environmental Protection (Controlled Wastes) Regulations 2004.*

5 OBJECTIVES

The objectives of the PWMP are:

- to minimise the generation of waste, and prevent any environmental contamination or risk to public health arising from wastes generated from the TANPF; and
- to minimise impacts on existing waste facilities.

6 PERFORMANCE REQUIREMENTS

Performance requirements for the management of waste include:

- Adherence to water quality discharge criteria (to be finalised during Works Approval);
- Minimise waste generation from the site;
- Waste records maintained and updated regularly;
- 100% of recyclable materials segregated and recycled; and
- All wastes transported from the Site and disposed of in accordance with legislative and regulatory requirements.

7 DETAILED RESPONSES AND MANAGEMENT ACTIONS

Waste management at the TANPF will be based around the following hierarchy:

- AVOID the use of materials (if possible) if they are difficult to manage;
- REDUCE the amount of waste produced;
- REPLACE the use of materials that are difficult to dispose of, with more environmentally acceptable ones;
- SEGREGATE waste for easier management;
- RECOVER/REUSE waste where feasible; and
- DISPOSE of waste in an environmentally responsible manner.

Specific waste management strategies are outlined in

Table 1.

Table 1 Waste Management Actions

Reference Number	Response and Management Actions	Related To	Timing/ Critical Date	Responsible Person
Avoidance				
PWMP-1	Evaluate the waste management issues associated with any new material or substance prior to its introduction to the site. Reconsider the use of substances with problematic waste characteristics.	OEMP, CEMP	As required	Person requisitioning the material should consult the EO
Reduction				
PWMP-2	Include waste management procedures, requirements and practices for all waste streams in the induction program.	OEMP, CEMP	As required	EO
PWMP-3	Require contractors to prepare waste management plans based on the waste management hierarchy, under the contractor management procedures to be specified in the CEMP/OEMP. Waste reduction at source will also be included in tenders for supply and construction contractors	OEMP, CEMP	As required	Relevant Section Manager
Replacement				
PWMP-4	Preferentially use substances or materials that are re-usable or recyclable where practicable.	OEMP, CEMP	As required	Person requisitioning the material should consult the EO
Segregation				
PWMP-5	Segregate waste into different categories as far as practicable.	OEMP, CEMP	Ongoing	Relevant Section Manager
PWMP-6	Stormwater drainage system will be designed to separate potentially contaminated stormwater from clean stormwater.	CEMP	Detailed Design	Construction Contractor
PWMP-7	Recover spent catalyst wherever possible.	OEMP	Ongoing	Senior Manager (Production)
PWMP-8	Clean wastewater, including rain water from roofs and parking areas and air condensate from chiller will be sent to clean surface water pond.	CEMP	Detailed Design	Construction Contractor
PWMP-9	Contaminated wastewater will be sent to contaminated pond.	CEMP	Detailed Design	Construction Contractor
Recovery/Reuse/Recycling				
PWMP-10	Contain all waste, taking into consideration fire safety, pest control, odour control and protection of water and soil resources.	OEMP, CEMP	Ongoing	Relevant Section Manager
PWMP-11	Segregate all recyclable materials and periodically remove from site.	OEMP, CEMP	Ongoing	Relevant Section Manager/ Contractor
PWMP-12	Clearly mark waste bins, and provide at convenient locations.	OEMP, CEMP	Ongoing	Relevant Section Manager
PWMP-13	Return spent catalyst to the manufacturer every 6-12 months for upgrading.	OEMP	Every 6 to 12 months	Senior Manager (Production)
PWMP-14	Sludge from cleaned heat exchangers and storage tanks will be sent to special treatment to recover precious metals (every 5-10 years) by an approved contractor.	OEMP	Every 5 to 10 years	Senior Manager (Production)
Disposal				
PWMP-15	All waste will be disposed in accordance with regulatory requirements, including any solid	OEMP, CEMP	Ongoing	General Manager

	waste sent to landfill.			
	No burning of waste material	OEMP, CEMP	Ongoing	General Manager
PWMP-15	Prior to contractor removal of controlled waste from site, BNPL will: • Ensure sufficient information is provided to the contractor to categorise the waste and select a disposal site; • Ensure that the waste is stored appropriately for transportation; and • Ensure the contractor has a valid CWTF.	OEMP, CEMP	Prior to contractor pickup	EO
PWMP-16	Periodically remove domestic and commercial waste (food scraps, packaging etc.) from site by a contractor and dispose to designated landfill.	OEMP, CEMP	As required	Senior Manager (Support Services)
PWMP-17	Dispose of catalysts and resins that are not returned to manufacturers in accordance with *Environmental Protection (Controlled Wastes) Regulations 2004* and landfill acceptance criteria. Arrange disposal in consultation with companies specialising in waste management.	OEMP	As required	EO
PWMP-18	Remove sanitary waste from the TANPF site using a licensed contractor and in accordance with Health Department and local authority guidelines.	OEMP, CEMP	As required	Contractor
PWMP-19	Water from the clean surface water pond and sea water blow down, will be tested, treated and confirmed as meeting Water Corporation and EPA acceptance criteria before its release off-site to Water Corporation.	OEMP, CEMP	Ongoing	EO
PWMP-20	Contaminated water will be sent to the contaminated water pond for evaporation. Water ponds will be designed to comply with Department of Water requirements for constructing contaminated surface ponds, and to deter birds wherever practicable.	CEMP	Detailed Design	Construction Contractor
PWMP-21	All hazardous waste materials will be documented and tracked, segregated from other waste streams and stored in suitable containers.	Hazardous Waste Management Plan	As required	EO
PWMP-22	Sludge from the contaminated surface water ponds will be routinely emptied as required and collected/ disposed of by a licensed contractor.	OEMP	On as needs basis	Senior Manager (Production)
PWMP-23	All waste being disposed off-site must be accompanied by a Material Movement Permit (obtained from EO). The form must be completed and given to security at access gate on exit from site.	OEMP, CEMP	As required	EO

8 MONITORING

Waste audits will be conducted on a random basis as determined by the Environmental Officer. Visual inspections of waste storage and disposal facilities, as well as general site inspections, will be conducted to ensure that storage and disposal facilities are functioning properly and dealing adequately with the quantities of waste generated.

Prior to contractor pick-up of controlled wastes, the composition of waste to be removed will be verified. If there is uncertainty about the composition of the waste stream, sampling and analysis may be needed to enable the contractor to determine the appropriate disposal site.

Should an environmental incident involving waste on the site occur, the environmental impacts will be monitored and ameliorated as required. This monitoring will be undertaken according to the requirements under the PERMP.

9 REPORTING

The findings of Waste Management Audits, all incidents of non-compliance and corrective actions are reported by the EO in the monthly Environment Reports and summarised in the annual Site Compliance Reports, submitted to DEC.

Waste volumes, including volumes recycled and disposed of to landfill will be reported in the Annual Environmental Report. Opportunities for improvement in waste management will be identified in these reports.

If an incident occurs, it is initially reported to the relevant Section Manager, who refers it to the General Manager. If necessary, the General Manager informs the DEC as soon as practicable.

10 REFERENCES

Other BNPL plans and procedures related to this procedure are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0003 Preliminary Emergency Response Management Plan (PERMP)
- 250-200-PLN-BNP-0006 Preliminary Hazardous Materials Management Plan (PHMMP)

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Erosion Control and Stormwater Management Plan

Document Number: 250-200-PLN-BNP-0010

Date: 23 December 2009

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1 PURPOSE

This Preliminary Erosion Control and Stormwater Management Plan (PESMP) lays down the response required to minimise erosion and environmental damage due to stormwater within the BNPL lease. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
SEO	Senior Environmental Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PESMP	Preliminary Erosion Control and Stormwater Management Plan

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

The PESMP details the management procedures relevant to the control of stormwater on the BNPL TANPF site, particularly water erosion and run-off. Management of wind erosion/ dust control is addressed in the PAQDMP. Wastewater management, and prevention of contamination from hazardous materials and chemicals stored on the site, are addressed in the PWQMP and PHMMP respectively.

Stormwater management within the TANPF site ensures that all water released from the Site meets appropriate water quality standards. The drainage system within the TANPF site will segregate contaminated water, including any pollution from possible spillages, ruptures or overflows, from the clean stormwater.

No permanent surface water bodies or streams are found within the lease. However, there are a number of minor ephemeral drainage lines, which discharge during rainfall events. Upstream uncontaminated surface run-off will be diverted around the Site.

Erosion and/or sedimentation may occur as a result of:

- vegetation clearing
- alteration of existing drainage patterns
- earthmoving activities
- vehicular and human movements

- wind or water action on cleared areas and/or stockpiles

Potential impacts from stormwater and erosion include:

- Loss of soil and landform through erosion;
- Deposition of sediments and silting-up of drainage channels due to high sediment loads; and
- Contamination of receiving waters from contaminated surface water run-off.

Critical management issues to be addressed are:

- Monitoring of erosional features and implementation of mitigation measures;
- Attenuation of stormwater flows and sediment deposition;
- Monitoring of stormwater for suspended solids and other contaminants prior to discharge; and
- Segregation of contaminated and uncontaminated stormwater streams.

5 OBJECTIVES

- To minimise impacts to natural drainage patterns and of soil disturbance, degradation and erosion during construction and operation.
- Identify erosional features and mitigate where possible.
- Maintain the quality of surface water and marine water and to minimise the offsite deposition of sediment.
- Minimise the potential for groundwater and surface water contamination.

6 PERFORMANCE REQUIREMENTS

- All erosional features identified and mitigated at an early stage.
- No accelerated erosion and run-off during and post construction work and during operations.
- No discharges of contaminated stormwater.
- No discharge of stormwater with elevated Total Suspended Solids (TSS) levels.

7 DETAILED RESPONSE AND MANAGEMENT ACTIONS

The detailed actions for managing stormwater and erosion/sedimentation and for responding to any incidents are provided in Table 1.

Table 1 Erosion Control and Stormwater Management Actions

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PESMP-1	Clean stormwater discharge will take the following format: • Discharge points will be controlled; • Sediment control fencing or traps will be provided (where deemed necessary); • Discharge will be to an open, shallow, gentle sloping drainway; and	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Relevant Section Manager
PESMP-2	The total area to be disturbed will be restricted to the 35 Ha area required for the TANPF and laydown area, with disturbance to landforms to be minimised where practicable.		Ongoing	Construction Site Manager Operations Site Manager
PESMP-3	Erosion and sediment control structures will be routinely inspected and maintained to ensure they remain effective, including removal of eroded soil and silt where necessary.	CEMP OEMP	Weekly (additional as required)	Environmental Officer
PESMP-4	Prohibit access outside approved disturbance boundary. Access outside the approved disturbance boundary is by written authorisation only. Access to be recorded on file. This will include controls for movement of vehicles and personnel on-site to avoid disturbance to drainage lines or vegetation which may lead to increased erosion and/or sedimentation.	CEMP OEMP	Ongoing	Construction Site Manager Operations Site Manager
PESMP-5	Sample and analyse clean stormwater in the clean water pond in accordance with Table 2.	OEMP	Prior to discharge	Laboratory Supervisor
PESMP-6	Implement the contaminated stormwater contingency response (*Section 11*) if the criteria in Table 2 cannot be met.	OEMP	Prior to discharge	Environmental Officer
PESMP-7	Periodically remove solids from the sedimentation basins. Dispose of solids appropriately.	CEMP OEMP	As required	Relevant Section Manager
PESMP-8	Undertake regular site inspections to identify erosional features for future monitoring.	CEMP OEMP	Construction: Monthly Operations: Annually	Environmental Officer
PESMP-9	Implement Erosion Control Contingency Response (*Section 12*) should active erosion features develop. Rehabilitate area as soon as practicable	CEMP OEMP	As required	Environmental Officer

8 MONITORING

8.1 Stormwater Monitoring

Stormwater will be directed through to the clean water pond, or contaminated water pond, depending on contamination and location of runoff within the TANPF. Samples will be obtained from the clean water pond on Site prior to discharge to the Water Corporation Brine Return line. Monitoring forms are provided in **Appendix A**. Details of the sampling and analysis methods will be contained in the detailed work instructions (yet to be finalised). A laboratory request form is included in **Appendix B**.

Stormwater that fails to meet the required water quality standards will be treated to meet the required levels before being discharged to sent to the Water Corporation Brine Return line. Stormwater that fails to meet the required water quality standards will be treated according to the contaminated stormwater contingency response (see *Section 11* for an example of this process, which is still to be refined).

In the event of an unauthorised discharge to the stormwater system, the SEO and GM must be notified as soon as possible (and this form completed) so that remedial measures/corrective action can be undertaken.

The acceptance criteria for the Clean Stormwater Quality Monitoring Programme is provided in Table 2 below.

Table 2 Clean Stormwater Quality Monitoring Programme

Parameter	Acceptance Criteria[1]	Type and source of water	Frequency of Monitoring
Total Suspended Solids (TSS)	80 mg/L	All stormwater discharge	Prior to discharge and weekly (if required) or otherwise deemed necessary.
pH	6-9	All stormwater discharge	Prior to discharge and weekly (if required) or otherwise deemed necessary.
Hydrocarbons	No criteria	All stormwater discharge	Prior to discharge and weekly (if required) or otherwise deemed necessary.

Notes:

1. These acceptance criteria are sourced from criteria contained in: ANZECC/ARMCANZ 2000 Guidelines for Freshwater and Marine Water and are also inline with the Burrup Fertilisers Works Approval 3791 (located immediately next door)

8.2 Erosion Monitoring

Regular site inspections will be undertaken across the entire lease to identify erosional features. Features that are identified will be monitored on a weekly basis. Additional monitoring of erosional features will take place following a rainfall event.

Active erosional features that are identified will be mitigated using the erosion contingency response (*Section 12*).

9 REPORTING

Adherence to the PESMP will be reported in the annual Site Compliance Report and submitted to the DEC annually on specified dates. Reporting will identify opportunities for continuous improvement in flora management on the site.

Records of all sampling and results will be maintained by the EO and summarised in the annual environmental report.

Any contaminated stormwater discharges identified through the monitoring program will be investigated and reported as required by BNPL's Incident Investigation and Reporting Procedure (to be developed prior to construction). This report will be provided to the General Manager (Operations), who will have the responsibility of reporting any incidents to the DEC if it has caused, or has the potential to cause pollution.

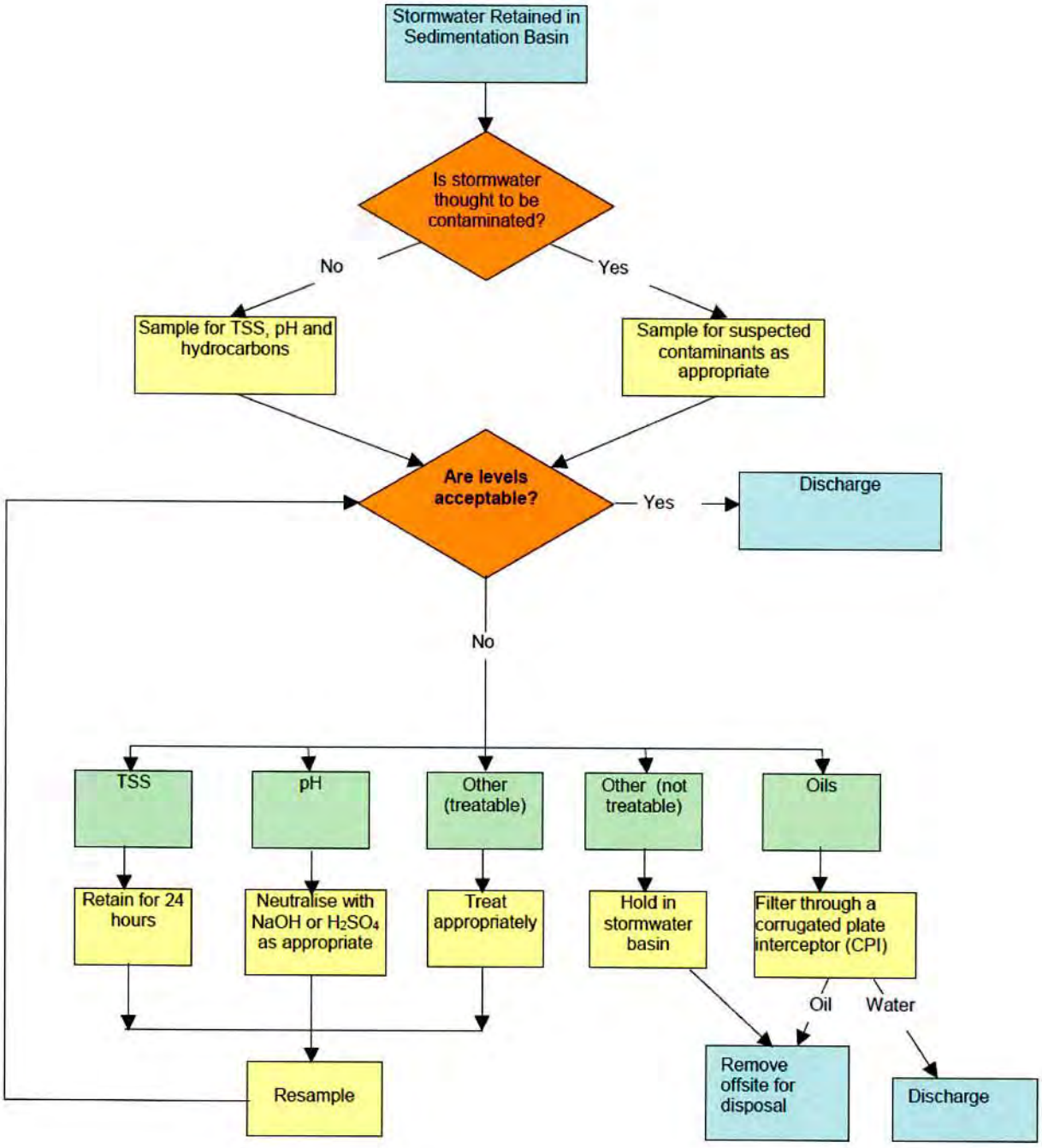
In addition to the Incident Report, a report will be prepared providing feedback on the cause of any incidents and the response; the steps that are necessary to prevent a similar incident from occurring again; and any other opportunities for continued improvement. This report will be provided to management and disseminated throughout the operational personnel.

10 REFERENCES

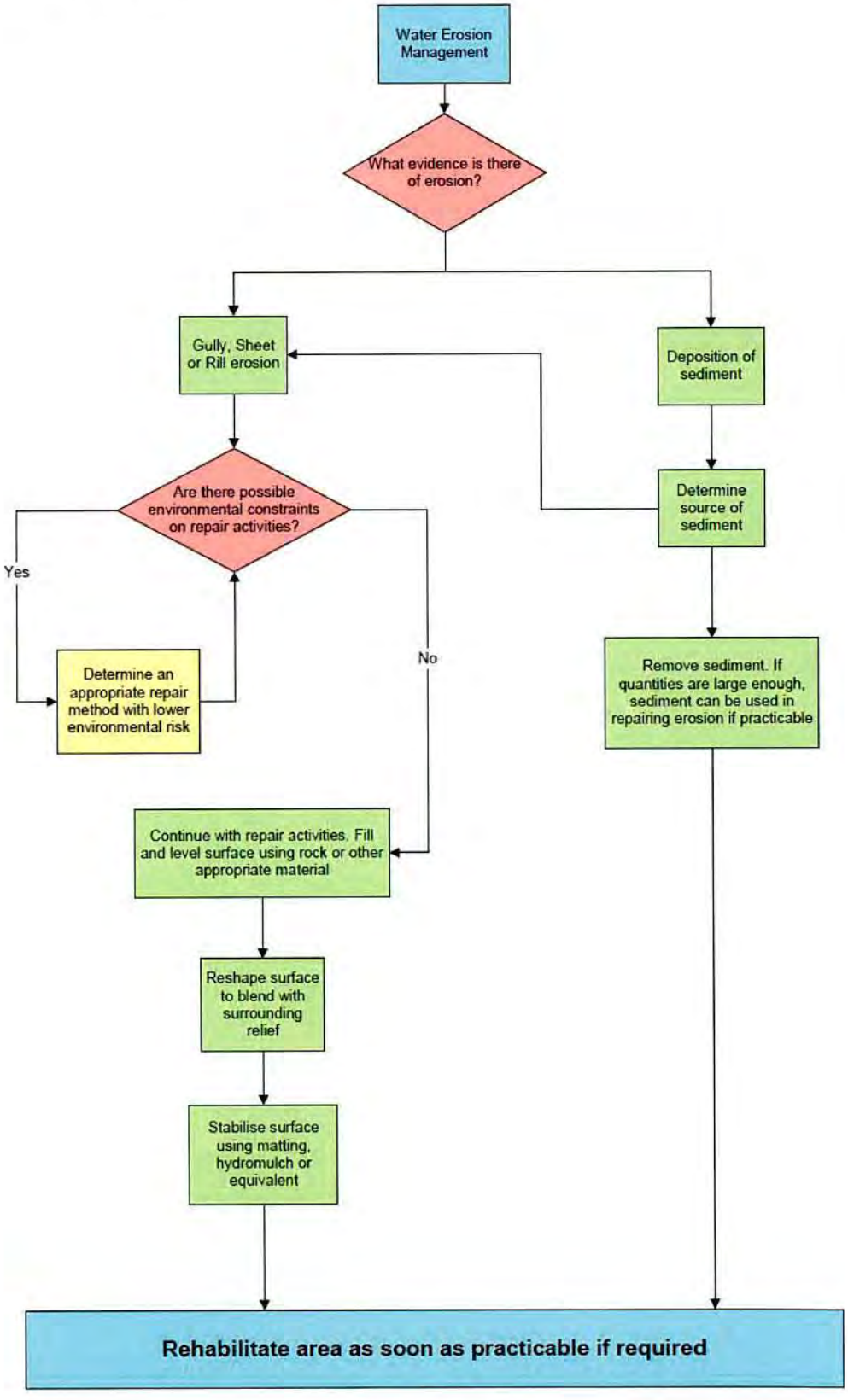
Other BNPL plans and procedures related to this procedure are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0002 Preliminary Air Quality and Dust Management Plan (PAQDMP)
- 250-200-PLN-BNP-0006 Preliminary Hazardous Materials Management Plan (PHMMP)
- 250-200-PLN-BNP-0013 Preliminary Water Quality Management Plan (PWQMP)

11 CONTAMINATED STORMWATER CONTINGENCY RESPONSE



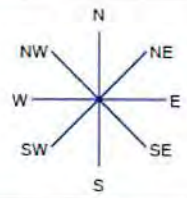
12 EROSION CONTROL PROCESS FLOW CHART & CONTINGENCY RESPONSE



APPENDIX A – STORMWATER MONITORING FORMS

EXAMPLE SHEET – BNPL version to be finalised prior to Operations

STORMWATER SAMPLE FIELD DATA SHEET

Date: _____	Wind Speed (please tick)	Wind Direction (please circle)	Cloud Cover (please tick)	Weather Conditions
	☐ 0-5km per hour ☐ 5-10km per hour ☐ 0-15km per hour ☐ 5-20km per hour ☐ 15-20km per hour		☐ 0-10% ☐ 10 – 20% ☐ 20 – 50% ☐ 50 – 80% ☐ 80 – 100%	☐ Raining ☐ Dry

STORMWATER TYPE

Potentially Contaminated ☐ **Uncontaminated** ☐

Field Measurements required when a sample is collected

Sample Location	Time	pH	Conductivity (uS/cm)	Temperature (°C)	Salinity (ppm)	Discharge Volume

Signed: _____

APPENDIX B – REQUEST SHEET

EXAMPLE SHEET – BNPL version to be finalised prior to Operations

STORMWATER SAMPLE CHAIN OF CUSTODY AND ANALYSIS REQUEST SHEET

TO: Quote no:	FROM: ..... Burrup Fertilisers

Job Description: Burrup Ammonia Plant

Sampler:..... **Phone (08)**.....
Date Collected: ..... **Time Collected:** .....

PARAMETER	Site:_____	Site:_____	Site:_____	Site:_____
Suspended Solids (SS) pH Turbidity (NTU) Total Recoverable Hydrocarbons Total Nitrogen Ammonia MDEA Other:..... Other:.....				

Relinquished By:	Date & Time:	Received By:	Date & Time:
..... BURRUP FERTILISERS		Laboratory	

Relinquished By:	Date & Time:	Received By:	Date & Time:
LABORATORY		..... BURRUP FERTILISERS	

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Terrestrial Fauna Management Plan

Document Number: 250-200-PLN-BNP-0011

Date: 23rd December 2009

PROJECT NUMBER 0086269 OR 114942				BURRUP NITRATES PTY LTD			
REV	DESCRIPTION	ORIGIN	CHECKED	DATED	BNPL APPROVAL	SIGNED	DATED
A	Issued for Review	ERM	TW	23/12/09	Y		
0	Approved for Use	BNPL	WJ/ FA	23/12/09	Y		

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TABLE OF CONTENTS

1 PURPOSE

This Preliminary Terrestrial Fauna Management Plan (PTFMP) lays down procedure for the management of terrestrial fauna on the BNPL lease. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be developed prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
CAMBA	China Australia Migratory Bird Agreement
CEMP	Construction Environmental Management Plan
DEC	Department of Environment and Conservation
EO	Environment Officer
JAMBA	Japan Australia Migratory Bird Agreement
OEMP	Operational Environmental Management Plan
PTFMP	Preliminary Terrestrial Fauna Management Plan
ROKAMBA	Republic of Korea Australia Migratory Bird Agreement
TANPF	Technical Ammonium Nitrate Production Facility

4 CURRENT STATUS

Conservation Significant fauna species listed under both the WA *Wildlife Conservation Act 1950* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) which have the potential to occur within the Site are included in **Appendix A**. It should be noted that migratory wetland bird species are considered as a single group based on their common habitat requirements.

For the majority of those species that are known to occur within the Burrup Peninsula, the Site does not contain key habitat requirements that are critical to the ongoing survival of the species being considered, such as nesting and denning areas. The Site may be utilised as part of their broader habitat requirements within the local area, however it is considered that similar habitat areas are present within the local area. In addition, the Site does not meet the preferred habitat requirements for many of the species under consideration.

5 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Disturbance of vegetation and habitats that are provided by vegetation (including low - lying grassed slopes and areas of marine influence) will be minimised where practical, during the final planning and construction phases of the TANPF project. Subsequent disturbance outside of the designated 35 ha disturbance area is subject to approval from relevant authorities. Although there is potential for some Pilbara endemic species to occur within the project lease, none of the fauna species observed were endemic fauna species nor were

any vertebrae species found that were considered to be restricted to the Burrup Peninsula. A list of the rare fauna that may occur on the Site is provided as **Appendix A**.

Fauna management issues during the construction and operational phases include:

- increasing human activity levels, vehicle movement, noise, light and dust;
- habitat removal and fragmentation; and
- introduction and spread of introduced species.

6 OBJECTIVES

- To minimise impacts to terrestrial fauna and habitats, in particular those of conservation significance.
- To monitor the presence of significant fauna at the TANPF site.
- To minimise accidents to fauna as a result of activities associated with the TANPF Project (eg. vehicle strike).
- To prevent the spread of introduced species.

7 PERFORMANCE REQUIREMENTS

- No unauthorised disturbance beyond approved site disturbance boundary (35 Ha).
- No loss of species recorded within the fenced site.
- No introduction of non-native or non-local fauna.

8 DETAILED RESPONSE AND MANAGEMENT ACTIONS

Table 1 specifies the responses and actions to manage fauna on the lease, and defines the responsibility and timing for their implementation.

Table 1 Responses and Management Actions to Manage Fauna

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PTFMP-1	Induct all staff with the requirement to protect rare fauna and habitat and the prohibition of: • pets on site; • firearms on the Site; and • the capture of fauna (except for monitoring/ removal purposes, conducted by qualified experts).	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Environmental Officer
PTFMP-2	The working area will be clearly marked on all construction drawings and physically flagged on the ground to ensure only the minimum area required is cleared.	CEMP	Ongoing during construction	Environmental Officer
PTFMP-3	Access for vehicles and machinery will be along designated access tracks and parking areas.		Construction: Ongoing Operation: Ongoing	Environmental Officer
PTFMP-4	Provide trained staff in consultation with the	CEMP	Construction: Ongoing	Construction

	DEC which will be present during construction and operations, to remove fauna (including snakes) from the Site with minimal interruptions to operations while minimising stress to animals.	OEMP	Operation: Ongoing	Site Manager General Manager (Operations)
PTFMP-5	Report the presence, or sitings of any species listed in **Appendix A** or their habitats (mounds or burrows) to the EO for investigation and follow-up.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	All employees (particularly botanical/ zoological contractors employed on site)
PTFMP-6	An environmental expert will be on site at all times to ensure that the CEMP is being complied with and that terrestrial fauna is being appropriately managed.	CEMP	Construction: Ongoing	Environmental Officer
PTFMP-7	Report all rare fauna sitings to DEC (Nature Conservation) and refer injured fauna to the Pilbara Wildlife Carers Association.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Environmental Officer
PTFMP-8	Appropriate management measures will be put in place (to be investigated and finalised) to deter birds, in particular, EPBC Act migratory listed birds, from entering in to the contaminated water pond.	OEMP	Management measure in place prior to commissioning	Environmental Officer
PTFMP-9	Inspect all excavations left open overnight at the start of each working day to release any uninjured fauna trapped and treat any injured fauna. Report sitings of any rare fauna to the EO.	CEMP OEMP	Daily Daily	Relevant Section Manger
PTFMP-10	Provide support to adjacent operation, BFPL, to maintain signage on Village Road warning drivers of the potential of fauna on the road (particularly the Pilbara Olive Python).		Ongoing	Construction Site Manager General Manager (Operations)
PTFMP-11	Prohibit access outside approved disturbance boundary. Access outside the approved disturbance boundary is by written authorisation only. Access to be recorded on file.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Construction Site Manager General Manager (Operations)
PTFMP-12	Implement fauna contingency plan in the event of fauna discovery within the approved disturbance boundary. See *Section 12*.	CEMP OEMP	Ongoing	Environmental Officer

9 MONITORING

- Visual monitoring for fauna and disturbance adjacent to or outside the working areas will be undertaken during clearing and construction by relevant site manager/s.
- Sightings of threatened species will be recorded.
- Any removals of fauna will be recorded.
- Any trenches or voids created during construction will be monitored daily for fauna.

- Inspections for introduced animals will be undertaken, and observations will be reported to the relevant site manager/s or EO.

10 REPORTING

All incidents of non-compliance and corrective actions are to be reported by the EO and summarised in the annual Site Compliance Report and submitted to the DEC annually on specified dates. Reporting will identify opportunities for continuous improvement in flora management on the Site.

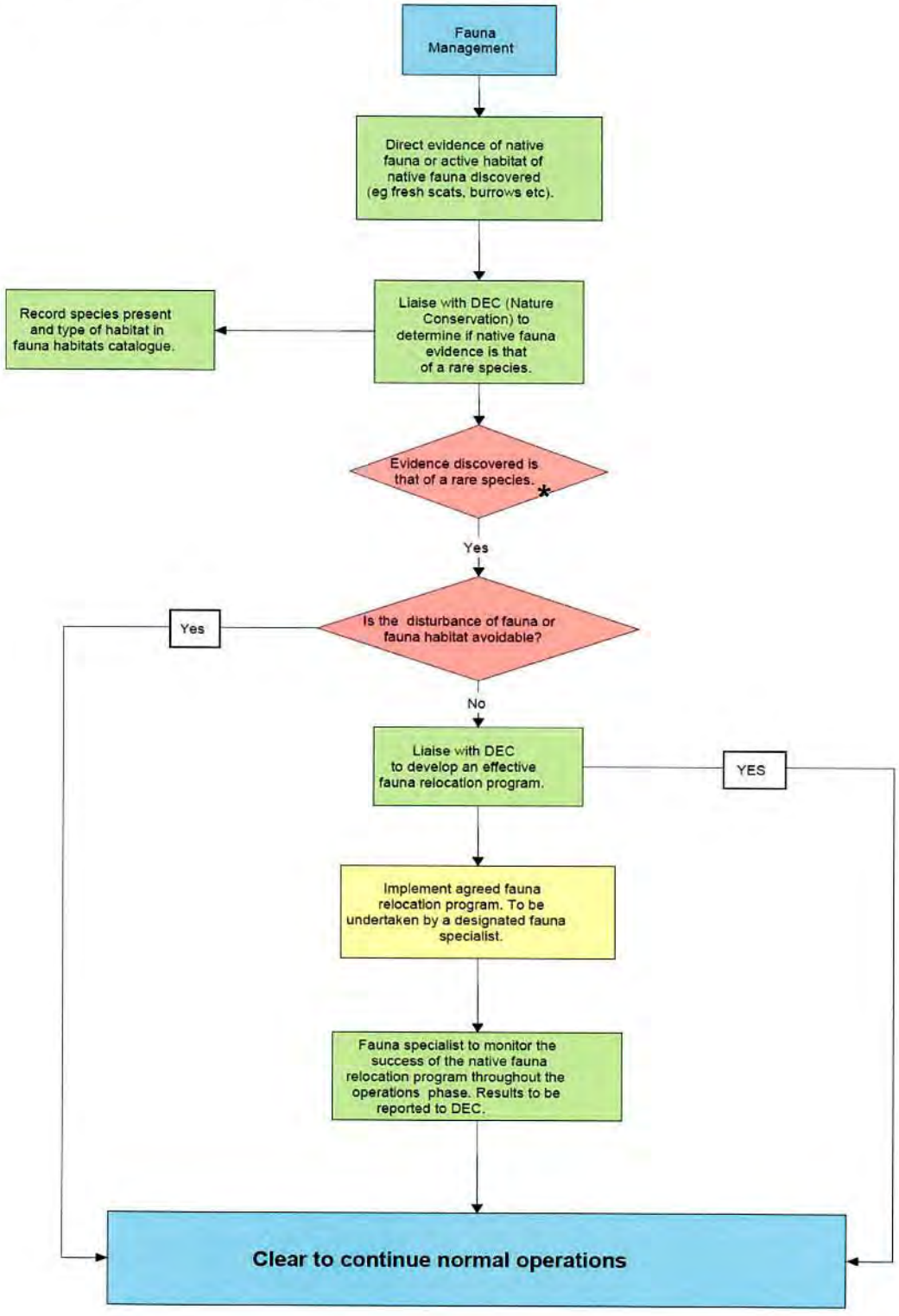
11 REFERENCES

Other BNPL plans and procedures related to this procedure are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0002 Preliminary Air Quality and Dust Management Plan (PAQDMP)
- 250-200-PLN-BNP-0012 Preliminary Terrestrial Vegetation and Flora Management Plan (PTVFMP)

12 TERRESTRIAL FAUNA MANAGEMENT CONTINGENCY

The following contingency will be undertaken by the EO in the event of fauna discovery on the TANPF site as indicated in PTFMP – 12 in Table 1.



* **Rare Species** – Conservation significant fauna species listed under both the WA *Wildlife Conservation Act 1950* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

APPENDIX A - LISTED FAUNA SPECIES THAT HAVE POTENTIAL TO OCCUR WITHIN THE SITE

Table A1 below provides a list of Conservation Significant fauna species listed under both the WA *Wildlife Conservation Act 1950* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) which have the potential to occur within the Site.

Table A1 Conservation Significant fauna species which have the potential to occur within the Site

Species Name	Common Name	Conservation Status		Habitat Requirements	Habitat Potential of the Site?
		WC Act	EPBC Act		
Mammals					
Dasyurus hallucatus	Northern Quoll	S1	E	The northern Quoll is described as being most abundant within rocky eucalypt woodland but is also known from a variety of habitat types, usually within 200 km of the coast where the species dens within tree hollows or rock crevices (Menkhorst & Knight 2001).	Preferred rocky eucalypt habitat not present within the site. Site may form part of broader foraging habitat within the local area.
Mormopterus loriae cobourgiana	Little North-western Mastiff Bat	P1	-	Restricted to mangroves and adjacent vegetation along narrow coastal strip (Menkhorst & Knight 2001). Roost in tree hollows and under loose bark.	No mangroves or potential roosting habitat occurs within the site. Site may form part of broader foraging habitat within the local area.
Macroderma gigas	Ghost Bat	P4	-	Known from Pilbara and Kimberly's in WA. Requires undisturbed roost caves or mine shafts (Menkhorst & Knight 2001).	Roosting habitat not present, Site may form part of broader foraging habitat within the local area.
Pseudomys chapmani	Western Pebble-mound Mouse, Ngadji	P4	-	Formerly on Burrup Peninsula, now confined to central and east Pilbara. Found on stony Hillsides with hummock grassland.	Nesting sites not recorded within the site and not recorded from trapping program on the BLPL site. No longer known from Burrup Peninsula
Rhinoicteris aurantius (Pilbara form)	Pilbara Leaf-nosed Bat		V	Colonies of the Pilbara Leaf-nosed Bat are found in three distinct areas: in the mines of the eastern Pilbara; scattered throughout the Hamersley Range in smaller colonies; and in sandstone formations south of the Hamersley Range in a	Potential roosting habitat not present, site may provide some foraging habitat.

Species Name	Common Name	Conservation Status		Habitat Requirements	Habitat Potential of the Site?
				small number of significant colonies. This includes the confirmed roosts of: Bamboo Creek mine, Copper Hills mine, Klondyke Queen mine, Lalla Rookh mine and one cave in Barlee Range; and 16 other likely permanent occurrences. Locations are defined as sites that support a colony, such as a cave or mine.	
Birds					
Falco peregrinus	Peregrine Falcon	S4		Nests on cliffs, crevice or large tree hollow. Occurs in a variety of environments including wetlands, plains and timbered watercourses (Pizzey & Knight 1997).	Site represents potential foraging habitat.
Ardeotis australis	Australian Bustard	P4		Grasslands, open shrublands and open scrublands. Species is relatively common away from settled areas (Pizzey & Knight 1997).	Species not previously recorded within the site or adjacent BNPL site.
Burhinus grallarius	Bush Stonecurlew	P4		Open woodland, coastal scrub and mangrove fringes (Pizzey & Knight 1997).	Species not previously recorded within the site or adjacent BNPL site.
Numenius madagascariensis	Eastern Curlew	P4		Tidal mudflats, saltmarses and grasslands near water (Pizzey & Knight 1997).	Site represents potential habitat.
Phaps histrionica	Flock Bronzewing	P4		Flooded claypans, watercourses and treeless grassy plains, nest on the ground by low bush or tussock.	Site represents potential habitat.
Reptiles					
Liasis olivaceus barroni	Pilbara Olive Python	S1	V	The Olive Python is generally found in rocky areas or gorges and especially rocky habitat associated with water courses. Besides taking refuge in caves and rock crevices they also can be found in hollow logs and burrows beneath rocks (Pilbara Pythons, 2008). Radio-telemetry has shown that individuals are usually in close proximity to water and rock outcrops.	Preferred rocky habitats and areas such as gorges, caves and rock crevices are not present within the site with these areas generally occurring approximately 500 metres to the north and extending over much of the Burrup Peninsula. Site may represent pat of the species broader habitat requirements within the local area.

Species Name	Common Name	Conservation Status	Habitat Requirements	Habitat Potential of the Site?
Migratory Bird Species				
EPBC Listed Species (see Table A2 below)		M	Migratory bird species are known to rely on coastal wetland habitats along western Australia as part of their habitat requirements. The Supratidal flat located within the site is considered to provide a potential foraging resource.	Supratidal flat is likely to provide an occasional foraging resource for migratory bird species

Table A2 EPBC listed Migratory species which may potentially to occur within the Site

Matters of National Environmental Significance – Migratory Species			
Species	**JAMBA**	**CAMBA**	**ROKAMBA**
Merops ornatus Rainbow Bee-eater			
Macronectes giganteus Southern Giant Petrel			
Oceanites oceanicus Wilson's storm petrel	✓		
Hirundo rustica Barn Swallow		✓	✓
Sula leucogaster plotus Brown booby	✓	✓	✓
Ardea alba Great Egret, White Egret	✓	✓	
Puffinus pacificus Wedge-tailed shearwater	✓		
Charadrius veredus Oriental Plover, Oriental Dotterel			✓
Glareola maldivarum Oriental Pratincole	✓	✓	
Numenius minutus Little Curlew, Little Whimbrel	✓	✓	✓
Apus pacificus Fork-tailed Swift	✓	✓	✓
Fregata ariel Lesser frigatebird	✓	✓	✓
Ardea ibis Cattle Egret	✓		
Ardea sacra Eastern reef heron		✓	
Haliaeetus leucogaster White-bellied sea-eagle		✓	
Gallinago stenura Pin-tailed snipe	✓	✓	✓
Limosa lapponica menzbieri Bar-tailed godwit	✓	✓	✓
Numenius minutus Little curlew	✓		✓
Numenius phaeopus variegatus Whimbrel	✓	✓	✓

Matters of National Environmental Significance – Migratory Species			
Species	**JAMBA**	**CAMBA**	**ROKAMBA**
Numenius madagascariensis Eastern curlew	✓	✓	✓
Tringa stagnatilis Marsh sandpiper	✓	✓	
Tringa nebularia Common greenshank	✓	✓	
Tringa cinerea Terek sandpiper	✓	✓	✓
Tringa hypoleucos Common sandpiper	✓	✓	✓
Tringa brevipes Grey-tailed tattler	✓	✓	✓
Arenaria interpres interpres Ruddy turnstone	✓	✓	✓
Calidris canutus rogersi Red knot	✓	✓	✓
Calidris tenuirostris Great knot	✓	✓	✓
Calidris alba Sanderling	✓	✓	✓
Calidris ruficollis Red-necked stint	✓	✓	✓
Calidris subminuta Long-toed stint	✓	✓	✓
Calidris acuminata Sharp-tailed sandpiper	✓	✓	✓
Calidris ferruginea Curlew sandpiper	✓	✓	✓
Limicola falcinellus Broad-billed sandpiper	✓	✓	✓
Phalaropus lobatus Red-necked phalarope	✓	✓	✓
Pluvialis squatarola Grey plover	✓	✓	✓
Charadrius mongolus Lesser sand plover	✓	✓	✓
Charadrius l. leschenaultii Great sand plover	✓	✓	✓
Sterna caspia Caspian tern		✓	
Sterna bengalensis Lesser crested		✓	
Sterna bergii Crested tern	✓		
Sterna hirundo Common tern	✓	✓	✓
Sterna leucoptera White-winged black tern	✓	✓	✓
Sterna anaethetus Bridled tern	✓	✓	
Cuculus saturatus optatus Oriental cuckoo	✓	✓	

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Terrestrial Vegetation and Flora Management Plan

Document Number: 250-200-PLN-BNP-0012

Date: 23rd December 2009

PROJECT NUMBER 0086269 OR 114942				BURRUP NITRATES PTY LTD			
REV	DESCRIPTION	ORIGIN	CHECKED	DATED	BNPL APPROVAL	SIGNED	DATED
A	Issued for Review	ERM	TW	23/12/09	Y		
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TABLE OF CONTENTS

1 PURPOSE

This Preliminary Terrestrial Vegetation and Flora Management Plan (PTVFMP) lays down procedure for the management of terrestrial vegetation and flora on the BNPL lease. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PTVFMP	Preliminary Terrestrial Vegetation and Flora Management Plan

4 CURRENT STATUS

The five dominant vegetation types were observed within the TANPF site:

- **AbTeWa (Coastal Flats)** – High Open to Open Heath of *Acacia bivenosa, A. coriaceae subsp. coriacea* over Low Open Shrubland over *Triodia epactia* hummock grassland and mixed Closed Grasses over Herbs on the coastal flats. The coastal flats run parallel to the saline inlet to the south and the lower hill slopes to the north and occur in the southern and northern portions of the site. Soils here become more sandy and slightly saline.
- **Sm (Saline inlet and Supra-tidal Flats)** – *Tecticornia (syn. Halosarcia) spp.* Scattered low shrubs to low open heath. Supra-tidal flats with *Tecticornia-Trianthema* succulent Dwarf Scrub. The saline inlet runs approximately east-west through the surrounding area.
- **ItTa** – *Indigofera trita* low shrubland over *Triodia epactia (T. angusta)* hummock grassland. One small occurrence of this unit is mapped in the southeast corner of the site.
- **TeSv (Coastal Flats)** – As noted in Trudgen (2002) this community is broadly described as *Sporobolus virginicus* grassland occurring on the edge of tidal flats. *Acacia bivenosa* occurs as a scattered shrub species while other associated species include *Trianthema turgidifolia* and *Eragrostis falcate*. This unit occurs in the north of the site, and is mixed with **AbTeWa**.

- **AbImTe (Upland and Upper Slopes)** – Recorded on the Upper slopes of the Northern part of the site, this community is described as an open *Acacia bivenosa* shrubland over gravel and stone. Additional shrub species present include *Indigofera monophylla*.

No known 'declared rare' (threatened) flora or EPBC listed flora species were identified within the TANPF site and it was concluded that habitat was unlikely to occur for those Priority species that have previously been recorded within the Burrup Peninsula.

However, the Sm vegetation community was considered to be of elevated conservation significance based on criteria established by Trudgen (2002).

The following discrete vegetation communities are also mapped by Trudgen (2002) as occurring within the Site, however were not observed to be widespread or dominant during the level 1 survey. These communities are shown in Appendix A.

- ChRe – *Corymbia hamersleyana* low open forest over *Rhagodia eremaea* high open shrubland.
- CcTe – *Cajanus cinereus* open heath to low shrubs over *Acacia orthocarpa* open shrubland over *Triodia epactia* hummock grassland.
- AbTa – *Acacia bivenosa* high open shrubs over *Triodia angusta* hummock grassland.
- Tw – *Triodia wiseana* hummock grassland.
- AoIlTw – *Acacia bivenosa*, *Grevillea pyramidalis subsp. pyramidalis* scattered tall shrubs over *Acacia orthocarpa*, *Indigofera linnaei*, *Crotalaria medicaginea* (Burrup for; B65-11) low open shrubland over *Triodia wiseana* (Burrup form), *Cenchrus ciliaris* hummock grassland/ grassland.
- GpCwTe – *Grevillea pyramidalis subsp. pyramidalis* open heath over *Corchorus walcottii* scattered low shrubs to low open heath over *Triodia epactia* hummock grassland.
- TcTeSg – *Termanalia canescens* low open woodland over *Stemodia grossa* low open shrubland.
- TeAb – *Triodia epactia* (Burrup form) hummock grassland with scattered *Acacia bivenosa* shrubs.
- MF – Mudflat.

5 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

Vegetation on the Burrup Peninsula and the surrounding islands is of significant conservation value. The BNPL TANPF site will be established through the permanent clearing of 35 hectares of land within the 79 hectare lease area. Vegetation and habitat clearing during site preparation and construction may impact on native flora and vegetation in the following ways:

- removal of habitat;
- fragmentation of habitats within the local area;
- introduction and spread of weeds (this is addressed in the PWMP); and
- Removal of 7.6 Ha of Sm vegetation type. While this community is considered to be of elevated conservation significance by Trudgen (2002) it is considered that this

community would be adequately conserved within the Burrup Peninsula and within the proposed Burrup Peninsula Conservation Reserve.

6 OBJECTIVES

- To minimise impacts to vegetation and flora by minimising the amount of vegetation that is permanently cleared.
- To prevent disturbance of vegetation and flora adjacent to work areas and outside the TANPF footprint.
- To avoid disturbance of significant vegetation associated with rockpiles, high scree slopes, drainage lines, low-lying grassed slopes, samphire communities and areas of marine influence, where practicable.

7 PERFORMANCE REQUIREMENTS

- No unauthorised disturbance beyond approved site disturbance boundary (35 Ha).

8 DETAILED RESPONSE AND MANAGEMENT ACTIONS

Table 1 specifies the responses and actions to manage flora on the lease, and defines the responsibility and timing for their implementation.

Table 1 Responses and Management Actions to Manage Flora

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PTVFMP-1	Induct all staff to ensure awareness of: • The significance of flora on the site (and immediate vicinity) and its conservation and protection; • The prohibition of vehicular or pedestrian activity in specified areas; and • The location of the site boundary, including an explanation of the importance to keep all activities within this boundary.		Construction: Ongoing Operation: Ongoing	Environmental Officer
PTVFMP-2	Prohibit access outside approved disturbance boundary. Access outside the approved disturbance boundary is by written authorisation only. Access to be recorded on file.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Construction Site Manager General Manager (Operations)
PTVFMP-3	Avoid disturbance to areas mapped as *Sm* and supra-tidal flat within the construction laydown area as far as practicable.	CEMP	Ongoing during construction	Environmental Officer
PTVFMP-4	The working area will be clearly marked on all construction drawings and physically flagged on the ground to ensure only the required area is cleared.	CEMP	Ongoing during construction	Environmental Officer
PTVFMP-5	Implement Flora contingency plan if disturbance of vegetation occurs beyond the approved disturbance boundary. See *section 12*.	CEMP OEMP	Ongoing	Environmental Officer

PTVFMP-6	Where appropriate, native species will be used in landscaping within the TANPF.		During construction	Environmental Officer
PTVFMP-7	Access for vehicles and machinery will be along designated access tracks and parking areas.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Environmental Officer
PTVFMP-8	The DEC will be consulted regarding the further development of suitable management procedures for Priority flora.	CEMP OEMP	As required	Environmental Officer
PTVFMP-9	In the event of unauthorised flora disturbance. Submit report to the DEC including: • Feedback on the cause of the incident; • Summary of response; • Prevention of further incidents; and • Opportunities for continued improvement.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Relevant Section Manager/EO

9 MONITORING

- Visual monitoring of vegetation disturbance adjacent to the working areas will be undertaken during clearing and construction by relevant site manager/s.

10 REPORTING

Adherence to the Terrestrial Vegetation and Flora Management Plan will be reported in the annual Site Compliance Report and submitted to the DEC annually on specified dates.

Reporting will identify opportunities for continuous improvement in flora management on the site.

11 REFERENCES

Other BNPL management plans related to this plan are:

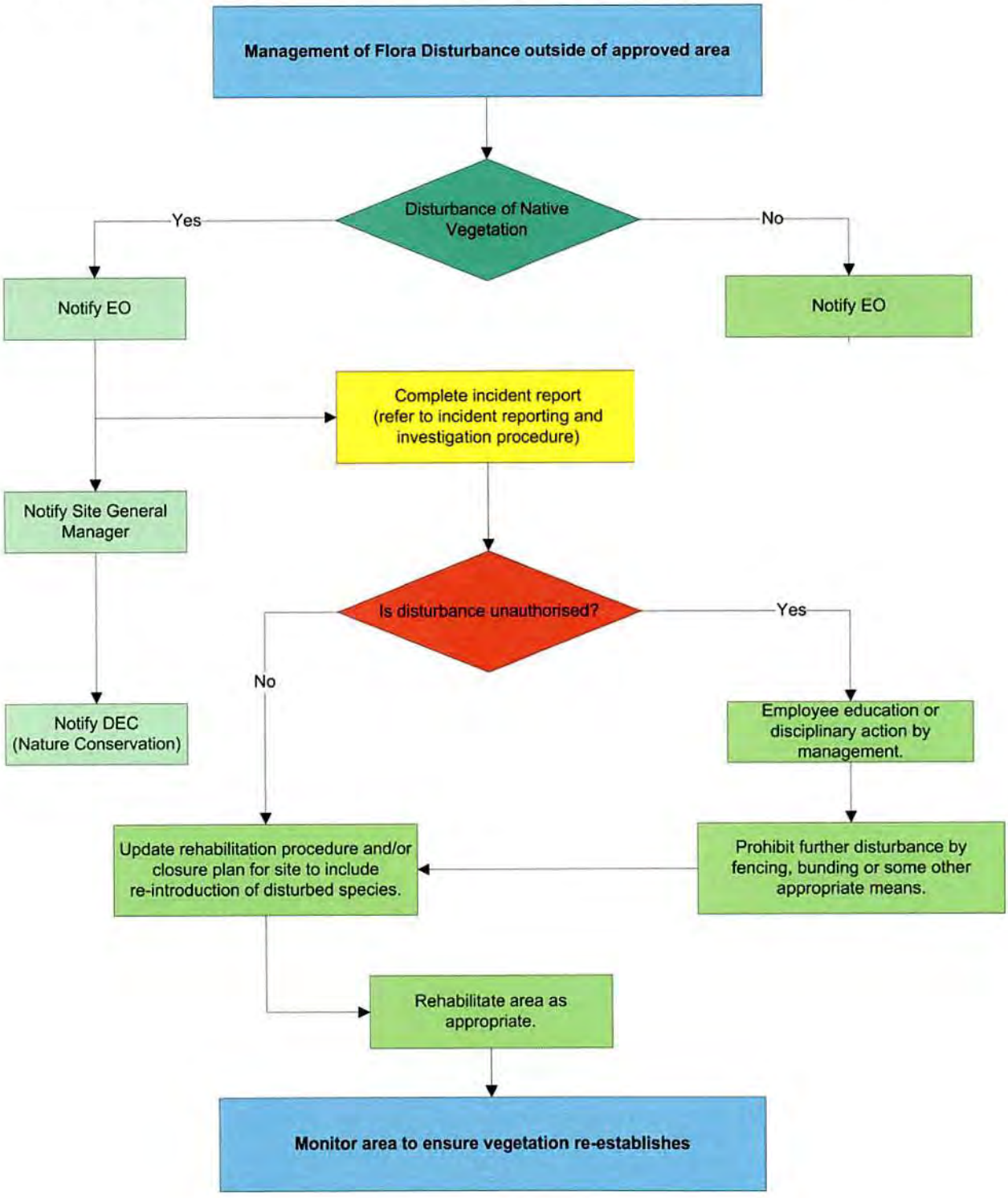
- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0002 Preliminary Air Quality and Dust Management Plan (PAQDMP)
- 250-200-PLN-BNP-0011 Preliminary Terrestrial Fauna Management Plan (PTFMP)
- 250-200-PLN-BNP-0014 Preliminary Weed Management Plan (PWMP)

References

Trudgen, M.E., 2002. *A flora, vegetation and floristic survey of the Burrup Peninsula, some adjoining areas and part of the Dampier Archipelago, with comparisons to the floristics of areas on the adjoining mainland Volume 1*. M.E. Trudgen and Associates and Department of Mineral and Petroleum Resources, Perth.

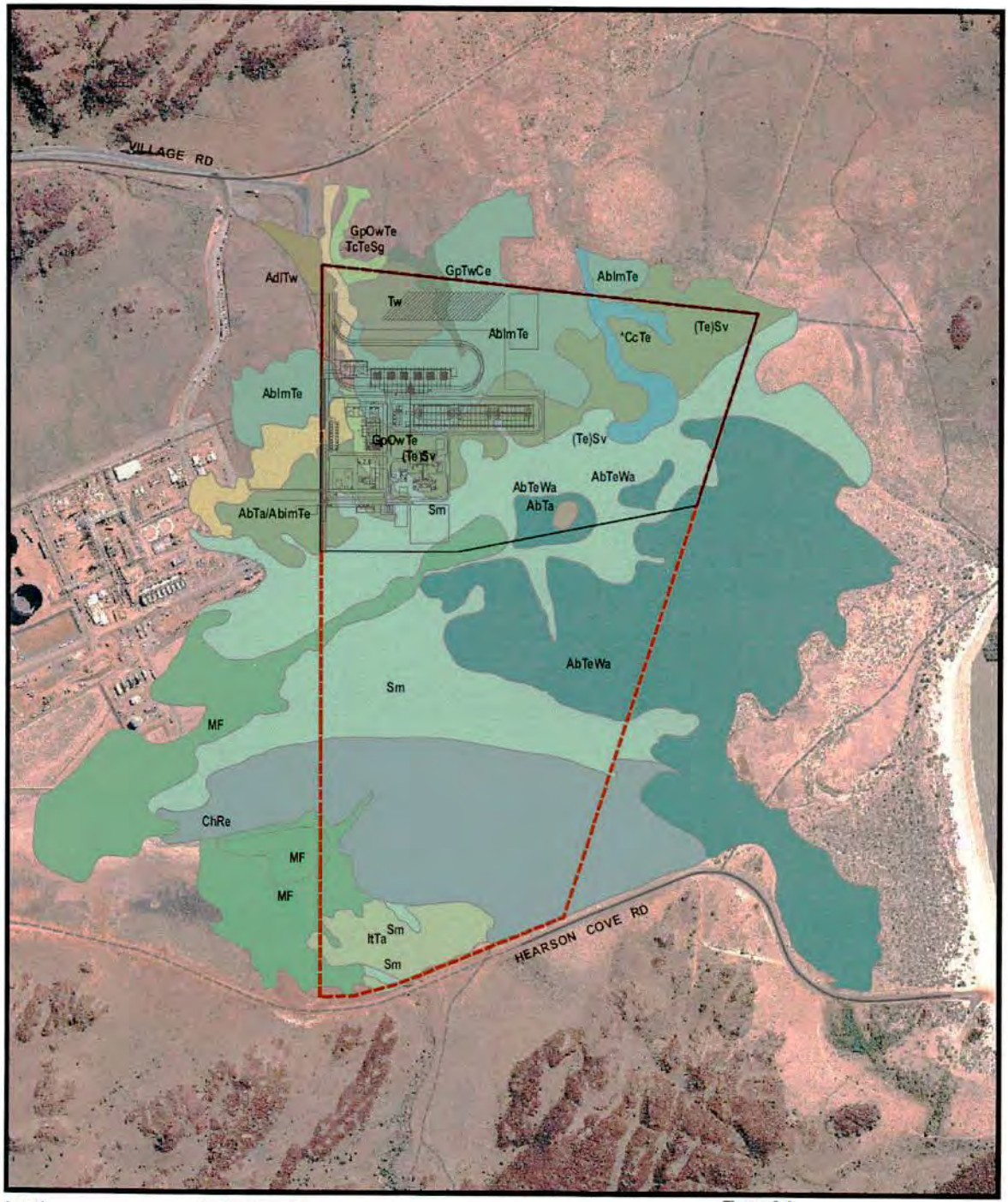
12 TERRESTRIAL FLORA MANAGEMENT CONTINGENCY

The following contingency will be undertaken by the EO in the event of disturbance outside the approved area, or of priority flora as indicated in PTVFMP – 5 in Table 1.



NOTE: A rehabilitation plan has yet to be developed. Rehabilitation measures will be included in an updated version of this plan prior to construction of the TANPF.

APPENDIX A – MAP OF VEGETATION COMMUNITIES



Legend

- Site D Boundary
- Boundary of Plant and Construction Laydown Area
- Schematic TANPF Layout

Vegetation Communities

- (Te)Sv
- *CcTe
- AbTa
- AbTa/AbimTe
- AbTeWa
- AblmTe
- AdlTw
- ChRe
- GpOwTe
- GpTwCe
- ltTa
- MF
- Sm
- TcTeSg
- Tw

Client:	Burrup Nitrates Pty Ltd
Project:	PER
Drawing No:	0086269p_GIS18_PER_R0
Date:	25/10/2009 Drawing size: A4
Drawn by:	DD Reviewed by: BC
Source:	Base information Landgate
Scale:	1:10 000

N

Figure 8.1
TANPF Layout Over Vegetation Communities

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ERM

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Water Quality Management Plan

Document Number: 250-200-PLN-BNP-0013

Date: 23 December 2009

PROJECT NUMBER 0086269 OR 114942				BURRUP NITRATES PTY LTD			
REV	DESCRIPTION	ORIGIN	CHECKED	DATED	BNPL APPROVAL	SIGNED	DATED
A	Issued for Review	ERM	TW	23/12/09	Y		
0	Approved for Use	BNPL	WJ/ FA	23/12/09	Y		

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TABLE OF CONTENTS

1 PURPOSE

This Preliminary Water Quality Management Plan (PWQMP) lays down the response required to minimise the environmental impact of the BNPL TANPF on the groundwater, surface water and coastal water environment. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

Groundwater trigger values are the water quality values that indicate that an observed change in groundwater quality due to activities on the Site, rather than natural variation. The trigger levels will be set at a value of 10% greater than the concentrations determined in baseline groundwater quality monitoring (to be undertaken once site access approved).

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
CEMP	Construction Environmental Management Plan DEC
Department of	Environment and Conservation
EO	Environment Officer
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PWQMP	Preliminary Water QUality Management Plan

4 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

This plan details the management procedures relevant to wastewater generation and the monitoring methods used to ensure that discharged wastewater meets appropriate quality criteria. Monitoring of groundwater is also addressed in this plan.

The monitoring of stormwater is addressed in the PESMP, including the response for monitoring and management in the case of stormwater contamination. The monitoring of water in response to a spill of hazardous materials or an environmental emergency is implemented under the PHMMP and PERMP respectively. Specific instructions regarding the methods for sampling and analysis of water will eventually be contained in work instructions under these plans, as well as being incorporated in to the still to be prepared CEMP and OEMP.

The wastewater stream from the BNPL TANPF will be discharged to King Bay via the Water Corporation's Brine Return pipeline and managed according to the existing Water Corporation Ministerial Conditions.

Numerous features have been developed to ensure that wastewater discharged from the BNPL TANPF will minimise the risk of environmental impact. These include the use of a contamination evaporation pond (a closed system) and clean surface water pond (which is analysed to meet appropriate levels before being discharged to the Water Corporation).

BNPL TANPF construction and operations may also have the potential to impact on groundwater, through spills or leaks from vessels containing contaminating materials. While above ground spills or leaks within the TANPF site will be captured by the drainage system and contained without impacts on groundwater. The drainage system within the TANPF site will segregate contaminated water, including any pollution from possible spillages, ruptures or overflows, from the clean stormwater. However, spills occurring offsite, or leaks from underground piping may reach the water table. Monitoring of groundwater quality allows the early identification of any groundwater contamination and triggers the identification and repair of any spills or leaks.

5 OBJECTIVES

- To maintain the quality of surface, marine and groundwater by minimising the potential for contamination.
- To maintain the existing quality of water resources and the surrounding supra-tidal flats.

6 PERFORMANCE REQUIREMENTS

- No discharge of water failing to meet water quality criteria (to be determined through Works Approval and operating license approved by the DEC).
- No discharge of untested water.
- Immediate investigation of any potential leaks or spills if elevated concentrations are identified in groundwater.

7 DETAILED RESPONSE AND MANAGEMENT ACTIONS

Detailed actions for water quality monitoring, and responses in the case of a breach of criteria are contained in Table 1.

Table 1 Water Quality Management Actions

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PWQMP-1	Induct all personnel regarding water quality management on the site.	CEMP OEMP	As required	EO
PWQMP-2	Monitor all wastewater streams in accordance with agreed parameters to be determined and finalised following detailed design and through the Works Approval process. This includes monitoring of the clean surface and contaminated surface water ponds.	OEMP	To be determined	Relevant Section Manager
PWQMP-3	If concentrations in discharged water exceed DEC guidelines, implement the Water Quality contingency procedure.	OEMP	As required	EO Relevant Section Manager
PWQMP-4	Maintain a record of all water quality sampling results, including any discharges occurring above water quality criteria and the duration for which the discharge was maintained.	OEMP		
PWQMP-5	Following baseline groundwater study, install groundwater monitoring bores and conduct groundwater sampling of all bores.	OEMP	Half yearly	Section Manager EO
PWQMP-6	If concentrations in groundwater exceed the groundwater trigger values, implement the Groundwater contingency response.	OEMP	As required	EO Relevant Section Manager
PWQMP-7	Summarise all water quality sampling results in the annual environmental report, identifying any opportunities for improvement in water and groundwater management.	OEMP	Annualy	EO
PWQMP-8	All transfer and/or releases of liquid waste streams and/or potentially contaminated water must be approved by the EO and/or Laboratory Supervisor (Section 13) prior to the event. If immediate off-site discharge is anticipated, approval must be given by the General Manager (Operations).	OEMP	As required	General Manager (Operations) EO
PWQMP-9	The use of water for dust suppression will be sourced from potable supplies.	CEMP	As required	Construction Site Manager
PWQMP-10	All plant, equipment and storage vessels on site will be maintained and continually monitored for leaks of fuels, oils and chemicals.	CEMP OEMP	As required	Relevant Section Manager

PWQMP-11	The final Site level proposed for the TANPF will be at least 5.5m AHD and as such will be located above the 1:100 year flood.	CEMP	As per design	Construction Contractor
PWQMP-12	A Dewatering Management Plan (if required) will be prepared in compliance with all relevant legislation.	CEMP	If required	Construction Site Manager

8 MONITORING PROGRAM

8.1 Wastewater Monitoring

A wastewater monitoring programme will be developed and implemented following completion of Final Detailed Design, but prior to construction and operation.

The wastewater monitoring plan will include several monitoring locations and will encompass monitoring at the:

- clean water surface pond;
- contaminated water pond; and
- water intake (Water from the Water Corporation) and the discharge to the Water Corporation Brine Return pipeline

Parameters to be sampled will include, but will not limited to:

- Ammonium Nitrate
- Total Phosphorous (TP)
- Total Nitrogen (TN)
- Dissolved Oxygen (DO)
- TDS
- pH
- Thermotolerant coliforms
- Trace metals (as required)
- Turbidity/TSS
- Total Petroleum Hydrocarbons (TPH)
- Flow rate

Monitoring frequencies will depend on the source that is to be monitored, though wastewater that will be sent to the Water Corporation will be monitored continuously for flow rate, accumulative flow, temperature, conductivity, oxidation reduction potential and TSS. These parameters will be averaged over a one month period and reported annually. Other parameters will be monitored on a "representative" basis. Additional sampling may occur at any of the sample points if it is needed.

8.2 Groundwater Monitoring

There will be groundwater monitoring bores installed at and around the BNPL TANPF and these will be monitored on a six month basis. The location of the groundwater monitoring bores are yet to be determined and will be finalised following further baseline groundwater testing and Final Detailed Design.

9 REPORTING

Water quality monitoring results are to be recorded on forms similar to those provided in **Appendix A** detailing the following information:

- Sampling date and location;
- Brief summary of weather conditions (e.g. antecedent rain, wind, dry conditions);
- Parameters and units to be detailed (to be confirmed); and
- Reasons why any specified parameter could not be sampled.

Any negative impacts on groundwater quality that are identified through the monitoring programs (yet to be finalised) will be investigated and reported as will be required by BNPL's Incident Investigation and Reporting Procedure (to be finalised prior to construction). This report will be provided to the General Manager (Operations), who will have the responsibility of reporting the incident to the DEC if it has caused, or has the potential to cause pollution.

In addition to the Incident Report, a report will be prepared providing feedback on the cause of the incident and the response; the steps that are necessary to prevent a similar incident from occurring again; and any other opportunities for continued improvement. This report will be provided to management and disseminated throughout the operational personnel.

All non-compliances, and corrective actions implemented, will be reported by the EO in the monthly Environment Report and summarised in the annual Site Compliance Report, submitted to the DEC. A summary of all water quality monitoring will be provided in the annual Environmental Report, along with any identified opportunities for improvement.

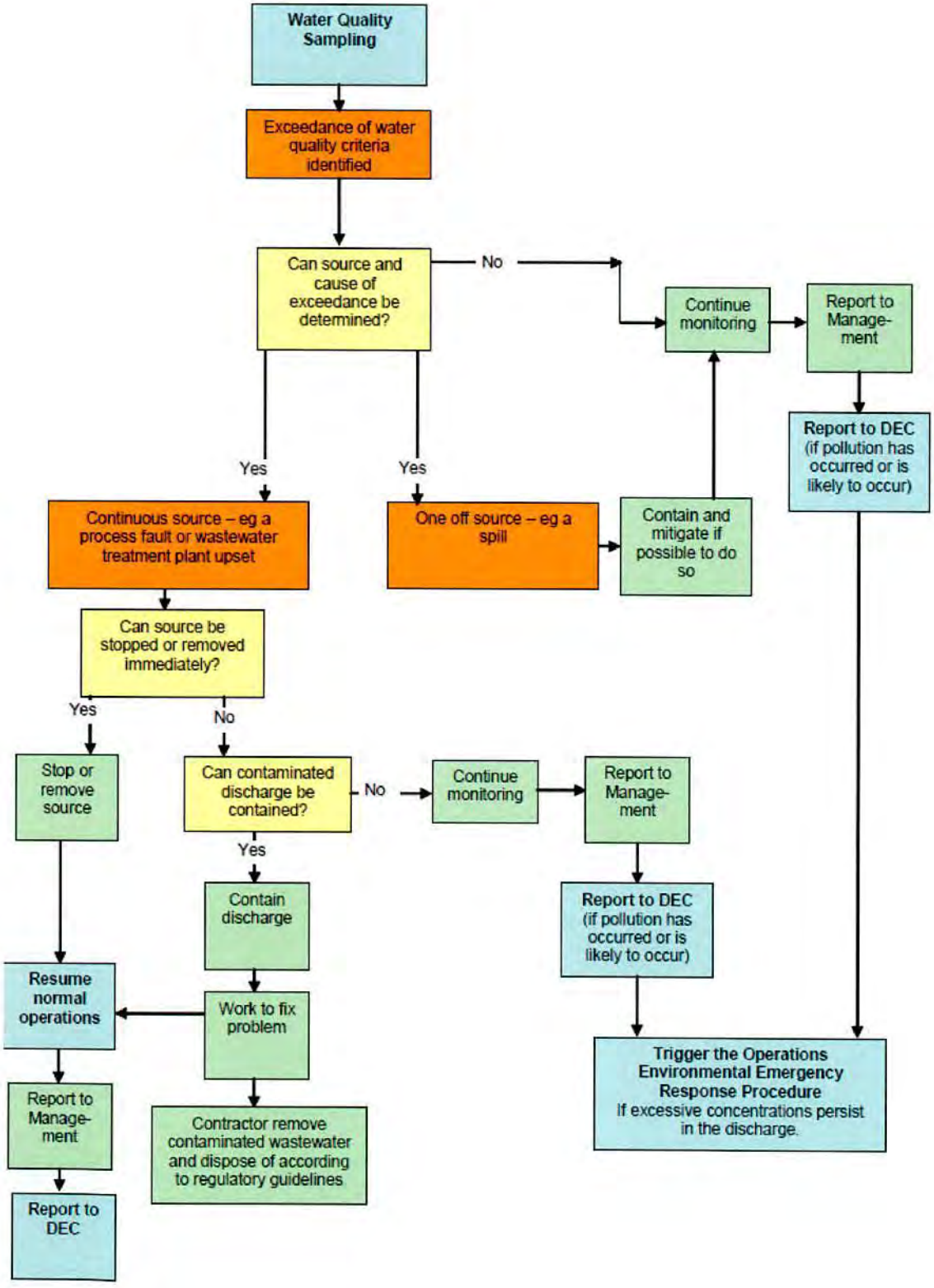
The DEC will be consulted on sources of wastewater to be discharged via the brine return through the Works Approval and Operation license process, where agreed parameters and frequency of monitoring will be finalised.

10 REFERENCES

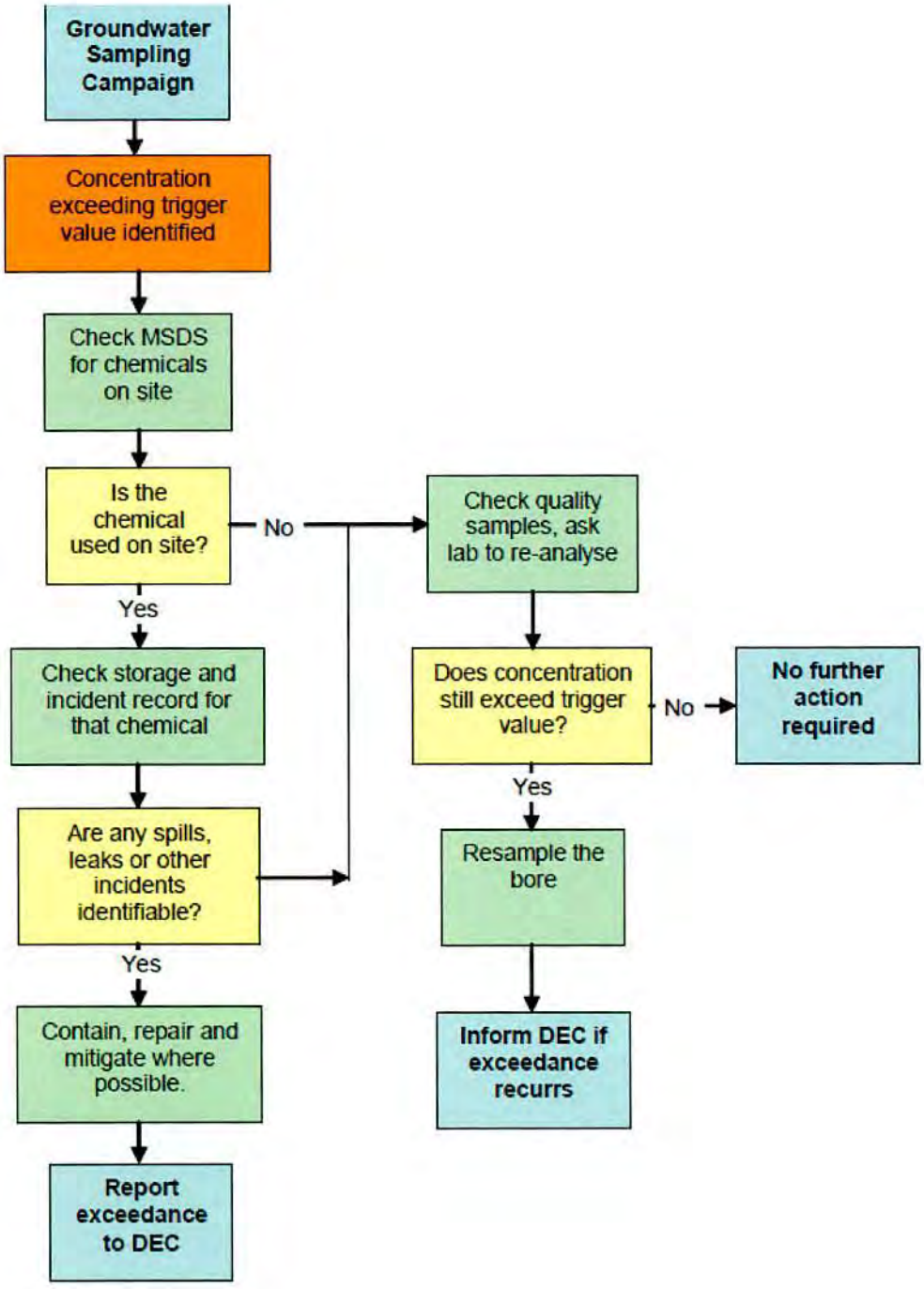
Other BNPL plans and procedures related to this procedure are:

- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0003 Preliminary Emergency Response Management Plan (PERMP)
- 250-200-PLN-BNP-0010 Preliminary Erosion Control and Stormwater Management Plan (PESMP)

11 WASTEWATER MONITORING CONTINGENCY PROCEDURE



12 GROUNDWATER QUALITY CONTINGENCY PROCEDURE



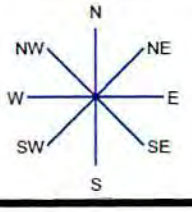
APPENDIX A – WATER QUALITY MONITORING FORMS

1	Groundwater Monitoring Field Sheet
2	Groundwater Chain of Custody and Request for Analysis Sheet
3	Wastewater Monitoring Field Sheet
4	Wastewater Chain of Custody and Request for Analysis Sheet

GROUNDWATER MONITORING FIELD SHEET

EXAMPLE SHEET – BNPL version to be finalised prior to Operations

BORE NUMBER: _____

Date:	Wind Direction (please circle)	Weather Conditions (please circle)	Equipment
Time		☐ Raining ☐ Dry	☐ pH calibrated ☐ conductivity calibrated ☐ standing water level probe ☐ pump and compressor ☐ buckets ☐ sample containers

SITE CONDITIONS	Was the cap on ? Yes/No What is the condition of the bore?_____ Has the bore been disturbed since last monitoring event? Yes/No
STANDING WATER LEVEL	
Casing Height of Bore	.....m
Standing Water Level	*(.....m) – (casing height_____) m = ...m
FIELD PARAMETERS	
pH	
Electrical Conductivity (uS/cm)	
Salinity (ppm)	
Temperature (°C)	
Additional Comments	

Signed: _____

GROUNDWATER SAMPLE CHAIN OF CUSTODY AND ANALYSIS REQUEST SHEET

EXAMPLE SHEET – BNPL version to be finalised prior to Operations

TO: (Laboratory) Quote no:	FROM: ..... Burrup Fertilisers

Job Description: Burrup Ammonia Plant

Sampler:..... **Phone (08)**.....

Date Collected: ..... **Time Collected:** .....

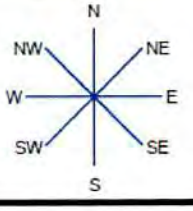
PARAMETER	BORE NUMBERS:_____
Suspended Solids (SS) pH Turbidity (NTU) Total Recoverable Hydrocarbons Total Nitrogen Ammonia	

Relinquished By:	Date & Time:	Received By:	Date & Time:
.... BURRUP FERTILISERS			

Relinquished By:	Date & Time:	Received By:	Date & Time:
		Name: BURRUP FERTILISERS	

WASTEWATER SAMPLE FIELD DATA SHEET

EXAMPLE SHEET – BNPL version to be finalised prior to Operations

Date: _____	Wind Speed (please tick)	Wind Direction (please circle)	Cloud Cover (please tick)	Weather Conditions
	☐ 0-5km per hour ☐ 5-10km per hour ☐ 0-15km per hour ☐ 5-20km per hour ☐ 15-20km per hour		☐ 0-10% ☐ 10 – 20% ☐ 20 – 50% ☐ 50 – 80% ☐ 80 – 100%	☐ Raining ☐ Dry

WASTEWATER LOCATION

Sampling Point M1 ☐ Sampling Point M2 ☐ Sampling Point M3 ☐ Sampling Point M4 ☐

FIELD MEASUREMENTS REQUIRED WHEN A SAMPLE IS COLLECTED

Sample Number	Sample Location	Time	pH	Conductivity (µS/cm)	Temperature (°C)	Salinity (ppm)

Additional Comments	

Signed: _____

WASTEWATER SAMPLE FIELD DATA SHEET

EXAMPLE SHEET – BNPL version to be finalised prior to Operations

TO: (Laboratory) Quote no:	FROM: ..... Burrup Fertilisers

Job Description: Burrup Ammonia Plant

Sampler:..... **Phone (08)**.....
Date Collected: ..... **Time Collected:** .....

	SAMPLE NUMBER							
PARAMETER								
Dissolved oxygen								
pH								
Total dissolved solids								
Temperature								
Enterococci								
Thermo-tolerant coliforms								
Ammoniacal Nitrogen								
Cadmium (Cd)								
Chromium (Cr total)								
Copper (Cu)								
Lead (Pb)								
Mercury (Hg)								
Nickel (Ni)								
Zinc (Zn)								
Other:.....								
Other:.....								

Relinquished By:	**Date & Time:**	**Received By:**	**Date & Time:**
..... BURRUP FERTILISERS		LABORATORY	

Relinquished By:	**Date & Time:**	**Received By:**	**Date & Time:**
LABORATORY		..... BURRUP FERTILISERS	

Burrup Nitrates Pty Ltd

An Oswal Group Global and Yara International ASA Joint Venture

Preliminary Weed Management Plan

Document Number: 250-200-PLN-BNP-0014

Date: 23rd December 2009

PROJECT NUMBER 0086269 OR 114942				BURRUP NITRATES PTY LTD			
REV	DESCRIPTION	ORIGIN	CHECKED	DATED	BNPL APPROVAL	SIGNED	DATED
A	Issued for Review	ERM	TW	23/12/09	Y		
0	Approved for Use	BNPL	WJ/ FA	23/12/09	Y		

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TABLE OF CONTENTS

1 PURPOSE

This Preliminary Weed Management Plan (PWMP) lays down procedure for the management of weeds on the BNPL lease. This plan will link to the overall Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) to be prepared prior to construction and operations respectively and will also tie in closely with the Preliminary Terrestrial Vegetation and Flora Management Plan. Detailed work instructions for BNPL staff are to be based on this plan and the CEMP and OEMP.

2 DEFINITIONS

The **TANPF Site or the Site** refers to the area within the disturbance boundary.

The **Lease area** is defined as the entire project lease, including the undisturbed area and the TANPF site.

Weeds are defined as non – native and non endemic flora species. Examples of exotic flora include weed species such as Buffel Grass (*Cenchrus ciliaris*) or Kapok (*Aerva javanica*). Exotic flora impact ecological diversity by displacing native species.

3 ABBREVIATIONS

BNPL	Burrup Nitrates Proprietary Limited
DEC	Department of Environment and Conservation
EO	Environment Officer
CEMP	Construction Environmental Management Plan
OEMP	Operational Environmental Management Plan
TANPF	Technical Ammonium Nitrate Production Facility
PWMP	Preliminary Weed Management Plan

4 CURRENT STATUS

Three introduced species, *Cenchrus ciliaris* (Buffel Grass), *Aerva javanica* (Kapok bush) and *Vachellia farnesiana* were found during a vegetation and flora survey of the TANPF site. Other weed species which are known to occur on the Burrup Peninsula and may potentially occur within the Site are shown in Table 1. The weed ratings shown in Table 1 are determined by assessing weed species against three criteria; invasiveness, distribution and environmental impacts. Species with a high weed rating are those which meet all three criteria, moderate meet two, mild one and low none. This rating system was established as part of the environmental weed strategy for Western Australia.

Table 1 Weeds Known to Occur on the Burrup Peninsula

Species Name	Common Name	Rating
Cenchrus setigerus	Birdwood Grass	High
Cenchrus enchinatus	Mossman River Grass	Low
Rumex vesciarius	Ruby Dock	High
Stylosanthes hamata	Carribean stylo	Mild

Species Name	Common Name	Rating
Bidens bipinnata	Bipinnate Beggar-Ticks	Not Determined
Euphorbia hirsuta	Strawberry Weed	Moderate
Passiflora foetida	Wild Passionfruit	High
Solanum nigrum	Nightshade	Moderate
Chloris barbata	Purple-top chloris	Low
Pennisetum setaceum	Fountain grass	Mild
Malvastrum americanum	-	Moderate

Note: rating is based on *Environmental Weed Strategy for Western Australia* (DEC, 1999).

Buffel Grass is widespread through the Site especially on the eastern and southern sides. Three specimens of the species *Vachellia farnesiana* were recorded in the northwestern section in relatively undisturbed vegetation.

None of the introduced species recorded are Declared Weeds under the *Agricultural and Related Resources Protection Act 1976*. However, *Cenchrus ciliata*, *Vachellia farnesiana* (syn. *Acacia farnesiana*) and *Aerva javanica* are all listed as Environmental Weeds with 'High ' rating under the Environmental Weed Strategy for Western Australia (DEC, 1999).

5 ASPECTS, IMPACTS AND MANAGEMENT ISSUES

The BNPL TANPF will be located within a relatively undisturbed area of vegetation, and areas surrounding the Site retain areas of high conservation value. Accordingly, management of exotic species of flora is of importance.

Plant construction and excavation activities have the potential to introduce new weed species to the Site or promote the spread of existing weed species within the area through activities such as:

- Contaminated fill being brought onto site;
- Weed species on site being spread by machinery, vehicle or pedestrian movement; and
- Soil disturbances, including clearing and grading, creating soil conditions conducive to weed establishment.

6 OBJECTIVES

- To minimise the incidence and spread of exotic flora species and the introduction of new exotic flora species.

7 PERFORMANCE REQUIREMENTS

- No new weed species introduced into the Development area as a result of BNPL activities.
- Adherence to the *Quarantine Act 1908* and regulations.

8 DETAILED RESPONSE AND MANAGEMENT ACTIONS

Table 2 specifies the responses and actions to manage weeds on the lease, and defines the responsibility and timing for their implementation.

Table 2 Responses and Management Actions to Manage Weeds

Reference Number	Response and Management Actions	Related to	Timing/ Critical Date	Responsible Person
PWMP-1	Should fill be required it will be obtained from a suitable weed free source. Potential sources will be inspected by a suitably qualified botanist.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Environmental Officer
PWMP-2	Conduct inspections of all earthmoving machinery prior to them entering the undisturbed part of the lease, to ensure they are clean of mud and plant debris, which may contain weed propagules.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Security, Relevant Section Manager, EO
PWMP-3	Inform all staff of the need for all off road vehicles and equipment to be free of any weed propagules in the Induction Program.	CEMP OEMP	Prior to work commencing	EO
PWMP-4	Prohibit BNPL workers from travelling cross-country on vehicle or foot outside the Site, without authorisation from the Environmental Officer.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Environmental Officer
PWMP-5	Establishing and maintaining plant, vehicles and equipment hygiene to prevent introduction and transfer of weeds.	CEMP OEMP	Construction: Ongoing Operation: Ongoing	Security, Relevant Section Manager, EO
PWMP-6	Undertake weed control actions whenever new introductions or spread of weed species are observed. See *Section 12*.	CEMP OEMP	Within 4 weeks of identification	Environmental Officer

9 MONITORING

- Monitoring throughout construction to identify introductions or the spread of weeds and to manage any new infestations, where they can be effectively controlled.
- Regular inspections of vehicles, equipment and construction materials will be undertaken to monitor the success of preventative measures.
- A weed monitoring and treatment programme will be implemented prior to the commencement of construction activities and will continue for the duration of the TANPF operations. The programme will identify appropriate treatment and control techniques for weed species encountered in the Site. DEC will be consulted on this where appropriate following initial monitoring performance targets are set.

10 REPORTING

Adherence to the PWMP will be reported in the annual Site Compliance Report and submitted to the DEC annually on specified dates. Reporting will identify opportunities for continuous improvement in weed management on the Site.

11 REFERENCES

Other BNPL plans and procedures related to this procedure are:

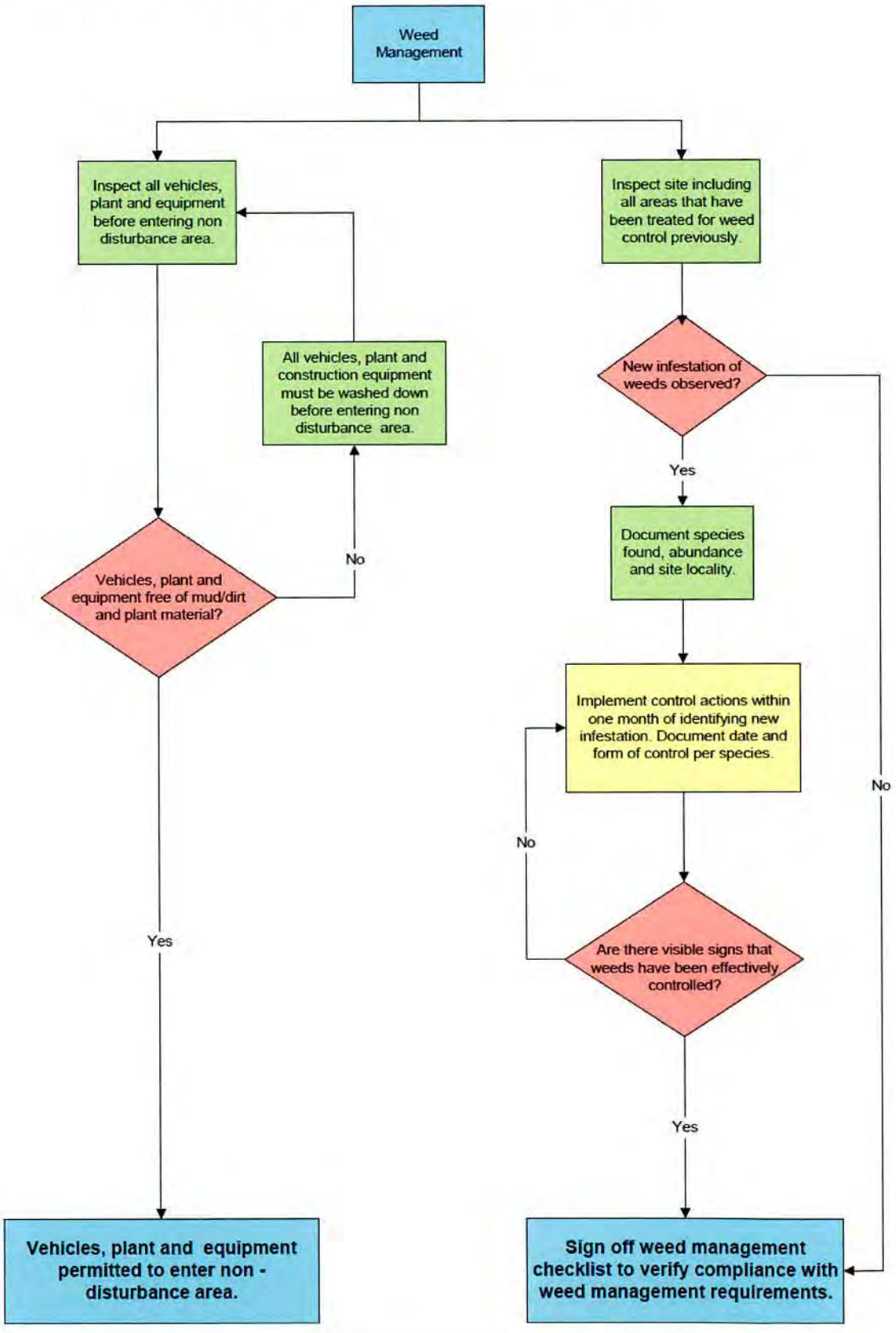
- Construction Environmental Management Plan (to be developed prior to construction)
- Operational Environmental Management Plan (to be developed prior to operation)
- 250-200-PLN-BNP-0011 Preliminary Terrestrial Fauna Management Plan (PTFMP)
- 250-200-PLN-BNP-0012 Preliminary Terrestrial Vegetation and Flora Management Plan (PTVFMP)

References

DEC, 1999. *Environmental Weed Strategy for Western Australia*. A WWW publication accessed in October 2009 at http://www.dec.wa.gov.au/pdf/plants_animals/environmental_weed_strategy_wa.pdf

12 WEED MANAGEMENT CONTINGENCY

The following contingency will be undertaken by the EO in the event of weed infestation upon the BNPL lease site as indicated in PWMP – 6 in Table 1.



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Annex H

DEC and EPBC Database Searches

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

6 May 2009 15:33

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Search Type: Area

Buffer: 10 km

Coordinates: -20.62177,116.7854, -20.62261,116.7925, -20.63252,116.7898, -20.63394,116.7855

Report Contents:

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None

Threatened Species:	12
Migratory Species:	30

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	3
Listed Marine Species:	64
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

National Heritage Places [Dataset Information]

Dampier Archipelago (including Burrup Peninsula) WA

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Macronectes giganteus Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale	Endangered	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll	Endangered	Species or species habitat may occur within area

Megaptera novaeangliae Humpback Whale	Vulnerable	Species or species habitat known to occur within area
Rhinonicteris aurantius (Pilbara form) Pilbara Leaf-nosed Bat	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leathery Turtle, Leatherback Turtle	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle	Vulnerable	Breeding likely to occur within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies)	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle	Vulnerable	Breeding likely to occur within area
Sharks		
Rhincodon typus Whale Shark	Vulnerable	Species or species habitat may occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow	Migratory	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone	Migratory	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Numenius phaeopus Whimbrel	Migratory	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank	Migratory	Species or species habitat likely to occur within area
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area

Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Puffinus pacificus Wedge-tailed Shearwater	Migratory	Breeding known to occur within area
Sterna caspia Caspian Tern	Migratory	Breeding known to occur within area
Migratory Marine Species		
Mammals		
Balaenoptera edeni Bryde's Whale	Migratory	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale	Migratory	Species or species habitat may occur within area
Dugong dugon Dugong	Migratory	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale	Migratory	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca	Migratory	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Migratory	Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	Migratory	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle	Migratory	Species or species habitat may occur within area
Chelonia mydas Green Turtle	Migratory	Breeding likely to occur within area
Dermochelys coriacea Leathery Turtle, Leatherback Turtle	Migratory	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle	Migratory	Breeding likely to occur within area
Natator depressus Flatback Turtle	Migratory	Breeding likely to occur within area
Sharks		
Rhincodon typus Whale Shark	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone	Listed	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel	Listed - overfly	Species or species habitat may occur within area

	marine area	
Glareola maldivarum Oriental Pratincole	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow	Listed - overfly marine area	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel	Listed	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area
Numenius phaeopus Whimbrel	Listed	Species or species habitat likely to occur within area
Pandion haliaetus Osprey	Listed	Breeding known to occur within area
Puffinus pacificus Wedge-tailed Shearwater	Listed	Breeding known to occur within area
Sterna caspia Caspian Tern	Listed	Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank	Listed - overfly marine area	Species or species habitat likely to occur within area
Mammals		
Dugong dugon Dugong	Listed	Species or species habitat likely to occur within area
Ray-finned fishes		
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish	Listed	Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish	Listed	Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish	Listed	Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish	Listed	Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish	Listed	Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Negros Pipefish	Listed	Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish	Listed	Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish	Listed	Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish	Listed	Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish	Listed	Species or species habitat may occur within area

Halicampus nitidus Glittering Pipefish	Listed	Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish	Listed	Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Seadragon, Ribboned Pipefish	Listed	Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish	Listed	Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse	Listed	Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse	Listed	Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse	Listed	Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse	Listed	Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish	Listed	Species or species habitat may occur within area
Solegnathus hardwickii Pipehorse	Listed	Species or species habitat may occur within area
Solegnathus lettiensis Indonesian Pipefish, Gunther's Pipehorse	Listed	Species or species habitat may occur within area
Solenostomus cyanopterus Blue-finned Ghost Pipefish, Robust Ghost Pipefish	Listed	Species or species habitat may occur within area
Syngnathoides biaculeatus Double-ended Pipehorse, Alligator Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bend Stick Pipefish, Short-tailed Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus longirostris Long-nosed Pipefish, Straight Stick Pipefish	Listed	Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake	Listed	Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake	Listed	Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake	Listed	Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake	Listed	Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake	Listed	Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake	Listed	Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake	Listed	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle	Listed	Species or species habitat may occur within area
Chelonia mydas Green Turtle	Listed	Breeding likely to occur within area
Dermochelys coriacea Leathery Turtle, Leatherback Turtle	Listed	Species or species habitat may occur within area
Disteira kingii Spectacled Seasnake	Listed	Species or species habitat may occur within area
Disteira major Olive-headed Seasnake	Listed	Species or species habitat may occur within area
Emydocephalus annulatus	Listed	Species or species habitat may occur within

Turtle-headed Seasnake		area
Ephalophis greyi North-western Mangrove Seasnake	Listed	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle	Listed	Breeding likely to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake	Listed	Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Seasnake	Listed	Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake	Listed	Species or species habitat may occur within area
Hydrophis mcdowelli	Listed	Species or species habitat may occur within area
Hydrophis ornatus a seasnake	Listed	Species or species habitat may occur within area
Natator depressus Flatback Turtle	Listed	Breeding likely to occur within area
Pelamis platurus Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [Dataset Information]	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale	Cetacean	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin	Cetacean	Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale	Cetacean	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Cetacean	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	Cetacean	Species or species habitat likely to occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area

Commonwealth Lands [Dataset Information]

Unknown

Places on the RNE [Dataset Information]
Note that not all Indigenous sites may be listed.

Indigenous

Burrup Peninsula - North Area WA

Dampier Climbing Men Area WA

Natural

Dampier Archipelago WA

Extra Information

State and Territory Reserves [Dataset Information]

Un-named (No. 36913) Nature Reserve, WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory

- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated: Thursday, 20-Nov-2008 14:17:56 EST

Department of the Environment, Water, Heritage and the Arts
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

20.45 °S 116.6 °E / 20.8 °S 117.02 °E Site D Burrup Peninsula (plus~20km buffer)

*	Date	Certainty	Seen	Location Name	Method

Schedule 1 - Fauna that is rare or is likely to become extinct

Dasyurus hallucatus — Northern Quoll — *15 records*

This carnivorous marsupial occurs across much of northern Australia with a disjunct population in the Pilbara. Occurs in a wide range of habitats but most suitable habitat appear to be rocky areas.

	1		BULGARRA
	1		DAMPIER ARCHIPELAGO
	1		DAMPIER ARCHIPELAGO
1900	1		DAMPIER ARCHIPELAGO
1970	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1980	1		DAMPIER ARCHIPELAGO
1986	1		DAMPIER ARCHIPELAGO
1986	1		DAMPIER ARCHIPELAGO
1986	1		DAMPIER ARCHIPELAGO

Liasis olivaceus barroni — Pilbara Olive Python — *4 records*

1993	3	1	Dolphin Island Nature Reserve	Day sighting
2001	1	9	Burrup Rifle Range	
2004	1	1	Burrup	Hair/skin
2005	1	1	Dampier	Day sighting

Chelonia mydas — Green Turtle — *1 records*

This species of marine turtle is widespread along the tropical coast of WA.

2006	1	1	West Intercourse Island	Day sighting

Natator depressus — Flatback Turtle — *1 records*

2006	1	1	West Intercourse Island	Day sighting

Schedule 4 - Other specially protected fauna

Falco peregrinus — Peregrine Falcon — *2 records*

This species is uncommon and prefers areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land.

2006	1	1	Burrup	Day sighting
2006	1	1	West Intercourse Island	Day sighting

Priority One: Taxa with few, poorly known populations on threatened lands

20.45 °S 116.6 °E / 20.8 °S 117.02 °E Site D Burrup Peninsula (plus~20km buffer)

*	Date	Certainty	Seen	Location Name	Method

Mormopterus loriae cobourgiana **Little North-western Mastiff Bat** *3 records*

This species occurs along the northwest coast and is known to roost in mangroves.

2001	2		Cowrie Cove	Heard
2006	1	1	Burrup	Caught or trapped
2006	1	1	West Intercourse Island	Caught or trapped

Priority Four: Taxa in need of monitoring

Macroderma gigas **Ghost Bat** *2 records*

This species is Australia's only carnivorous bat and has a patchy distribution across northern Australia. It shelters in caves, mine shafts and deep rock fissures and is sensitive to disturbance.

2006	1	1	Burrup	Caught or trapped
2006	1	1	West Intercourse Island	Caught or trapped

Pseudomys chapmani **Western Pebble-mound Mouse, Ngadji** *2 records*

This species is well-known for the characteristic pebble-mounds which it constructs over underground burrow systems. These mounds are most common on spurs and lower slopes of rocky hills.

1979	2	0	Karratha	Definite signs
1983	2	0	Burrup Peninsula	Definite signs

Ardeotis australis **Australian Bustard** *1 records*

This species is uncommon and may occur in open or lightly wooded grasslands.

2007	1	2	Mount Anketell	Day sighting

Burhinus grallarius **Bush Stonecurlew** *2 records*

A well camouflaged, ground nesting bird which prefers to 'freeze' rather than fly when disturbed. It inhabits lightly timbered open woodlands.

2006	1	1	Burrup	Day sighting
2006	1	1	West Intercourse Island	Day sighting

Numenius madagascariensis **Eastern Curlew** *2 records*

This species is a migratory visitor and has been observed on reef flats and sandy beaches along the West Australian coast and in coastal estuaries.

1966	1		Nichol Bay	Day sighting
2002	1	2	Nichol Bay	

Phaps histrionica **Flock Bronzewing** *1 records*

This species is gregarious and occurs in treeless or sparsely wooded grassy plains within reach of open water.

1968	1	300	Nickol River	Day sighting

* Information relating to any records provided for listed species:-
Date: date of recorded observation
Certainty (of correct species identification): 1=Very certain; 2=Moderately certain; and 3=Not sure.
Seen: Number of individuals observed.
Location Name: Name of reserve or nearest locality where observation was made
Method: Method or type of observation

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Annex I

Level 1 Flora and Vegetation Report

Burrup Nitrates Pty Ltd

Proposed Technical Ammonium Nitrate Production Facility site, Burrup Peninsula.

Level 1 Flora Survey

April 2009

DRAFT REPORT

Outback Ecology Services
1/71 Troy Terrace
Jolimont WA 6014
Ph: +61 (08) 9388 8799
Fax: +61 (08) 9388 8633
admin@outbackecology.com

Level 1 Flora Survey

Distribution:

Company	Copies	Contact Name

Document Control for Job Number: EBR-VS-1208

Document Status	Author	Reviewer	Signature	Date of Issue
Draft Report	M. Henson	D. Jasper	DJ	6/05/2009
Final Report				

EXECUTIVE SUMMARY

ERM commissioned Outback Ecology to conduct a level 1 flora survey of Site D within the King Bay Hearson Cove Industrial Precinct on the Burrup Peninsula. A botanist from Outback Ecology accompanied an ecologist from ERM to the site on 30 March 2009.

Database searches returned a list of seven Priority coded species that were known from the immediate area. Review of the habitat preferences of each led to the conclusion that it was unlikely that these would be present at the study site, except perhaps for *Terminalia supranitifolia* (P3), which had been recorded by Astron in 2001 on an adjacent site. This species was not identified within the Site during this survey. No DRF species are known to occur on the Burrup Peninsula. In addition, no Threatened Ecological Communities are known to occur on the Burrup Peninsula.

No Priority species were found or recorded during the survey. It appeared that the season had been good, with plenty of rain, and some species were already in flower. Perennial grasses (eg *Triodia epactia, *Cenchrus ciliaris*) were healthy and in flower.

The previous vegetation mapping of the site from Trudgen (2002) was ground-truthed and found to be largely accurate, except for a unit in the southern part of the site, and the invasion of introduced species in the time since the mapping had been done.

Vegetation condition varied from Very Good in the northern part of the site to Degraded in the eastern and southern parts. Consultation with the botanist who conducted the field work in Hearson's Cove for the Trudgen (2002) report, Dr Arthur Weston, indicated that **Cenchrus ciliaris* had increased its dominance and cover in the time since that field work had been finished in 2000.

The vegetation present in the site of the proposed development is well represented in other parts of the Hearson's Cove and on the Burrup Peninsula. Clearing of part of it would not result in fragmentation of communities or creation of remnant vegetation.

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1. Introduction

1.1 Project Background

Burrup Nitrates Pty Ltd (Burrup Nitrates) is planning to develop an Ammonium Nitrate Production Facility on the Burrup Peninsula, 13km north of Karratha, WA. ERM commissioned Outback Ecology to undertake a Level 1 flora survey of the site during March 2009.

1.2 Scope and Objectives of the Study

This report documents the results of a Level 1 flora survey over the site. The objectives of the survey were to:

- Conduct a desktop review to collect ecological information relevant to the project areas and surrounds;
- Undertake a site visit to conduct a census and develop a catalogue of flora within the survey area and to determine the presence of any flora of conservation significance; and
- Confirm previous vegetation mapping conducted for the site.

1.3 Location of Project Area

The Site is located on the Burrup Peninsula approximately 13km north west of Karratha. The Site is adjacent to the existing Burrup Fertilisers Pty Ltd (BFPL) Ammonia plant and covers an area of approximately 79 hectares (ha), of which the proposed TANPF requires an approximate footprint of 23.7 ha (**Figure 1**).

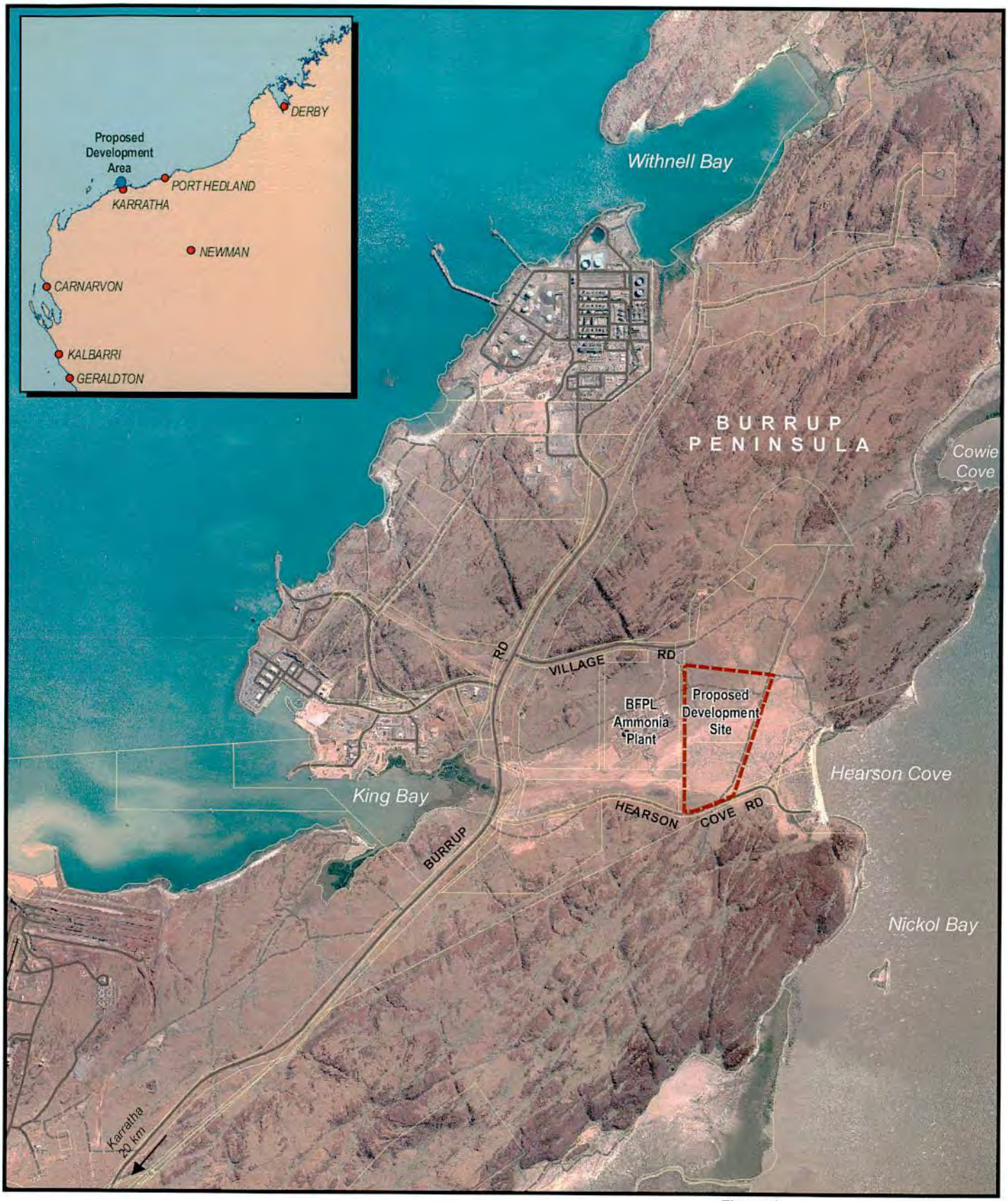
1.4 Existing environment

IBRA Region – Pilbara 4 (Roebourne subregion)

The Burrup Peninsula lies within the Roebourne subregion of the Pilbara biogeographic region, Western Australia. The '*Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*' McKenzie, N. L., *et al.* (2003) describes the Roebourne subregion, as follows:

'Quaternary alluvial and older colluvial coastal and subcoastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, *Sporobolus* and mangal occur on marine alluvial flats and river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three. Climate is arid (semi-desert) tropical with highly variable

rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually. Average annual rainfall is 280 mm/annum BOM (2009).



Legend

Site D Boundary

Figure 1

Location of TANPF

Client:	Burrup Nitrates Pty Ltd		
Project:	PER		
Drawing No:	0086269p_GIS01_PER	Suffix No:	R0
Date:	21/10/2009	Drawing size:	A4
Drawn by:	DD	Reviewed by:	BC
Source:	Base information LANDGATE		
Scale:	1:50 000		

N

0 500 1,000 1,500m

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2 Methods

2.1 Desktop Review

A review of databases and publicly available information was conducted prior to the field surveys. The desktop review consisted of the following:

- A search of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters database for flora of conservation significance and Threatened Ecological Communities (TEC) known, or likely, to occur within the survey areas;
- A search of the Department of Environment and Conservation (DEC) Threatened (Declared Rare) Flora database, the Western Australian Herbarium (WAHERB) database and the Declared Rare and Priority Flora List for rare and priority flora known, or likely, to occur within the survey areas;
- A search of the DEC TEC database for listings of communities known, or likely, to occur within the survey areas;
- A limited review of publicly available ecological information pertaining to the survey areas and surrounds.

2.2 DRF and Priority Field Survey

The proposed development site was traversed by foot, and descriptions and opportunistic sampling were taken as required. The field survey was conducted by two ecologists on 30 March 2009, with the ecologists remaining onsite for approximately six hours.

Descriptions of vegetation units were taken and compared to existing vegetation mapping. Flora was either identified *in situ* if taxon were familiar to the field survey party, or plant specimens were collected, pressed and brought back to Perth for further identification. Specimens collected were identified by reference to taxonomic guides and Western Australian Herbarium samples.

3. Results and discussion

3.1 Desktop Review

3.1.1 Environment Protection and Biodiversity Conservation (EPBC) Act 1999 Protected Matters Database Search

A National Heritage place listed as occurring within the database search area was:
Dampier Archipelago (including Burrup Peninsula) WA.

The Hearson's Cove area in which this survey took place is excluded from the National Heritage area.

No EPBC listed flora species or TECs were identified within a ten kilometre radius of the site. The EPBC protected matters search results are provided as **Appendix C.**

3.1.2 Declared Rare and Priority Flora – DEC Database Search

No Declared Rare (as defined under the Western Australian *Wildlife Conservation Act 1950)* species has been recorded from the Burrup Peninsula. Seven Priority Flora have been recorded from the Burrup Peninsula (**Table 1**). Of the Priority Flora, one is Priority 1, and six are Priority 3. Priority definitions are included as Appendix A, and the database search results are included as Appendix B.

Table 1: Priority Flora recorded from the Burrup Peninsula (DEC, 2009)

Species	Cons. Code	Habitat
Acacia glaucocaesia	P3	Red and sandy loam, floodplains
Gymnanthera cunninghamii	P3	Sandy soils
Hibiscus brachysiphonius	P3	Clay. Creeklines, clay flats.
Rhynchosia bungarensis	P3	Coarse sand amongst boulders, flow lines
Stackhousia clementii	P1	Skeletal soils. Sandstone hills
Terminalia supranitifolia	P3	Sand. Among basalt rocks.
Themeda sp. Hamersley Station (ME Trudgen 11431)	P3	Red clay, clay pans

Of these Priority species, *Terminalia supranitifolia* (P3) had been identified on an adjacent site by Astron in 2001 (Astron, 2001). This adjacent site included hillsides that provided habitat for the *Terminalia* to occur. This habitat type was not identified within the site that is the subject of this report.

3.1.3 Threatened Ecological Communities – DEC database search

No Threatened Ecological Communities were listed by the DEC as occurring within the database search area.

3.2 Declared Rare and Priority field Survey

No DRF or Priority Flora were identified during this survey. A full list of species recorded on the survey can be found in Appendix C. The specimens that could not be identified were compared against specimens of DRF and Priority Flora known to occur in the region and were confirmed not to be species of conservation significance.

One Priority species, *Terminalia supranitifolia* (P3) had been identified on an adjacent site by Astron in 2001. This species is recorded as growing between basalt rocks and on cliffs. Habitat for this species was not recorded during the current survey and *Terminalia supranitifolia* was not considered to be present within the site.

3.3 Introduced Flora

Three introduced species, **Cenchrus ciliaris* (Buffel Grass), **Aerva javanica* (Kapok bush) and **Vachellia farnesiana* were found during the survey.

Buffel Grass is widespread through the site especially on the eastern and southern sides, as may be seen from the photos below.

Three specimens of the species **Vachellia farnesiana* were recorded in the north-western section in relatively undisturbed vegetation.

None of the introduced species recorded are Declared Weeds under the *Agricultural and Related Resources Protection Act 1976*. However, *Cenchrus ciliata, Vachellia farnesiana* (syn. *Acacia farnesiana*) and *Aerva javanica* are all listed as Environmental Weeds with 'High' rating under the *Environmental Weed Strategy for Western Australia* (DEC, 1993).

Weeds listed as Environmental Weeds are rated according to three criteria:

- **Invasiveness** ability to invade bushland in good to excellent condition or ability to invade waterways. (Score as yes or no).
- **Distribution** – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world. (Score as yes or no).
- **Environmental Impacts** – ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community. (Score as yes or no).

The rating of each weed is then given according to the following scoring system:

- **High** - a weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research ie prioritising funding to it.

- **Moderate** - a weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).
- **Mild** – a weed species scoring one of the criteria. A mild rating would indicate monitoring of the weed and control where appropriate.
- **Low** – a weed species would score none of the criteria. A low ranking would mean that this species would require a low level of monitoring.

(**From DEC, 1993, p. 59**)

3.5 Vegetation Units

The following five broad vegetation types were identified during the flora survey and are mapped at **Figure 2**. These correspond to those vegetation assemblages previously identified and mapped as occurring within the area by Trudgen and Associates (2002). These vegetation types also broadly correspond with the vegetation associations mapped at the adjacent BFPL site by Astron (2001). The five dominant vegetation types mapped at the site by Trudgen are described below and the corresponding vegetation type recorded by Astron (2001) is also provided in parentheses. The remaining vegetation associations are described in Trudgen (2002).

AbTeWa (Coastal Flats) – High Open to Open Heath of *Acacia bivenosa,A. coriaceae* subsp. *coriacea* over Low Open Shrubland over *Triodia epactia* hummock grassland and mixed Closed Grasses over Herbs on the coastal flats. The coastal flats run parallel to the saline inlet to the south and the lower hill slopes to the north and occur in the southern and northern portions of the site. Soils here become more sandy and slightly saline.

Sm (Saline inlet and Supratidal Flats) – *Tecticornia (syn. Halosarcia)* spp. Scattered low shrubs to low open heath. Supratidal flats with *Tecticornia-Trianthema* succulent Dwarf Scrub. The saline inlet runs approximately east-west through the surrounding area.

ItTa (No Astron analogue)– *Indigofera trita* low shrubland over *Triodia epactia* (*T. angusta*) hummock grassland. One small occurrence of this unit is mapped in the south-east corner of the site.

TeSv (Coastal Flats) As noted in Trudgen (2002) this community is broadly described as *Sporobolus virginicus* grasslandoccurring on the edge of tidal flats. *Acacia bivenosa* occurs as a scattered shrub species while other associated species include *Trianthema turgidifolia* and *Eragrostis falcate*. This unit occurs in the north of the site, and is mixed with **AbTeWa**.

AbImTe (Upland and Upper Slopes) Recorded on the Upper slopes of the Northern part of the site this community is described as an open *Acacia bivenosa* shrubland over gravel and stone. Additional shrub species present include *Indigofera monophylla*.

These types match the observed vegetation during this survey, except perhaps that the **Cenchrus ciliaris* has increased its cover and dominance in the Coastal Flats vegetation type since the time of the Trudgen (2002) report (Dr. Arthur Weston, *pers. comm.*).

One correction to the Trudgen (2002) mapping is indicated with the unit **ChRe** in the southern section of the site. *Corymbia hamersleyana* was observed to be absent from this area and based on observed species this section should be remapped as **AbTeWa.** The modified Trudgen 2002 vegetation mapping of the site is shown at **Figure 2.**

3.6 Vegetation Condition

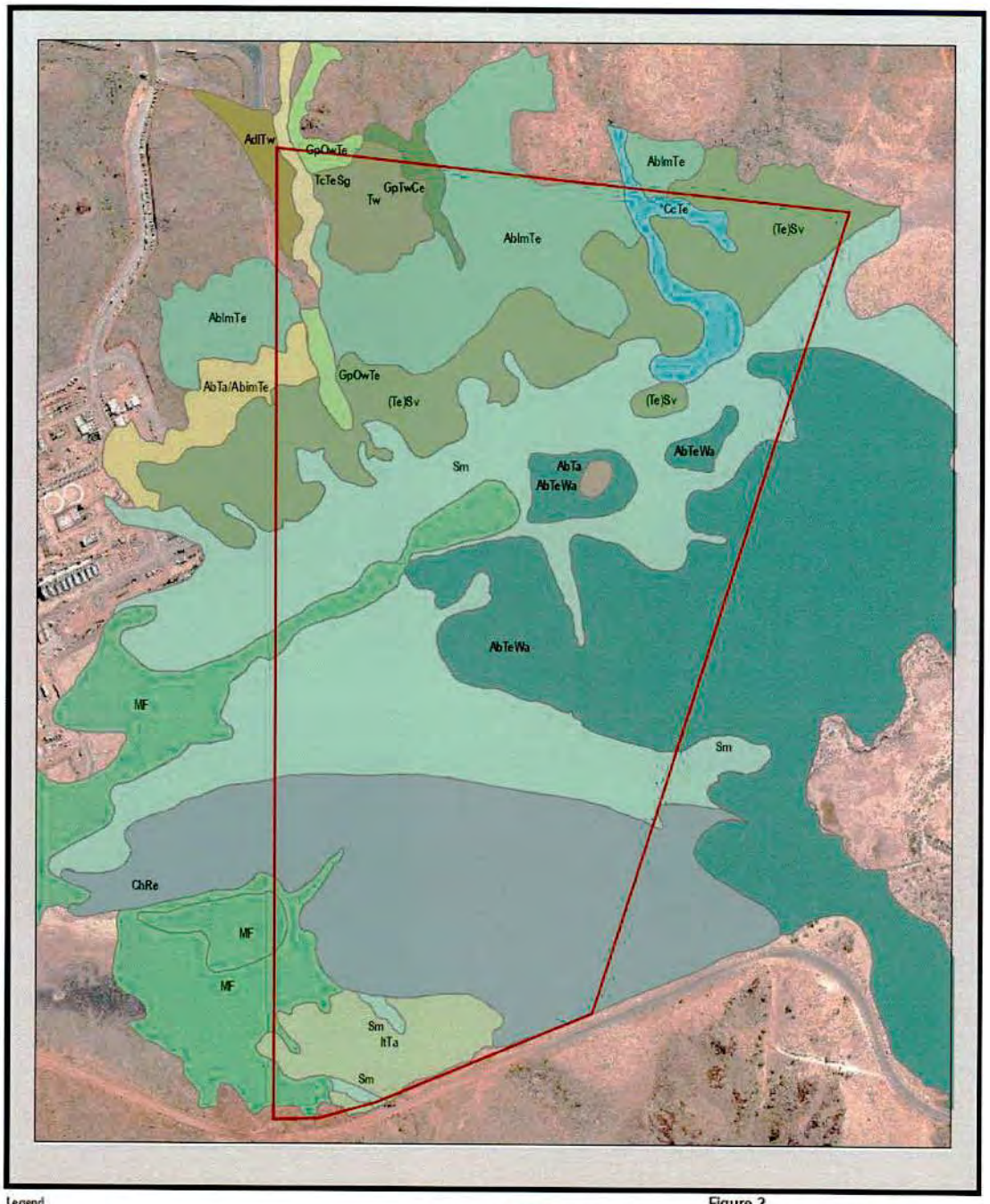
Vegetation condition across the site ranged from Very Good to Degraded.

The condition of the vegetation in the north-east corner of the site is Very Good. It still retains its structure however there are patches of the aggressive introduced species **Cenchrus ciliaris* and **Aerva javanica*.

The north-eastern part of the site is adjacent to the old site of the Hearson Construction Village, a very disturbed area. While it may be possible that weed infestation has spread from there it is also an indication that there has been historical disturbance around the site and possibly within it. The eastern and southern parts of the site are heavily invaded by **C. ciliaris* to the extent that it forms a Closed Grassland in parts (>80% cover).

Plate 1 is taken from the point S20 37 34 E 116 47 29 looking towards the south-east (the hill overlooking the south end of Hearson's Cove can be seen in the background) and shows a **Cenchrus ciliaris* Closed Grassland in the foreground. This is the prevalent condition in the eastern part of the site.

Plate 2 is taken from S20 37 58 E116 47 13 looking towards the south-west and shows **C. ciliaris* and **Aerva javanica* competing with *Triodia epactia* under *Acacia bivenosa*. This is the prevalent condition in the southern part of the site.



Legend

Site D Boundary

Vegetation Communities

- (Te)Sv
- *CcTe
- AbTa
- AbTa/AblmTe
- AbTeWa
- AblmTe
- AdlTw
- ChRe
- GpOwTe
- GpTwCe
- lTa
- MF
- Sm
- TcTeSg
- Tw

Client:	Burrup Nitrates Pty Ltd		
Project:	BNPL TAN Plant EIA and Works Approval		
Drawing No:	0086289p_14_GIS		
Date:	19/08/2009	Drawing size:	A4
Drawn by:	DD	Reviewed by:	BC
Source:	Aerial supplied by Landgate		
Scale:	1:10 000		

N 0 75 150 225 300m

Figure 2
Vegetation Communities

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Plate 1: **Cenchrus ciliaris Grassland.*

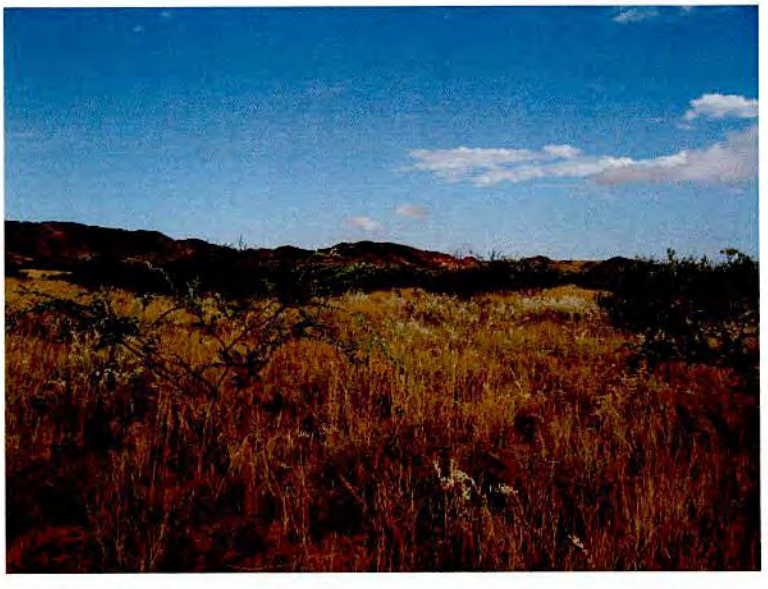

Plate 2: **AbTeWa:** **Cenchrus ciliaris* and **Aerva javanica* in *Acacia bivenosa* over Triodia *epactia.*

4. Conclusion and Summary

It appeared that the season had been good, with plenty of rain, and some species were already in flower. Perennial grasses (eg *Triodia epactia, *Cenchrus ciliaris*) were healthy and in flower. This created excellent conditions for survey work and allowed a high proportion of species to be identified in the short time the ecologists were on site.

Database searches returned a list of seven Priority coded species that were known from the immediate area. Review of the habitat preferences of each species led to the conclusion that it was unlikely that these would be present at the study site. *Terminalia supranitifolia* (P3) had been recorded by Astron in 2001 on an adjacent site, however the habitat for this species did not extend into the current study area and this species was not recorded during this survey.

No Priority species were found or recorded during the survey. Review of habitat preferences of those species recorded in the database searches would indicate that it is unlikely they would occur on the site due to lack of suitable habitat.

No DRF species are known to occur on the Burrup Peninsula, and none were recorded during this survey. No Threatened or Priority Ecological Communities are known to occur on the Burrup Peninsula, and none were recorded during this survey.

The Trudgen (2002) vegetation units mapped during this survey appear to be well represented in the local area and it is unlikely that further disturbance will threaten any vegetation types or create remnant vegetation.

Vegetation condition varied from Very Good in the northern part of the site to Degraded in the eastern and southern parts. Consultation with the botanist who conducted the field work in Hearson's Cove for the Trudgen (2002) report, Dr Arthur Weston, indicated that the **C. ciliaris* had increased its dominance and cover in the time since that field work had been finished in 2000. As all three introduced species recorded have 'High' ratings as environmental weeds and readily invade good quality bushland, it is likely that the vegetation condition in the Hearson's Cove area will deteriorate further.

5. References

Astron Environmental Pty Ltd. (Astron) (2001). *Flora and Vegetation Survey of the Proposed Ammonia Plant.* Unpublished report prepared for Sinclair Knight Merz on behalf of Burrup Fertilisers Pty Ltd.

DEC (1993) An Environmental Weed Strategy for Western Australia. Report by the Department of Conservation and Land Management, Perth Western Australia

McKenzie, N. L., May, J. E. and McKenna, S. (ed) (2003) *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia* edn). Department of Conservation and Land Management, Perth.

BOM (2009) Bureau of Meteorology online. http://www.bom.gov.au.

Trudgen and Associates (2002) *A Flora, Vegetation and Floristic Survey of the Burrup Peninsula, Some Adjoining Areas of the Dampier Archipelago, with Comparisons to the Floristics of Areas on the Adjoining Mainland.* Prepared for the WA Department of Mineral and Petroleum Resources.

APPENDIX A
Priority Definitions

Definition of Declared Rare and Priority Flora Species (CALM, 2005)

Conservation Code	Category Description
R	*Declared Rare Flora – Extant Taxa* "Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such."
P1	*Priority One – Poorly Known Taxa* "Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey."
P2	*Priority Two – Poorly Known Taxa* "Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora' but are in urgent need of further survey."
P3	*Priority Three – Poorly Known Taxa* "Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey."
P4	*Priority Four – Poorly Known Taxa* "Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia) are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years."

APPENDIX B
DEC Database Searches

WAHERB SPECIMEN DATABASE
GENERAL ENQUIRY

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: P. Glennon 236 Date: 07 1986 (PERTH 00808458)
LOCALITY Dampier Salt Lease WA
LAT 20 Deg 40 Min 0.000 Sec S LONG 116 Deg 42 Min 11.000 Sec E
Distinctly pruinose and more compact and heavier flowering, much more attractive than A. Victorii.
Previous det.: Acacia victoriae
Frequency:stands common in area of Nicol River.

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: P. Glennon 13 Date: 07 1979 (PERTH 00152897)
LOCALITY Karratha - Port Hedland area: towards Port Hedland out of Karratha, turnoff, second creek WA
LAT 20 Deg 47 Min Sec S LONG 116 Deg 58 Min Sec E
Flowers very small in racemes. No spikes. All plant glaucous, very delicate,
thin. Thickly flowered rounded plant. Single trunk much branched more or less 1 m. Pods thin walled.
Previous det.: Acacia glaucocaesia Domin

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: P. Glennon 13 Date: 11 1979 (PERTH 00669423)
LOCALITY Karratha - Port Hedland area: towards Port Hedland out of Karratha, turnoff, second creek WA
LAT 20 Deg 47 Min Sec S LONG 116 Deg 58 Min Sec E
Fruiting.
Previous det.: Acacia glaucocaesia Domin

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: K. Glennon 381 Date: 26 07 1987 (PERTH 00872148)
LOCALITY Beside road next to DSI [Dampier Salt Industries] salt stockpile WA
LAT 20 Deg 40 Min 0.000 Sec S LONG 116 Deg 42 Min 11.000 Sec E
Previous det.: Acacia glaucocaesia Domin

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: L.C. Snook s.n. Date: 09 1961 (PERTH 00153397)
LOCALITY Muda - Karratha WA
LAT 20 Deg 44 Min 23.000 Sec S LONG 116 Deg 50 Min 53.000 Sec E
Previous det.: Acacia victoriae

Gymnanthera cunninghamii
(Benth.) P.I.Forst. (Asclepiadaceae)
CONSERVATION STATUS:P3
Coll.: R.D. Royce 7369 Date: 13 06 1962 (PERTH 01217496)
LOCALITY West Lewis Island, Dampier Archipelago WA
LAT 20 Deg 35 Min 41.000 Sec S LONG 116 Deg 36 Min 41.000 Sec E
Shrub 4 - 5 ft branched from ground; milky sap.
Previous det.: Wrightia saligna (R. Br.) F. Muell. ex Benth.

Hibiscus brachysiphonius
F.Muell. (Malvaceae)
CONSERVATION STATUS:P3
Coll.: K. Glennon 497 K Date: 10 1987 (PERTH 03425800)
LOCALITY Recr.[Recreation] No 2 LIA Karratha beside creekline also found Cleaverville turnoff and toward Yanyare River, Dampier WA
LAT 20 Deg 46 Min Sec S LONG 116 Deg 54 Min Sec E
Upright sub-shrub leaves 3 foliate lobed and dentate with scattered stiff hairs.
Flowers mauve peduncle exceptionally long calyx lobes lanceolate - 5. Epicalyx
lobes linear almost as long as calyx - 10. Both hirsute capsule globular
glabrous celled just exceeding calyx containing numerous hairy seeds. Creekline.
Associated with depressed soak areas. A. xiphophylla, D. spicata,
Mukia maderaspatana, Malvastrum a., Desmodium filiforme, Phyllanthus sp. Sida Spinosa, Triodia sp.
Abundance: very uncommon. Plants usually 1 to few. (Seeds hard to obtain as frequently attacked by grubs).

Rhynchosia bungarensis
Maesen (Papilionaceae)
CONSERVATION STATUS:P3
Coll.: V. Long VL 227 Date: 09 11 1987 (PERTH 07271557)
LOCALITY One Shack Bay; East Lewis Island WA
LAT 20 Deg 38 Min Sec S LONG 116 Deg 38 Min Sec E
Twining, very sticky dark green spreading creeper. Velvety very sticky glandular
tomentum on leaves and stems. Leaflets suborbicular-broad oval 5-15 mm x 5-10 mm
inflorescence on erect raceme. Flowers 5-7 mm long, sticky, yellow with deep
red stripes radiating from throat. Standard 5 x 7 mm wings 4 mm long. Legumes
15 x 5 mm, falcata with velvety tomentum. Also seen later in very dense clumps. Rocky outctop atop rocky slopes.
Previous det.: Rhynchosia minima aff.

Rhynchosia bungarensis
Maesen (Papilionaceae)
CONSERVATION STATUS:P3
Coll.: M.I. Blackwell Bp 8 Date: 21 09 1983 (PERTH 07271484)
LOCALITY Near quadrant on cutting along road to Con. camp; Burrup Peninsula WA
LAT 20 Deg 47 Min Sec S LONG 116 Deg 46 Min Sec E
Fine wiry scandent creeper growing from large rootstock appears to be able to withstand intense heat from and on the rocks.
In crevices in rock piles.
Previous det.: Rhynchosia minima cf.

Stackhousia clementii
Domin (Stackhousiaceae)
CONSERVATION STATUS:P1
Coll.: J.E. Wajon 654 Date: 14 06 2003 (PERTH 07130392)

LOCALITY Water Corporation service corridor, Burrup Fertilizers near Hearson Cove Road; Karratha WA
LAT 20 Deg 37 Min 3.400 Sec S LONG 116 Deg 47 Min 21.800 Sec E
Perennial, open herb, 25 cm high x 40 cm wide. Stick like stems, no leaves. Very small flowers about 5 mm long.
Edge of estuarine area. Salt lake. Industrial. Cream wet clay. Bare areas with other small shrubs including Trianthema.
Population structure: 5% flowering, 95% fruiting.
Frequency:6-20 plants.

Stackhousia clementii
Domin (Stackhousiaceae)
CONSERVATION STATUS:P1
Coll.: V. Long VL 4150-6 Date: 30 04 2002 (PERTH 06404146)
LOCALITY King Bay - Hearson Cove tidal inlet, Burrup Peninsula WA
LAT 20 Deg 37 Min 49.000 Sec S LONG 116 Deg 47 Min 3.000 Sec E
Lime-green, more or less leafless plant (or scale like leaves) to 45 cm with
numerous erect slender branches. Flowers in clusters, forming a cylindrical spike. Woody base.
Soft, silty saline soil over limestone - with much limestone and coral rubble,
on small 'island' within tidal inlet (very rarely inundated).

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 32 Date: 22 11 1998 (PERTH 07195796)
LOCALITY Site 17, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 42.700 Sec S LONG 116 Deg 46 Min 47.300 Sec E
Rocky slope.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 9 Date: 05 11 1998 (PERTH 07196016)
LOCALITY Site 6, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 30.200 Sec S LONG 116 Deg 46 Min 46.700 Sec E
Small rocky terrace on large rock outcrop

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 11 Date: 08 11 1998 (PERTH 07196067)
LOCALITY Site 7, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 9.000 Sec S LONG 116 Deg 47 Min 13.700 Sec E
Steep rock outcrop slope.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 16 Date: 10 11 1998 (PERTH 07196113)
LOCALITY Site 10, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 7.300 Sec S LONG 116 Deg 47 Min 57.800 Sec E
Steep rock outcrop slope.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 26 Date: 20 11 1998 (PERTH 07196164)
LOCALITY Site 14, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 32.800 Sec S LONG 116 Deg 46 Min 56.100 Sec E
Steep rock outcrop slope.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 28 Date: 20 11 1998 (PERTH 07196148)
LOCALITY Site 15, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 1.400 Sec S LONG 116 Deg 47 Min 9.400 Sec E
Steep rock outcrop slope.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 30 Date: 22 11 1998 (PERTH 07195761)
LOCALITY Site 16, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 26.500 Sec S LONG 116 Deg 46 Min 42.800 Sec E
Top of rock outcrop on plateau. Spinifex/shrub.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 24 Date: 18 11 1998 (PERTH 07196180)
LOCALITY Site 8, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 48.300 Sec S LONG 116 Deg 46 Min 59.600 Sec E
Top of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 36 Date: 24 11 1998 (PERTH 07195826)
LOCALITY Site 19, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 22.000 Sec S LONG 116 Deg 46 Min 23.600 Sec E
Top of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 38 Date: 26 11 1998 (PERTH 07195885)
LOCALITY Site 20, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 33.300 Sec S LONG 116 Deg 46 Min 23.700 Sec E
Top of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 40 Date: 26 11 1998 (PERTH 07195869)

LOCALITY Site 21, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 4.100 Sec S LONG 116 Deg 46 Min 21.200 Sec E
Top of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: Mrs K. Glennon 306 Date: 12 1986 (PERTH 1061755)
LOCALITY Base hills right hand side Dampier Island, near right hand side of Dampier Salt Ltd lease. WA
LAT 20 Deg 40 Min 0.000 Sec S LONG 116 Deg 42 Min 0.000 Sec E
Low spreading tree to 3 m. Tangled, sometime deciduous. Leaves (especially young
ones and green parts of flowers) silvery silky fine pubescence. Abundant lemon
melaleuca type flowering spikes. Bark grey, weathered and cracked.
White sand at base of shattered volcanic rock hills near beachfront.
Ipomoea costata, Brachychiton ?lanceolate and Ficus virens.
Plants appear very old specimens here. Found only on this island.
Previous det.: Terminalia supranitifolia N. Byrnes

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: Mrs. K. Glennon 316 Date: 05 1983 (PERTH 1155059)
LOCALITY Rear of beach, Hearson Cove WA
LAT 20 Deg 38 Min Sec S LONG 116 Deg 48 Min Sec E
Stunted canopy tree, very gnarled twisted trunk, intricate branches, grey in
colour. Leaves glossy, silvery silky tomentum. Flowers lemon, fruits not winged. Leaves lemon-green colour.
Found at base of rocky hillsides or in this case rocky outcrop at rear of beach.
Associated with Ipomoea costata, Ficus virens, Brachychiton (acuminatum), [???] maritima.
Abundance: uncommon.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: F. Lullfitz s.n. Date: 12 1971 (PERTH 1061798)
LOCALITY 1.8 miles from Dampier on road to Hearson Cove, Nickol Bay WA
LAT 20 Deg 40 Min 0.000 Sec S LONG 116 Deg 42 Min 0.000 Sec E
Small tree 7 feet high, 10 feet across. At base of basalt ridge.
Previous det.: Terminalia discolor

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: B. Hyland 16829 Date: 21 07 2004 (PERTH 07288999)
LOCALITY Near Dampier WA
LAT 20 Deg 40 Min Sec S LONG 116 Deg 45 Min Sec E
Shrub or small tree with flaky bark. Rock pile.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: W.B.E. s.n. Date: 11 03 1983 (PERTH 07469713)
LOCALITY Hearson's cove beach WA
LAT 20 Deg 38 Min Sec S LONG 116 Deg 48 Min Sec E
Small spreading tree 2.5 m. In shelter of Boulders above [HMW]. Calcium soil.
Associated vegetation: Myamorphum sp., and Rhagodia sp.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: W.B.E. s.n. Date: 11 03 1983 (PERTH 07469721)
LOCALITY Hearson's cove beach WA
LAT 20 Deg 38 Min Sec S LONG 116 Deg 48 Min Sec E
Small spreading tree 2.5 m. In shelter of Boulders above [HWM].
Associated vegetation: Myamorphum sp., and Rhagodia sp.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: W.B.E. s.n. Date: 11 03 1983 (PERTH 07469748)
LOCALITY Hearson's cove beach WA
LAT 20 Deg 38 Min Sec S LONG 116 Deg 48 Min Sec E

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: M.I. Blackwell Bp 104 Date: 10 02 1982 (PERTH 07469756)
LOCALITY Burrup Peninsula WA
LAT 20 Deg 47 Min Sec S LONG 116 Deg 46 Min Sec E
A compact spreading small tree to 6 m x 8 m In rock piles. Near Burrow Pitt 8.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: A.S. Weston 10863 Date: 06 12 1978 (PERTH 1061763)
LOCALITY King Bay - Withnell Bay Road, peninsula between Dampier and Dolphin Island. WA
LAT 20 Deg 38 Min 0.000 Sec S LONG 116 Deg 45 Min 0.000 Sec E
Shrub 1.5 m tall, spreading. Leaves pale green. Flowers yellow-green. Rockpiles.
Abundance: common.
Previous det.: Terminalia sp.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 2 Date: 02 11 1998 (PERTH 07195958)
LOCALITY Site 1, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road VIC
LAT 20 Deg 40 Min 13.400 Sec S LONG 116 Deg 45 Min 25.200 Sec E
Base of rockpile.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 42 Date: 28 11 1998 (PERTH 07195923)
LOCALITY Site 5, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA

LAT 20 Deg 40 Min 0.800 Sec S LONG 116 Deg 45 Min 51.800 Sec E
Base of rockpile.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 14 Date: 08 11 1998 (PERTH 07196075)
LOCALITY Site 9, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 5.200 Sec S LONG 116 Deg 47 Min 31.900 Sec E
Base of rockpile.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 3 Date: 02 11 1998 (PERTH 07195966)
LOCALITY Site 2, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 40 Min 6.900 Sec S LONG 116 Deg 45 Min 48.300 Sec E
Mid-slope of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 44 Date: 28 11 1998 (PERTH 07195907)
LOCALITY Site 22, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 34.900 Sec S LONG 116 Deg 46 Min 4.000 Sec E
Mid-slope of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 34 Date: 24 11 1998 (PERTH 07195842)
LOCALITY Site 18, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 15.500 Sec S LONG 116 Deg 46 Min 42.300 Sec E
Rock outcrop terrace, some soil. Spinifex/shrubs

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 6 Date: 03 11 1998 (PERTH 07196040)
LOCALITY Site 3, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 38.600 Sec S LONG 116 Deg 46 Min 18.200 Sec E
Rocky plateau.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 8 Date: 03 11 1998 (PERTH 07196008)
LOCALITY Site 4, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 39 Min 31.300 Sec S LONG 116 Deg 46 Min 30.200 Sec E
Rocky plateau.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 20 Date: 12 11 1998 (PERTH 07196229)
LOCALITY Site 12, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road VIC
LAT 20 Deg 38 Min 29.500 Sec S LONG 116 Deg 47 Min 46.500 Sec E
Rocky plateau.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 18 Date: 10 11 1998 (PERTH 07196091)
LOCALITY Site 11, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road WA
LAT 20 Deg 38 Min 19.000 Sec S LONG 116 Deg 47 Min 37.500 Sec E
Rocky slope.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 22 Date: 15 11 1998 (PERTH 07469764)
LOCALITY Burrup Peninsula, Pistol Ranges, S of Hearson Cove Road WA
LAT 20 Deg 38 Min 9.500 Sec S LONG 116 Deg 47 Min 30.100 Sec E
Top of rock outcrop. Site 13.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 22 Date: 15 11 1998 (PERTH 07196202)
LOCALITY Site 13, Burrup Peninsula, Pistol Ranges, south of Hearson's Cove Road VIC
LAT 20 Deg 38 Min 9.500 Sec S LONG 116 Deg 47 Min 30.100 Sec E
Top of rock outcrop.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 20 Date: 12 11 1998 (PERTH 07469772)
LOCALITY Burrup Peninsula, Pistol Ranges, S of Hearson Cove Road WA
LAT 20 Deg 38 Min 29.500 Sec S LONG 116 Deg 47 Min 46.500 Sec E
Rocky plateau. Site 12.

Terminalia supranitifolia
Byrnes (Combretaceae)
CONSERVATION STATUS:P3
Coll.: D. Rochford 2 Date: 02 11 1998 (PERTH 07469780)
LOCALITY Burrup Peninsula, Pistol Ranges, S of Hearson Cove Road WA
LAT 20 Deg 40 Min 13.400 Sec S LONG 116 Deg 45 Min 25.200 Sec E
Base of rockpile. Site 1.

Themeda sp. Hamersley Station (M.E. Trudgen 11431)
PN (Poaceae)
CONSERVATION STATUS:P3
Coll.: A.A. Mitchell 2664 Date: 20 08 1992 (PERTH 3144909)
LOCALITY 10km W of Karratha on road to Dampier opp & Mile Railway sheds on E side of road WA
LAT 20 Deg 43 Min 45.000 Sec S LONG 116 Deg 45 Min 44.000 Sec E
1.8m tall upright grass bsaes not buried in ground Drainage focus in cracking clay plain

Eragrostis xerophila grassland
Common
Previous det.: Themeda triandra Forssk.

October 24, 2008 Summary of Threatened Flora Data
Total No. of Records = 9
Page 1 of 1

Species Name	Cons.Code	Pop ID	No.Plants	Latitude	Longitude	Purpose	Status Vest
Hibiscus brachysiphonius	3	10		20^45'14.4"	116^45'36.1"	Water	WAT
Stackhousia clementii	1	4		20^37'45.9"	116^47'03.2"	Utilities	PRI
		5	6	20^37'03.4"	116^47'21.8"	Un-allocated Crown land	NON
Terminalia supranitifolia	3	1		20^36'32.4"	116^46'57.3"		UNK
		2		20^39'30.8"	116^44'38.8"		UNK
		3		20^37'37.2"	116^47'57.8"		UNK
		4		20^41'00.0"	116^44'38.8"		UNK
		7A	30	20^37'00.4"	116^47'13.1"	Unknown	DOL
		7B	5	20^36'46.2"	116^47'33.8"	Unknown	DOL

APPENDIX C
EPBC Protected Matters Database Report

APPENDIX D
Species List

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Annex J

Fauna Species Observed on Site

Fauna Species Observed on Site

Species Name	Common Name
Birds	
Phaps chalcoptera	Common Bronze-wing Pigeon
Geopelia cuneata	Diamond Dove
Grallina cyanoleuca	Magpie Lark
Coracina novaehollandiae	Black-faced Cuckoo Shrike
Lichenostomus virescens	Singing Honeyeater
Larus novaehollandiae	Silver Gull
Himantopus himantopus	Black-winged Stilt*
Tringa nebularia	Common Greenshank*
Charadrius ruficapillus	Red-capped Plover*
Egretta garzetta	Little Egret
Sterna caspia	Caspian Tern
Megalurus timoriensis	Tawny Grassbird
Hirundo neoxena	Welcome Swallow
Artamus cinereus	Blackfaced Woodswalow
Hieraaetus morphnoides	Little Eagle*
Merops ornatus	Rainbow Bee-eater*
Egretta novaehollandiae	Whitefaced Heron
Nycticorax caledonicus	Nankeen Night Heron
Malurus lamberti	Variegated Fairy-wren
Actitis Hypoleucos	Common Sandpiper*
Mammals	
Macropus robustus	Euro

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Annex K

Conservation Species

Conservation Species

Table K.1 Consideration of Threatened Species Occurrence within the Study Area

Species Name	Common Name	Conservation Status		Habitat Requirements	Habitat Potential of the Site?
		WC Act	EPBC Act		
Flora					
Stackhousia clementii		P1		Dense broom-like perennial herb, to 0.45 m high. Flowers green, yellow, brown. Occurs on skeletal soils on sandstone hills.	Species has not been previously recorded on the Burrup Peninsula , site does not meet the species habitat requirements
Acacia glaucocaesia		PS		Dense, glabrous shrub or tree, 1.8–6 m high. Fl. yellow, Jul–Sep. Red loam, sandy loam, clay. Floodplains	Species has not been previously recorded on the Burrup Peninsula.
Gymnanthera cunninghamii		P3		Erect shrub, 1–2 m high. Flowers cream, yellow, green from Jan–Dec. Occurs on sandy soils, species records within Karratha area.	Species has previously been recorded on the Burrup Peninsula, however not within Site D or the BFPL Site
Hibiscus brachysiphonius		P3		Procumbent perennial, herb or shrub, 0.1–0.3 m high. Fl. pink, Aug–Oct. Clay. Creeklines, clay flats.	Species has not been previously recorded on the Burrup Peninsula , site does not meet the species habitat requirements
Rhynchosia bungarensis		P3		Compact, prostrate shrub to 0.5 m high. Flowers yellow. Occurs on pebbly, shingly coarse sand amongst boulders. Recorded from Karratha area.	Species has not been previously recorded on the Burrup Peninsula.
Terminalia supranitifolia		P3		Spreading, tangled shrub or tree, 1.5–3 m high. Flowers green, yellow from May–Jul/Dec. Occurs on sand and among basalt rocks. Specimen recorded within Karratha area	Species previously recorded within the BNPL site however species and required habitat not identified within Site D.
Themeda sp. Hammersley Station		P3		Tussocky perennial, grass-like or herb, 0.9–1.8 m high. Fl. Aug. Red clay. Clay pan, grass plain	Species has not been previously recorded on the Burrup Peninsula.
Mammals					
Dasyurus hallucatus	Northern Quoll	S1	E	The northern Quoll is described as being most abundant within rocky eucalypt woodland but is also known from a variety of habitat types, usually within 200 km of the coast where the species dens within tree hollows or rock crevices (Menkhorst & Knight 2001).	Preferred rocky eucalypt habitat not present within the site. Site may form part of broader foraging habitat within the local area.
Mormopterus loriae cobourgiana	Little North-western Mastiff Bat	P1	-	Restricted to mangroves and adjacent vegetation along narrow coastal strip (Menkhorst & Knight 2001). Roost in tree hollows and under loose bark.	No mangroves or potential roosting habitat occurs within the site. Site may form part of broader foraging habitat within the local area.
Macroderma gigas	Ghost Bat	P4	-	Known from Pilbara and Kimberly's in WA. Requires undisturbed roost caves or mine shafts (Menkhorst & Knight 2001).	Roosting habitat not present,. Site may form part of broader foraging habitat within the local area.
Pseudomys chapmani	Western Pebble-mound Mouse, Ngadji	P4	-	Formerly on Burrup Peninsula, now confined to central and east Pilbara. Found on stony Hillsides with hummock grassland.	Nesting sites not recorded within the site and not recorded from trapping program on the BLPL site.. No longer known from Burrup Peninsula
Rhinoicteris aurantius (Pilbara form)	Pilbara Leaf-nosed Bat		V	Colonies of the Pilbara Leaf-nosed Bat are found in three distinct areas: in the mines of the eastern Pilbara; scattered throughout the Hamersley Range in smaller colonies; and in sandstone formations south of the Hamersley Range in a small number of significant colonies. This includes the confirmed roosts of: Bamboo Creek mine, Copper Hills mine, Klondyke Queen mine, Lalla Rookh mine and one cave in Barlee Range; and 16 other likely permanent occurrences. Locations are defined as sites that support a colony, such as a cave or mine	Potential roosting habitat not present, site may provide some foraging habitat.
Birds					
Falco peregrinus	Peregrine Falcon	S4		Nests on cliffs, crevice or large tree hollow. Occurs in a variety of environments including wetlands, plains and timbered watercourses (Pizzey & Knight 1997).	Site represents potential foraging habitat.
Ardeotis australis	Australian Bustard	P4		Grasslands, open shrublands and open scrublands. Species is relatively common away from settled areas (Pizzey & Knight 1997).	Species not previously recorded within the site or adjacent BNPL site.
Burhinus grallarius	Bush Stonecurlew	P4		Open woodland, coastal scrub and mangrove fringes (Pizzey & Knight 1997).	Species not previously recorded within the site or adjacent BNPL site.
Numenius madagascariensis	Eastern Curlew	P4		Tidal mudflats, saltmarses and grasslands near water (Pizzey & Knight 1997).	Site represents potential habitat.
Phaps histrionica	Flock Bronzewing	P4		Flooded claypans, watercourses and treeless grassy plains, nest on the ground by low bush or tussock.	Site represents potential habitat.

		Conservation Status			
Reptiles					
Liasis olivaceus barroni	Pilbara Olive Python	S1	V	The Olive Python is generally found in rocky areas or gorges and especially rocky habitat associated with water courses. Besides taking refuge in caves and rock crevices they also can be found in hollow logs and burrows beneath rocks (Pilbara Pythons, 2008). Radio-telemetry has shown that individuals are usually in close proximity to water and rock outcrops.	Preferred rocky habitats and areas such as gorges, caves and rock crevices are not present within the site with these areas generally occurring approximately 500 metres to the north and extending over much of the Burrup Peninsula. Site may represent pat of the species broader habitat requirements within the local area.
Migratory Bird Species					
EPBC Listed Species			M	Migratory bird species are known to rely on coastal wetland habitats along western Australia as part of their habitat requirements. The Supratidal flat located within the site is considered to provide a potential foraging resource	Supratidal flat is likely to provide an occasional foraging resource for migratory bird species

Annex L

Site Access Approval

Department for Planning and Infrastructure
Government of Western Australia

19 FEB 2009

State Land Services

Your ref:
Our ref: 00129-2009/1 Prompt Job No. 090503
Enquiries: Leanne Shaw Ph: (08) 9347 5037
Fax: (08) 9347 5001
leanne.shaw@dpi.wa.gov.au

17 February 2009

Burrup Nitrates Pty Ltd
Level 8
225 St Georges Terrace
PERTH WA 6000

Attention: Mr Wolfgang Jovanovic

Dear Sir

SECTION 91 LICENCE FOR GEOTECHNICAL, HERITAGE & ENVIRONMENTAL INVESTIGATIONS.

Attached is your Occupation Licence 00129/2009_1_13 (Original and Duplicate) for a period of 12 months commencing from 23 February 2009 onwards. Please note that the following fees and charges are to be paid 30 days from the date of this licence – please refer to conditions 3 and 4.

(1)	Licence fees for 12 months	$2,000.00
(2)	10% GST on licence fees	$ 200.00
(3)	Document preparation fees	$ 100.00
	Total Payable	$2,300.00

Please sign the both copies of the licence (and witness) to confirm your acceptance of Occupation Licence 00129/2009_1_13 and return them to our office with the total fees of $2,300.00. The licence will then be executed by the Minister for Lands under delegation and the duplicate returned for your purposes.

Please contact this office quoting the above reference and job number should you require further information or if you wish to discuss this matter.

Yours sincerely

Leanne Shaw
State Land Officer
State Lands – Kimberley/Pilbara
State Land Services

0503lms02.doc

Government of **Western Australia**
Department for **Planning and Infrastructure**

Licence to Occupy Crown Land

In Accordance with Section 91 of the *Land Administration Act 1997* (WA)

Licence Number Lic 00129/2009_1__13

TABLE OF CONTENTS

THIS DEED OF LICENCE is made on the day of

BETWEEN

THE STATE OF WESTERN AUSTRALIA ACTING THROUGH THE MINISTER FOR LANDS, a body corporate under the *Land Administration Act 1997*, care of Department Planning and Infrastructure, 1 Midland Square, MIDLAND, WA 6056 (**Licensor**)

AND

BURRUP NITRATES PTY LTD care of Level 8. 225 St Georges Terrace, PERTH, WA 6000 (**Licensee**).

BACKGROUND

A. The Licence Area is a portion of Crown land. Crown land is administered by the Minister through the Department on behalf of the State of Western Australia.

B. The Licensee wishes to have access to the Licence Area for the Permitted Use.

C. The Minister on behalf of the State of Western Australia is authorised by section 91 of the LAA to grant a licence of Crown land for any purpose.

D. The Licensor has agreed to grant to the Licensee the Licence in respect of the Licence Area on the terms and conditions and for the Permitted Use set out in this Licence.

OPERATIVE PART

The Parties covenant and agree on the matters set out above and as follows:

---

1. DEFINITIONS AND INTERPRETATION

1.1 DEFINITIONS

In this Licence the following terms shall have the following meaning:

Authorisation includes consents, authorisation, permit, licence, approval, agreement, certificate, authority or exemption from, by or with a Governmental Agency and all conditions attached to those authorisations.

Business Day means a day other than a Saturday, Sunday or Public Holiday in Western Australia.

Contamination is the state of being contaminated as that term is defined in the *Contaminated Sites Act 2003(WA)*.

CSA means the *Contaminated Sites Act 2003*.

Date of Commencement means the date of commencement specified in item 2(b) of the Schedule.

Date of Expiry means the date of expiry specified in item 2(c) of the Schedule.

Department means the department principally assisting the Minister in the administration of the LAA being at the Date of Commencement, the Department for Planning and Infrastructure.

Environment has the meaning given by section 3 of the *Environment Protection Act 1986.*

Environmental Harm has the same meaning as that term is defined in the *Environmental Protection Act 1986.*

Environmental Law means all planning, environmental, contamination or pollution laws and any regulations, orders, directions, ordinances or all requirements, permission, permits or licences issued thereunder.

Environmental Notice means any notice, direction, order, demand or other requirement to take any action or refrain from taking any action from any Governmental Agency, whether written or oral and in connection with any Environmental Law.

Further Term means the further term, if any, specified in item 6 of the Schedule.

Governmental Agency means any government or any governmental, semi-governmental, administrative, fiscal or judicial body, department, commission, authority, tribunal, agency or entity.

LAA means the *Land Administration Act 1997.*

Law includes any requirement of any statute, regulation, proclamation, ordinance or by-law present or future whether State, Federal or otherwise.

Licence means the contractual rights granted to the Licensee under clause 2 and the rights granted under this Licence necessary for the exercise of the rights granted under clause 2.

Licence Area means the licence area specified in item 1 of the Schedule.

Licence Fee means the licence fee specified in item 3(a) of the Schedule.

Licensee's Agent includes the employees, agents, contractors, consultants, invitees and any other person acting with the authority of the Licensee.

Licensee's Property means all plant, equipment, structures, materials, and other property brought, placed or erected on the Licence Area by, on behalf of or with the authority of the Licensee, including any temporary site accommodation, excavation materials, fencing, and services equipment or facilities.

Minister means the Minister for Lands, a body corporate under section 7(1) of the LAA.

Parties mean the Licensor and the Licensee.

Party means the Licensor or the Licensee, as the case may be.

Permitted Use has the meaning given to this term in clause 2.1.

Pollution means any thing that is Pollution within the meaning of the *Environmental Protection Act 1986*, which is not authorised under any Law.

Schedule means the Schedule to this Licence.

Services includes water supply, gas, sewerage, waste disposal, drainage, electricity, gas retractation and telecommunications facilities and all pipes, cables, fixtures and fittings associated with those services.

Surrounding Area means any land or water adjacent to or in the vicinity of the Licence Area and the air generally above the Licence Area, and includes an affected site within the meaning of that term as defined in the CSA.

Term means the term specified in item 2(a) of the Schedule.

1.2 INTERPRETATION

In this agreement:

(a) clause headings are for convenient reference only and shall have no effect in limiting or extending the language of the provisions to which they refer;

(b) a reference to a clause, schedule or annexure is a reference to a clause of or schedule or annexure to the document in which the reference appears;

(c) a reference to any Law includes consolidations, amendments, re-enactments or replacements of it;

(d) the singular includes the plural, the plural includes the singular and any gender includes each other gender;

(e) if a period of time is specified and runs from a given day or the day of an act or event, it is to be calculated exclusive of that day;

(f) the word 'person' includes a reference to the person's personal representatives, executors, administrators, successors and assigns and a reference to a corporation includes a reference to the corporations successors and assigns;

(g) covenants by this deed by two or more persons shall be deemed joint and several;

(h) a reference to the word "including" is deemed to be followed by the words "but not limited to".

2. GRANT OF LICENCE

2.1 GRANT OF LICENCE

In consideration of the matters set out in this Licence and the payment of the Licence Fee by the Licensee to the Licensor, the Licensor hereby GRANTS to the Licensee a non-exclusive right for the Term to enter upon and remain on and use the Licence Area, with such vehicles, machinery, plant or equipment as is reasonably necessary for the purpose of:

(a) Geotechnical, heritage & environmental investigation

(the **Permitted Use)** in accordance with the terms and conditions set out in this Licence.

2.2 NO ESTATE OR INTEREST IN LAND

The Licensee acknowledges and agrees that:

(a) The rights conferred by this Licence rest in contract only and do not create in or confer upon the Licensee any tenancy or any estate or interest in or over the Licence Area and the rights of the Licensee will be those of a licensee only.

(b) This Licence confers no right of exclusive occupation of the Licence Area upon the Licensee and the Licensor may at any time and at all times from time to time exercise all the Licensor's rights as licensor including (but without in any way limiting the generality of this provision) the Licensor's rights to use possess and enjoy the whole or any part of the same save only in so far as such rights shall unreasonably:

(i) prevent the operation of the rights granted to the Licensee under this Licence; or

(ii) be inconsistent with the express provisions of this Licence.

(c) The rights granted to the Licensee under this Licence are only exercisable during the Term.

2.3 COMPLY WITH LAWS AND ORDERS

(a) The Licensee shall punctually comply with and observe, at the expense of the Licensee, all Laws and all lawful orders and requirements of any statutory, public or other Governmental Agency which relates to the Licence Area or any part of it, or the use or occupancy of the Licence Area, and with all lawful notices received either by the Licensor or the Licensee from any such Governmental Agency.

(b) Without limiting the generality of this clause, the Licensee will obtain, comply with and observe, at the expense of the Licensee, all Authorisations or other requirements under any Law necessary to use the Licence Area for the Permitted Use.

3. TERM AND LICENCE FEE

3.1 TERM

The Term shall commence on the Date of Commencement and shall expire at the Date of Expiry.

3.2 FURTHER TERM

Any application for a Further Term or extension of the rights granted to the Licensee under this Licence must be made to the Licensor, in writing no less than 30 days prior to the expiration of this Licence and may be granted or refused at the Licensor's absolute discretion.

3.3 LICENCE FEE

The Licensee must pay the Licence Fee to the Department, at the times and in the manner specified in item 3 of the Schedule.

4. LICENSEE'S COVENANTS

4.1 COVENANTS WITH LICENSOR

The Licensee covenants with the Licensor that the Licensee and the Licensee's Agents:

(a) must not construct or erect or permit to be constructed or erected any permanent structure, improvement or fixture or fence on the Licence Area;

(b) must not cause or permit any damage to the Licence Area or to the Surrounding Area;

(c) must not cause or permit any Contamination, Pollution or Environmental Harm to occur in, on or under the Licence Area or to the Surrounding Area, and if any Contamination, Pollution or Environmental Harm is caused by the Licensee or the Licensee's Agents, the Licensee must minimise and remediate any resultant damage and harm to the reasonable satisfaction of the Licensor;

(d) must keep the Licence Area in good and safe repair and condition, and must take all steps necessary to keep it safe and free from hazard to any property or person on or using the Licence Area or the Surrounding Area, and where required must keep secure the Licence Area;

(e) must ensure that traffic on all adjoining and surrounding roads is not unduly disrupted due to vehicles entering or leaving the Licence Area;

(f) must, while using the Licence Area:

(i) ensure the safe movement of pedestrians using the Licence Area or adjoining areas, including erecting signs to warn persons likely to be endangered by the Licensee's use of the Licence Area, and

(ii) ensure that pedestrians using the Licence Area or adjoining areas are not unduly disrupted;

(g) must not dispose and not store on the Licence Area any rubbish or any poisonous, toxic or hazardous substance;

(h) must not undertake nor allow to be undertaken any excavation of the Licence Area;

(i) must pay all outgoings payable in respect of the Licence Area;

(j) must punctually comply with and observe:

(i) all Laws; and

(ii) all notices received either by the Licensor or the Licensee from, and the requirements of, any relevant Governmental Agency;

(k) must obtain, keep current and comply with all consents, approvals permits, licences or other requirements under any Law, if any, to use the Licence Area for the purposes permitted under this Licence;

(l) must repair or remedy any damage caused or permitted by the Licensee or the Licensee's Agents, to the Licence Area or the Surrounding Area, Services in, on, under or over the Licence Area or improvements, including remediating any Contamination, Pollution, Environmental Harm, and erosion or other form of degradation; and

(m) must reinstate the Licence Area on the expiration of the Term or other termination of this Licence, in accordance with clause 7.

5. INDEMNITY, RELEASE AND INSURANCE

5.1 INDEMNITY AND RELEASE

(a) The Licensee hereby releases and indemnifies and agrees to keep released and indemnified the Licensor, the State, the Crown, all Ministers of the Crown, and all officers, servants, agents contractors invitees and licensees of any of them (the **Indemnified Parties)** from and against all claims, demands, actions, suits, proceedings, judgments, damages, costs, charges, expenses (including legal costs of defending or settling any action, claim or proceeding) and losses of any nature whatsoever whether based in contract, tort or statute or any combination thereof which the Indemnified Parties (or any of them) may suffer or incur or which may at any time be brought maintained or made against them (or any of them) in respect of or in connection with:

(i) in respect of any destruction, loss (including loss of use), injury or damage of any nature or kind of or to property of any person whether or not on the Licence Area and including the property of:

(A) any of the Indemnified Parties; or

(B) the Licensee or the Licensee's Agents; and

(ii) in respect of any death of, or injury or illness sustained by, any person and including:

(A) the Indemnified Parties; or

(B) the Licensee or the Licensee's Agents,

directly or indirectly caused by arising out of or in connection with:

(1) the Licensee's or Licensee's Agents use or enjoyment of the Licence Area or any part of the Licence Area pursuant to the terms of this Licence;

(2) any works carried out by or on behalf of the Licensee under this License;

(3) the exercise or enjoyment of any rights conferred upon the Licensee under this Licence;

(4) any Contamination , Pollution or Environmental Harm caused or contributed to by the Licensee or the Licensee's Agents of the Licence Area or the Surrounding Area;

(5) any remediation required in respect of the Licence Area or the Surrounding Area or otherwise having to comply with any Environmental notice or any other notice received from any Governmental Agency;

(6) any default by the Licensee in the due and punctual performance, observance and compliance with any of the Licensee's covenants or obligations under this Licence; or

(7) any other act, neglect, default or omission by the Licensee or the Licensee's Agents.

(b) The obligations of the Licensee under this clause:

(i) are unaffected by the obligation of the Licensee to take out insurance and the obligations of the Licensee to indemnify are paramount; and

(ii) continue after the expiration or earlier determination of this Licence.

5.2 INSURANCE

(a) The Licensee must during the Term effect, maintain and keep current with an insurer approved by the Licensor, a public liability insurance policy for the amount specified in item 7 of the Schedule for any one claim (or any other amount reasonably required by the Licensor from time to time consistent with usual

prudent commercial practice) and which policy includes, but is not limited to, coverage in respect of:

(i) any injury to, illness of, or death of, any person;

(ii) any loss, damage or destruction to any property including to the property of any of the Indemnified Parties;

(iii) the loss of use of any property, including the property of any of the Indemnified Parties;

(iv) liability arising out of any Contamination Pollution or Environmental Harm of the Licence Area or the Surrounding Area; and

(v) any claims, risk and events covered under the indemnities provided by the Licensee to the Licensor under this Licence,

and such insurance shall include the interests of the Licensor under this Licence.

(b) The Licensee must give to the Licensor a copy of the policy of insurance referred to in sub-clause (a) at the Date of Commencement and the Licensee is to submit evidence to the Licensor on each anniversary of the Date of Commencement during the Term, or as otherwise requested by the Licensor, which shows that the insurance policy referred to is still current.

(c) The Licensee shall effect and maintain all insurance required to be effected by it by law. Without limiting the generality hereof, the Licensee shall have all necessary insurance with respect to its employees under the relevant Laws and shall, if required by the Licensor, produce evidence of such insurance at any time.

(d) The Licensee will not do or omit to do any act or thing or bring onto or keep anything on the Licence Area which might render the insurance on the Licence Area void or voidable.

6. TERMINATION OF LICENCE

6.1 DEFAULT

(a) This Licence and the rights granted to the Licensee pursuant to it, may be terminated by the Licensor by notice in writing to the Licensee:

(i) if moneys payable under this deed are in arrears and unpaid for 14 days after formal demand;

(ii) if the Licensee breaches or fails to observe any of the covenants, conditions or terms on the Licensee's part expressed or implied in this deed, other than the obligation referred to in sub-clause (i) and the breach has not been remedied by the Licensee within 14 days after service of a notice from the Licensor requiring the Licensee to remedy the breach or non observance;

(iii) if the Licensee:

(A) being a corporation, goes into compulsory or voluntary liquidation;

(B) enters into any composition with its creditors; or

(C) has execution issued against it,

and this Licence and rights granted pursuant to it will terminate on expiry of the notice period specified in the notice.

(b) No compensation or money is payable to, or recoverable by, the Licensee from the Licensor for termination of the Licence under this clause.

(c) Any termination of the Licence under this clause:

(i) does not affect any rights and obligations that are expressed in this Licence to survive expiry or earlier termination of this Licence; and

(ii) is without prejudice to the rights of the Licensor in respect of any antecedent breach of the terms, covenants or conditions contained or implied in this Licence by the Licensee.

6.2 LICENSOR'S RIGHT TO ENTER AND TO REMEDY

(a) If the Licensee has breached or failed to observe any of the terms of this Licence on its part contained or implied in this Licence, and that breach or non-performance has continued for at least 14 days after the service of a written notice on the Licensee requiring it to remedy the same, without affecting its other rights under this deed, the Licensor may (but is not obliged to) remedy the breach, including the payment of monies.

(b) For this purpose, the Licensee acknowledges and agrees that:

(i) the Licensor, its servants, agents and contractors may enter the Licence Area at any time with all necessary materials and equipment to execute all or any required works as the Licensor thinks fit; and

(ii) all debts costs and expenses incurred by the Licensor, including legal costs and expenses, in remedying a default is a debt due to the Licensor, and must be paid by the Licensee to the Licensor on demand.

---

7. REMOVAL OF PROPERTY ON EXPIRY OR TERMINATION

7.1 OBLIGATION TO REMOVE PROPERTY AND RESTORE

(a) The Licensee must upon the expiration of the Term or earlier termination of this Licence yield and deliver up possession of the Licence Area to the Licensor and in doing so must by the end of the Term or within 21 days after the earlier termination of this Licence:

(i) remove all of the Licensee's Property from the Licence Area, to the Licensor's absolute satisfaction;

(ii) reinstate the Licence Area to the state and condition in which it was at the Date of Commencement;

(iii) promptly make good to the satisfaction of the Licensor any damage caused by the removal of the Licensee's Property referred to in sub-clause (a)(i), including filling in, consolidating and levelling off any holes or trenches on the Licence Area and paving or resurfacing the Licence Area to the Licensor's satisfaction; and

(iv) remediate any Contamination, Pollution or Environmental Harm to the Licence Area or the Surrounding Area caused by the Licensee or the Licensee's Agents or arising out of the Permitted Use.

(b) The Licensee's obligations under sub-clause (a) will survive the expiration of the Term or other termination of this Licence.

7.2 FAILURE TO REMOVE

If the Licensee's Property is not removed in accordance with clause 7.1, its presence on the Licence Area after the expiry of the relevant period referred to in clause 7.1(a) shall no longer be authorised by this Licence and:

(a) the Minister may treat any structure forming part of the Licensee's Property as an alleged unauthorised structure under section 270 of the LAA;

(b) sections 270, 271 and 272 of the LAA apply with respect to the removal of any such alleged unauthorised structure;

(c) the Minister may, but is not obliged to, remove the Licensee's Property from the Licence Area, may store it at the Licensee's expense, and may make good any damage caused by that removal, and may reinstate the Licence Area to the condition provided for in clause 7.1(a)(ii); and

(d) any costs incurred by the Minister in doing any matter under sub-clause (c) or section 270(6) of the LAA, are a debt due by the Licensee to the Licensor and may be recovered in a Court of competent jurisdiction.

---

8. NO ASSIGNMENT

(a) The rights granted by this Licence are for the benefit of the party named as "Licensee" in this Licence.

(b) The Licensee must not:

(i) assign or transfer its rights under this deed, or grant any sublicence or part with the possession, of the Licence Area, to any person; or

(ii) mortgage, charge or encumber its rights under this Licence.

(c) To the extent that sections 80 and 82 of the *Property Law Act 1969* may be applicable, they are expressly excluded.

(d) For the purposes of sub-clause (b), where the Licensee is a corporation (not being a corporation where shares are listed on any Stock Exchange in Australia) any intended change in the beneficial ownership or control of the Licensee which will have the consequence of altering the effective control of the Licensee is deemed to be an assignment of the Licensee's rights under this Licence.

9. GENERAL PROVISIONS

9.1 COSTS AND STAMP DUTY

The Licensee will pay stamp duty (if any) assessed on this Licence and any copies of it.

9.2 FEES AND CHARGES

The Licensee will pay all statutory and other fees and charges (if any) relating to this Licence within 30 days of the due date.

9.3 NOTICES

(a) Any notice that must or may be served under or pursuant to this Licence may be signed by the Party giving the notice or by any solicitor or duly appointed representative of the Party giving the notice, and will be sufficiently served on the Party if:

(i) left at the address or forwarded to the Party by registered post to the address; or

(ii) sent by facsimile transmission to the facsimile number,

specified in item 6 of the Schedule (in the case of a notice being given to the Licensor) or in item 7 of the Schedule (in the case of a notice being given to the Licensee), or such other address as is notified by the Party to the other Party during the Term.

(b) A notice sent by post will be deemed to be given at the time when it ought to be delivered in the ordinary course of a post whether the contrary is shown or not.

(c) A notice given by facsimile transmission will be deemed to have been given on the date on which the facsimile transmission report of the machine from which it was sent, shows that it was successfully transmitted in its entirety.

9.4 BREAK CLAUSE

The Licensor shall be at liberty at any time during the Term to terminate this Licence by giving the Licensee 30 days notice in writing of its intention to so terminate and upon the expiration of such notice period this Licence will terminate, but without affecting any obligations which accrued before the date of such termination, or that are stated to survive expiry or earlier termination of this Licence.

9.5 EFFECT OF WAIVER

No consent or waiver express or implied by the Licensor or its officers, servants, agents, contractors or any of them, to or of any breach of any covenants conditions or stipulations of the Licensee will be construed as a consent or waiver to or of any other breach of the same or any other covenants conditions or stipulations contained or implied in this Licence.

9.6 GOVERNING LAW

(a) This Licence shall be construed and interpreted in accordance with the laws in force in the State of Western Australia.

(b) The Parties submit to the non-exclusive jurisdiction of the Courts of Western Australia.

9.7 VARIATION

This Licence cannot be altered or varied by the Parties except by deed.

---

10. GOODS AND SERVICES TAX

10.1 DEFINITIONS

In this clause the following terms have the following meanings:

(a) **GST Act** means a *New Tax System (Goods and Services Tax) Act 1999* and any legislation substituted for or amending that Act;

(b) The terms **GST**, **GST law**, **Tax Invoice** and **Taxable Supply** have the meaning given in section 195-1 of the GST Act.

10.2 LICENCE FEE EXCLUSIVE OF GST

The Licence Fee and any other amounts payable by the Licensee to the Licensor, under this Licence, are exclusive of GST.

10.3 LICENSEE TO PAY GST

The Licensee must pay additional to the Licence Fee and any other amounts payable by the Licensee, any GST payable by the Licensor in respect of a Taxable Supply made under this Licence.

10.4 VARIATION OF GST

Where GST is payable, the amount payable will be the amount specified in the Schedule to this Licence, until varied from time to time consequent upon each review of Licence Fee in accordance with this Licence.

10.5 TAX INVOICE

Where GST is payable, the Licensor will provide to the Licensee, a Tax Invoice in the format and form required as set out in the GST law.

10.6 NOTIFICATION IS CONCLUSIVE

A written notification given to the Licensee by the Licensor of the amount of GST that the Licensor is liable to pay on a Taxable Supply made or to be made under this Licence is conclusive between the Parties except in the case of an obvious error.

10.7 TIME FOR PAYMENT

The Licensee must pay to the Licensor the amount of the GST that the Licensee is liable to pay under this Licence:

(a) at the same time; and

(b) in the same manner,

as the Licensee is obliged to pay for the Taxable Supply.

10.8 APPORTIONMENT OF GST

Where a Taxable Supply is not separately supplied to the Licensee, the liability of the Licensee for any amount for GST, in relation to that Taxable Supply, is determined on the same basis as the Licensee's proportion of that Taxable Supply is determined.

SCHEDULE

ITEM	TERM	DEFINITION
1.	**Licence Area**	Lots 3017 & 3018 on Deposited Plan 50979
2.	**(a) Term**	Twelve (12) months
	(b) Date of Commencement	23rd February 2009
	(c) Date of Expiry	22nd February 2010
3.	**(a) Licence Fee**	$2,000.00
	(b) GST Amount	$200.00
	(c) Payment Date	30 days after the date of commencement
4.	**Licensor's Address for Service of Notices**	Minister for Lands C/- Department for Planning & Infrastructure State Land Services 1 Midland Square MIDLAND WA 6056 Attention: Manager, Kimberley/Pilbara Region
	Facsimile No:	(08) 9347 5001
5.	**Licensee's Address for Service of Notices**	Burrup Nitrates Pty Ltd Level 8 225 St Georges Terrace PERTH WA 6000
	Facsimile No:	(08) 9327 8199
6.	**Further Term**	Not applicable
7.	**Insurance**	$10,000,000.00

EXECUTED AS A DEED on the date set out on page 3 at the commencement of this Licence.

SIGNED FOR AND ON BEHALF OF THE STATE OF WESTERN AUSTRALIA by an authorised officer for and on behalf of the Minister for Lands by delegation under section 9 of the Land Administration Act 1997 in the presence of:)

.....
Department for Planning and Infrastructure Officer

.....
Name of Witness

.....
Address of Witness

.....
Address (continued)

.....
Occupation of Witness

THE COMMON SEAL OF BURRUP NITRATES PTY LTD was hereunto affixed in the presence of)

.....
Signature of Director

.....
Print full name of Director

.....
Signature of Director/Secretary

.....
Print full name of Director/Secretary

Annex M

DIA Aboriginal Heritage Search

Search Criteria

13 sites in a search polygon. The polygon is formed by these points (in order):

MGA Zone 50	
Northing	Easting
7719713	477660
7719628	478479
7718500	478116
7718348	477660

Disclaimer

Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

Copyright

Legend

Restriction

N	No restriction
M	Male access only
F	Female access

Access

C	Closed
O	Open
V	Vulnerable

Coordinate Accuracy

Accuracy is shown as a code in brackets following the site coordinates.

[Reliable]	The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
[Unreliable	The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

Status

L	Lodged
I	Insufficient Information
P	Permanent register
S	Stored data

IR	Insufficient Information (as assessed by Site Assessment Group)
PR	Permanent register (as assessed by Site Assessment Group)
SR	Stored data (as assessed by Site Assessment Group)

Site Assessment Group (SAG)

Sites lodged with the Department are assessed under the direction of the Registrar of Aboriginal Sites. These are not to be considered the final assessment.

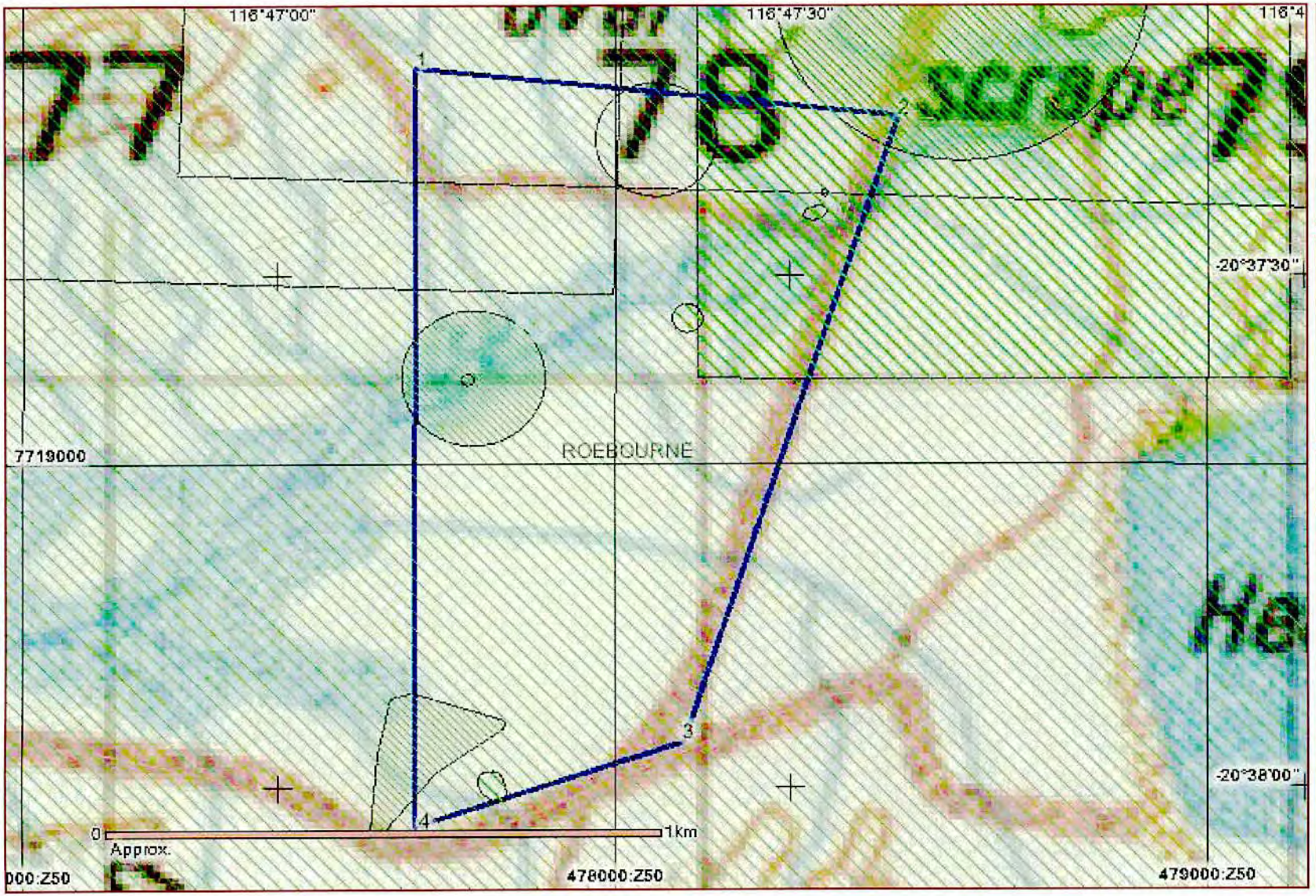
Final assessment will be determined by the Aboriginal Cultural Material Committee (ACMC).

Spatial Accuracy

Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code "closed" or "vulnerable". Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
9639	P	O	N	Grinding Stone Site	Artefacts / Scatter			478339mE 7719453mN Zone 50 [Reliable]	P02572
9764	I	O	N	Hearson Cove Road 2	Artefacts / Scatter			477791mE 7718420mN Zone 50 [Reliable]	P02421
10573	I	O	N	King Bay Coastal Flat	Artefacts / Scatter			477749mE 7719152mN Zone 50 [Reliable]	P01625
11722	P	O	N	Hearsons Cove	Engraving			478639mE 7719655mN Zone 50 [Unreliable]	P00427
19212	L	O	N	Drd 112	Engraving		*Registered Informant names available from DIA.	478069mE 7719585mN Zone 50 [Reliable]	
19226	L	O	N	Drd 126	Artefacts / Scatter		*Registered Informant names available from DIA.	477759mE 7719155mN Zone 50 [Reliable]	
19473	P	O	N	Petroglyph Site 11	Engraving		*Registered Informant names available from DIA.	478584mE 7719862mN Zone 50 [Reliable]	
20098	L	O	N	Burrup Service Corridor 67	Artefacts / Scatter	Shell		477698mE 7718458mN Zone 50 [Reliable]	
20896	L	C	M	Bf / Fs 03-3	Engraving		*Registered Informant names available from DIA.	Not available for closed sites	
23263	L	O	N	Wgd 01 (Woodside Pluto Survey Area D)	Artefacts / Scatter	[Other: Knapping floor]	*Registered Informant names available from DIA.	478122mE 7719263mN Zone 50 [Reliable]	
23264	L	O	N	Wgd 02 (Woodside Pluto Survey Area D)	Grinding patches / grooves		*Registered Informant names available from DIA.	478355mE 7719489mN Zone 50 [Reliable]	

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
23323	I	C	N	Burrup Peninsula, Murujuga	Ceremonial, Mythological, Skeletal material/Burial, Man-Made Structure, Fish Trap, Modified Tree, Engraving, Quarry, Artefacts / Scatter, Midden / Scatter, Historical, Grinding patches / grooves	Archeological Deposit, Massacre, Meeting Place, Plant Resource, Camp, Shell, Hunting Place, Named Place, Rockshelter, Natural Feature, Water Source	*Registered Informant names available from DIA.	Not available for closed sites	
23383	P	C	M	Woodside Pluto Area B 3	Man-Made Structure		*Registered Informant names available from DIA.	Not available for closed sites	



Legend

- Highlighted Area
- Town
- Map Area
- Search Area

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Annex N

TANPF Air Quality Report

FINAL REPORT

Burrup Nitrates Pty Ltd

Technical Ammonium Nitrate Plant
Air Quality Assessment

December 2009

Environmental Resources Management Australia
Level 3, Yarra Tower (WTC)
18-38 Siddeley Street, DOCKLANDS VIC 3005
AUSTRALIA
Telephone +61 3 9696 8011
Facsimile +61 3 9696 8022
www.erm.com

FINAL REPORT

Burrup Nitrates Pty Ltd

Technical Ammonium Nitrate Plant
Air Quality Assessment

December 2009

Reference: 0086269RP02-AQ

For and on behalf of Environmental Resources Management Australia
Approved by: _____
Signed: _____
Position: _____
Date _____

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1 INTRODUCTION

1.1 OVERVIEW

Burrup Nitrates Pty Ltd (BNPL) proposes to design, construct and operate a 350,000 tonnes per annum (TPA) Technical Ammonium Nitrate Production Facility (TANPF) within the King Bay/Hearson Cove Industrial Precinct on the Burrup Peninsula, Western Australia, approximately 13km north-west of Karratha *(Figures 2.1)*.

The proposed TANPF will be owned by BNPL, a joint-venture between Burrup Holdings Ltd (BHL) and Yara International ASA (Yara), with Yara managing the design, construction and commissioning of the project. The TANPF will be operated by BHL.

This Air Quality Assessment forms part of the Public Environmental Review (PER) for the proposed TANPF. The PER has been prepared in response to the environmental assessment and approval requirements of both the Commonwealth and Western Australian applicable legislation (*Environment Protection and Biodiversity Conservation Act 1999* and *WA Environmental Protection Act 1986*).

During operation of the TANPF, atmospheric emissions of Oxides of Nitrogen (NO_x) and ammonia will primarily occur. These air emissions have potential regional and local impacts. Regional impacts are those encountered from several kilometres to several hundred kilometres of the source. Potential regional impacts could be related to gases such as NO_x that react at ground level or sea level to form ozone. Local effects are related to health, e.g. due to an increase in exposure within the TANPF.

BNPL is proposing to employ the latest production technology, resulting in reduced emissions over similar ammonium nitrate facilities currently operating throughout the world. Use of the latest process technology has eliminated many emission sources except combustion of natural gas for power generation, nitric acid production and storage and solidification of ammonium nitrate in the prilling tower.

1.2 OBJECTIVES

The air quality assessment has the following key objectives:

- Assess the significance of predicted air emissions from the TANPF and whether comprehensive plume dispersion modelling is warranted; and
- Assess the health (National Environment Protection Measures {NEPM} Occupational) and environmental impact (ambient air quality) of predicted air emissions from the TANPF.

Assessment of air emissions significance and impacts is based on the criteria outlined in the NEPM (Ambient Air) 2003.

1.3 APPROACH

In order to determine the significance of predicted air emissions from the TANPF, a conservative "worst case" screening analyses has been undertaken using simple calculations and plume dispersion modelling computations.

The screening approach adopted is consistent with the Department of Environment and Conservation (DEC) *Air Quality and Air Pollution Modelling Guidance Notes* (DEC, 2006b), and EPA Guidance Statement No. 18 *Prevention of air quality impacts from land development sites* (EPA, 2000).

2 SITE AND PROCESS DESCRIPTION

2.1 SITE LOCATION

The proposed TANPF will be located at Site D (the Site) within the King Bay/Hearson Cove Industrial Precinct, approximately 13 km north-west of Karratha and 1,300 km north of Perth (*Figure 2.1*). The King Bay/Hearson Cove Industrial Precinct is within the greater Burrup Industrial Estate, which consists of 1,400 Hectares (Ha) of industrial land on the Burrup Peninsula, Western Australia.

The Site is adjacent to the existing Burrup Fertilisers Pty Ltd (BFPL) ammonia plant, with site access from Village Road, Burrup Peninsula.

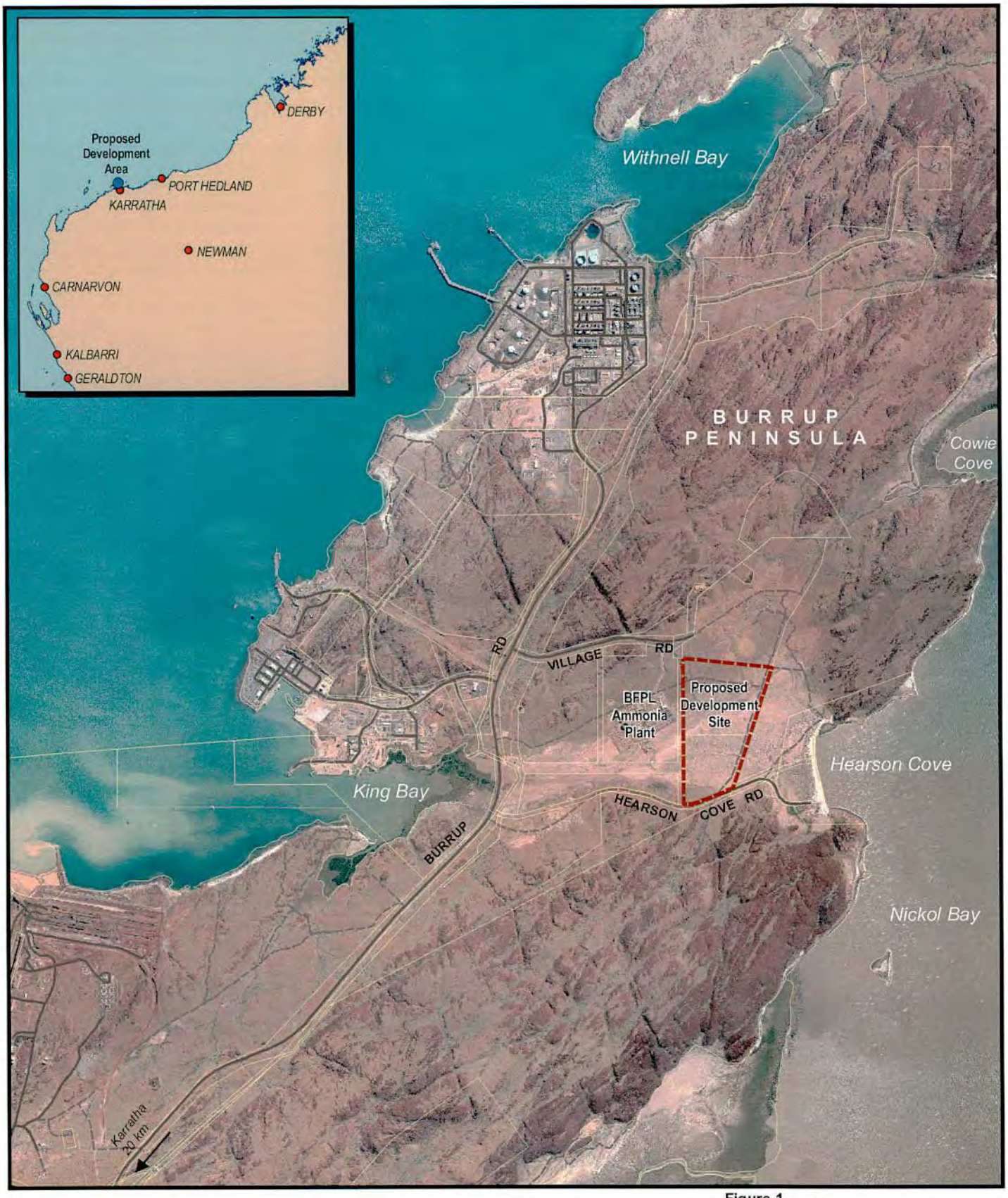
2.2 PROCESS DESCRIPTION

The proposed TANPF will manufacture and supply Technical Ammonium Nitrate (TAN), the main raw material for the production of porous Ammonium Nitrate and Fuel Oil (ANFO), which is the most used civil explosive currently on the market. TAN will be transported to the local mining market in the Pilbara region of Western Australia (WA) by truck.

Liquid ammonia will be the main input to the proposed TANPF, which will be transferred by pipeline from the adjacent BFPL ammonia plant.

TAN will be stored in a bagged product storage facility and a bulk storage facility. The former is envisaged to have a storage capacity of 1,800 Mega tonnes (MT) while the latter will have a capacity of 12,000 MT.

Construction is planned to commence after all relevant government approvals have been received with an associated construction period of approximately two (2) years. The minimum operational lifetime of the TANPF is 20 years.



Legend

Site D Boundary

Figure 1

Location of TANPF

Client:	Burrup Nitrates Pty Ltd		
Project:	PER		
Drawing No:	0086269p_GIS01_PER	Suffix No:	R0
Date:	21/10/2009	Drawing size:	A4
Drawn by:	DD	Reviewed by:	BC
Source:	Base information LANDGATE		
Scale:	1:50 000		

N

0 500 1,000 1,500m

Environmental Resources Management Australia Pty Ltd
6th Floor, 172 St Georges Tce, Perth, WA, 6000
Telephone +61 9 321 5200

ERM

2.2.1 *Key Project Components*

Nitric Acid Plant

The following outlines the various unit operations and processes within the proposed Nitric Acid plant.

Ammonia / Air Pretreatment

Air is initially filtered in a two-stage filter system. This is followed by compression in a compressor that does not require any inter-stage cooling. The compressed air is then split into two streams with the primary air going to the ammonia burner, whilst the secondary air stream is sent to the nitric acid bleacher.

Liquid ammonia feed is evaporated, superheated (using steam) and filtered to remove impurities. The superheated ammonia is then injected into the primary air and mixed before being fed to the ammonia burner.

Nitric Acid Synthesis

The compressed air/ammonia mixture enters the burner and passes through a gas distribution system. At the platinum gauzes, ammonia is combusted to Nitrogen Oxide (NO) at a temperature around 890 to 900 °C.

In the downstream piping and equipment, NO is oxidised to Nitrogen Dioxide (NO_2) generating additional heat that is used in the heat recovery network.

The gas is cooled down further and condensed, forming nitric acid with around 40% by weight in the weak acid condenser. The acid is then separated from the process gas and pumped to the appropriate tray in the absorption tower.

The process gas is compressed to the selected absorption pressure. The compressed gas is used to heat the tail gas. In the absorption tower, Nitrogen Oxide (NOx) gases are absorbed into water to form NA. The gas leaving the absorber (tailgas) is expected to have a NOx content of approximately 400 ppm, depending on pressure and chilled water temperatures.

The tailgas will then enter the EnviNOx reactor (N_2O/NOx reduction unit with catalyst). This reduction unit utilises Best Available Technology (BAT), and the tailgas vented to the atmosphere from the TANPF will comply with statutory requirements and environmental guidelines.

After the EnviNOx reactor the tailgas will enter the tailgas turbine where it is expanded to recover 70% of the power demand for the compressor train.

The acid concentration will be optimized to match the ammonium nitrate plant requirements, but will be approximately 60% by weight. Heat generated from the acid production operation is removed into the chilled water and sweet water cooling loops.

Ammonium Nitrate Solution Plant

The following is an overview of the ammonium nitrate solution plant process.

Ammonium Nitrate Synthesis

Super-heated gaseous ammonia at about 90 °C and pre-heated liquid nitric acid (approximately 60% weight) at about 65 °C are injected into the bottom part of a forced circulation neutralizer operating at pressure. The reaction is exothermic in nature and requires good control of feeds. The molar ratios of reactants are controlled automatically. Nitric acid flow controls the main flow of ammonia.

The circulating stream leaving the neutralizer enters a cyclone separator operating under slight vacuum providing flash evaporation of the solution giving a concentration of about 93% weight. The temperature rise in the neutraliser will be limited to 145 °C.

Technical Ammonium Nitrate Prilling Plant

In order to generate products of the specified properties, a number of unit operations and processes are required, as described herein.

Ammonium Nitrate Solution Concentration

The ammonium nitrate solution from the neutraliser is sent to a falling film evaporator that operates under vacuum. Evaporation ultimately results in a product concentration up to 96.5% weight ammonium nitrate.

Additive Preparation

To produce the higher density grade AN, an additive known as permalene is required. This permalene solution (25%) is prepared from the raw materials boric acid, ammonium sulphate and diammonium phosphate. On the other hand, lower density ammonium nitrate is produced by the introduction of an organic additive. Note that for safety reasons, this organic additive is introduced just before the prill nozzle. The additives are either produced on-site or are delivered as ready-made chemicals.

Prilling

The ammonium nitrate solution is pumped to the top of the prilling tower. Here, the solution flows by gravity to the prilling nozzles where they form droplets that crystallise as they fall from the top of the tower.

The cooling air required for crystallisation of the ammonium nitrate is recycled to limit atmospheric emissions, while cool and hot air generated is re-used via a series of unit operations.

Drying

Prills exiting the prill tower are directed to the drying section for reducing the moisture content from 3 - 4% weight to 0.05 - 0.2 % weight, depending on grade.

This is achieved via either co-current or counter current dryers. This unit operation removes most of the water present and results in a porous product.

Cooling and conditioning

Dried prills are screened before being fed to the fluidised bed cooler. Oversizes and fines are removed and recycled while the on-spec prills are cooled to the optimal storage temperature. The fluidised bed cooler is a two-stage cooler with intermediate air recycle. The air usage in this section is also integrated to other sections of the facility. The cooled product is finally sent to a coating drum where anti-caking agents are sprayed on.

Bagging and Bulk Storage

The storage facilities proposed for this project are a bagged product storage facility and a bulk storage facility. The former is envisaged to have a storage capacity of 1,800 MT while the latter will have a capacity of 12,000 MT. Other storage units, including Nitric Acid and ammonium nitrate storage tanks, will be in place to ensure that the Nitric Acid plant will be able to operate independently from the ammonium nitrate solution/TAN operations and to allow intermediate storage between TAN production and bagging.

Final product leaving the processing unit will be conveyed to the bulk storage or directly to the truck loading area. The truck loading can also be fed from the bulk storage using a front-end loader and conveying system. Products that are to be bagged will also be reclaimed from the bulk storage and conveyed to the bagging plant.

Forklifts will be used to transport bagged products to the product storage building. Bagged products will be transported to customers using trucks.

Bulk material will be transported to the consumers by trucks only, which will be loaded using a system consisting of front loaders, bucket elevators and silos in combination with a truck weighing system to meet regulatory and safety requirements. Approximately 15 trucks (~ 70 MT capacity) will operate per working day. (i.e 12 hours of operation).

Ammonium nitrate solution may be loaded on trucks from the AN storage tank which will be provided with a necessary loading system. If ammonium nitrate solution is sold, approximately 3 - 4 trucks per day at 25 MT per truck will be required.

Energy Supply

The expected electricity requirement for the TANPF is 8.5 Megawatt-hours (MWh). Of this, 5MWh will be imported from BFPL with the remaining 3.5 MWh generated onsite using (excess) process steam from the Nitric Acid Plant and an onsite turbine. On occasions where the onsite TANPF steam supply is limited, there is capacity for BFPL to provide all 8.5MWh of energy required for the site. Electricity is generated at BFPL using natural gas-fired boilers, and steam generation units.

3 EMISSIONS TO ATMOSPHERE

3.1 CONSTRUCTION EMISSIONS

Construction activities associated with earthworks and vehicular movement are likely to result in a temporary increase in atmospheric emissions across the Site. Emissions will result from the use of heavy machinery and plant equipment, the running of generators and increased use of vehicles required for construction workforce transport.

Dust emissions are expected to be greatest during the construction phase and are likely to vary depending on the construction activity and the prevailing wind conditions. Earthworks for the TANPF, cut and fill, area for evaporation ponds and the onshore ammonia pipeline trenching (between BFPL and TANPF) are all likely to result in increased dust levels. Construction will also see a significant increase in vehicle movements over unpaved roads and access tracks, which will contribute to dust generation during construction.

Control strategies to minimise the impacts from construction activities such as the generation of dust from vehicle movements and earthworks will be discussed and managed through the implementation of a Construction Environmental Management Plan (CEMP) outlined in the main PER.

Emissions to atmosphere from vehicle fuel combustion are expected to be primarily oxides of nitrogen (NO_x), carbon monoxide (CO) and particulate matter (PM). Due to the low emission rates of mobile vehicles, magnitude of existing industrial pollution sources, the short duration and transient nature of these emissions during project construction in an isolated area such as Burrup Peninsula, these emissions have not been considered further in this evaluation.

3.2 OVERVIEW OF OPERATING CONDITIONS

Atmospheric emissions from the TANPF will vary depending on the operating conditions and efficiency of pollution control equipment. These include normal routine operations and non-routine operations such as plant start up, plant maintenance and emergency shutdown. It is expected however that normal conditions will predominate for the great majority of the time and will occur in excess of 95% of the time.

More specifically, the TANPF consists of three major process components which are designed to operate independently of each other:

- Nitric Acid Plant - 95% availability (approximately 345 days);
- Ammonium Nitrate Solution Plant - 95% availability (approximately 345 days); and
- Ammonium Nitrate Prilling Plant - 90% availability (approximately 329 days).

It is anticipated that the level of production may be reduced for up to 4 to 5 days per year, with another 5 days where the plant is shutdown for annual maintenance. Regular six-monthly shutdowns will also be required to replace catalyst in the Nitric Acid Plant - other process components will remain in operation.

As catalyst deteriorates from the Nitric Acid Plant process, emissions of NO_x are expected to gradually increase over the six month period subsequent to its replacement.

Emergency shutdowns may occur up to 1 -2 times per year. A shutdown will result in similar emission to that of start-ups due to the fact the majority of emissions are discharged through controlled emission sources.

Fugitive sources of wind-blown dust are expected to be minor given the proposed plant and access roads (internal and external) will be sealed and all bulk storage of product will be within fully enclosed areas. Particulate emissions from fugitive sources are considered insignificant and have not been included in the screening air quality assessment.

3.3 *EMISSIONS FROM NORMAL ROUTINE OPERATIONS*

Emission estimates have been calculated and provided by the project engineers (Udhe) based on the current facility concept design. These emission estimates are provided in *Appendix A*.

3.3.1 *Nitric Acid Plant*

Major emissions from the nitric acid plant will include oxides of nitrogen (NO_x), carbon monoxide (CO) and ammonia (NH_3), which will be continuously emitted to the atmosphere.

Mitigation of emissions of NO_x is included as part of the design of the nitric acid plant; the use of a 'dual pressure process' to manufacture nitric acid reduces the production of NO_x at source. In addition emissions of NO_x are further reduced through catalytic abatement prior to discharge.

3.3.2 *Nitric Acid Tank Vents*

Nitric acid will be capable of being stored in two bulk storage tanks with a total capacity of 3,000 m^3, to allow the ammonium nitrate plant to continue operation in the event of a shutdown of the nitric acid plant. Emissions of nitrogen oxides from tank losses have been calculated by Udhe.

3.3.3 *Ammonia Stripper Unit*

Ammonia will be imported to TANPF as a liquid from BFPL which is evaporated for use in the process. As the ammonia contains some oil and water, the vapourising unit occasionally needs to be drained to remove the oil and water. The drained liquid typically contains some liquid ammonia which is stripped from the liquid and vented to atmosphere so that the liquid can be resold. This is generally a monthly operation, depending on the purity of the ammonia imported to site.

Due to the intermittent nature of this emissions, as well as the short duration of each event, emissions from the ammonia stripper unit has not been included as an emission source in the assessment.

3.3.4 *Ammonium Nitrate – Solution Plant*

In the Ammonium Nitrate Solution Plant, Nitric Acid will be neutralised with ammonia to create ammonium nitrate. As this reactor is a closed loop system, it is not anticipated that there will be any emissions to atmosphere from this source.

In addition, any inert ammonia will be vented through the scrubber at the prilling tower prior to emission to atmosphere.

Nitric acid from the ammonium nitrate plant will be in a liquid form. The process differs from conventional ammonium nitrate plants in that this process step allows for condensation of any nitric acid vapours within the closed loop system. On that basis, it is not expected that there will be any emissions of nitric acid as a result of this process. Therefore the ammonium nitrate solution plant has not been included as an emission source in the assessment.

3.3.5 *Prilling Tower*

Cooling air, required for the crystallisation of the ammonium nitrate in the TAN Prilling Plant is scrubbed and recirculated to limit atmospheric emissions. A small "bleed" of air is emitted to atmosphere after being scrubbed a second time.

The scrubbers are designed to meet the *European Union Best Available Techniques (BAT)* Reference guidance. This guidance indicates that BAT is to reduce ammonia and dust emissions from prilling by scrubbing or optimising the operation conditions of prilling towers and to re-use scrubber liquids on site.

3.3.6 *Storage and Batching*

Prills are dried in rotating drums; two pre-drying and two drying drums. From these drums the prills go through a fluidised bed cooler to cool the prills to storage temperature.

Air from the drying drums and fluidised bed cooler is scrubbed prior to release to the atmosphere through the prill tower stack.

Bulk storage of prills is in a fully enclosed area; prills are transferred via conveyor to the bagging station. There is potential for dust emissions from this process; however there will be dust extraction to minimise dust for the occupational health and safety of employees working in this area of the TAN prilling plant. In addition, there are extraction points in the bagging process to enable sealing of the bags to be undertaken. This exhaust is scrubbed prior to being released to the atmosphere through the prill tower stack.

3.3.7 *Emissions Associated with Energy Supply*

Electricity will be provided from the adjacent BFPL site. An expected increase in natural gas consumption at BFPL of 1.75 TJ/day has been estimated to be required to provide sufficient power for the operation of the TANPF.

Emissions associated with power generation at the adjacent BFPL site have been estimated using the National Pollutant Inventory, *Combustion in Boilers – Emission Estimation Techniques* manual (NPI, 2008).

3.3.8 *Normal Routine Air Emission Summary*

Air emissions for each source are detailed in *Table 3.1*.

Table 3.1 *Normal Operations - Emission Estimates*

Source	NO_x (g/s)	NO_2 (g/s)	PM_{10}(g/s)	NH_3 (g/s)	CO (g/s)
Nitric Acid Plant	4.2	2.1		0.02	1.3
Prilling Tower		0	0.8	0.6	
NA Storage Tank Vent A	0.04	0.02			
NA Storage Tank Vent B	0.04	0.02			
Offsite power generation	2.1	1.1	0.058		0.66

1 Emissions of ammonium nitrate dust from the Prilling Tower has been assessed as PM_{10}.

2 Assumed a 50% conversion of NO_x to NO_2

A conversion ratio of 2:1 (50%) for NO_x to NO_2 has been conservatively applied. Historical air quality monitoring of NO_x and NO_2 at Dampier on the Burrup Peninsula[1] shows the ratio of NO_x to NO_2 to generally remain well below 3:1 (~30%).

3.4 *EMISSIONS FROM NON-ROUTINE OPERATIONS*

Significant process venting and/or flaring will not be required to minimise any risk to personnel and the plant in the event of process upsets. Where practicable and without compromising the safety of the plant and personnel, potential continuous venting sources have been eliminated during concept design. The closed-loop design of process plant generally only provides for discharges of major emissions through controlled emission sources.

It is expected that the TANPF will be shutdown for sufficient time to require a cold start up to a maximum of one occasion per year (annual maintenance). Each start up will be of approximately 6 hours duration, during which time the Nitric Acid Plant stack will be the major source of emissions. Maximum emissions from the Nitric Acid Plant stack include up to 26 g/ of oxides of nitrogen and 0.07 g/second of ammonia. Peak emissions are unlikely to remain at the maximum for the entire duration of the start-up process.

Shutdowns of the TANPF plant will take several forms. A majority of shutdowns will be required for planned annual maintenance, in which case there will be the opportunity to minimise emissions. Bi-annual shutdowns of the Nitric Acid Plant will also be required for maintenance (catalyst replacement).

Alternatively, there could be an emergency shutdown, which will result in the majority of emissions being released via the main Nitric Acid Plant stack. It is anticipated that such emergency situations will rarely occur and be of less than one hour duration. Maximum emissions from the Nitric Acid Plant stack include up to 26 g/second of oxides of nitrogen and 0.07 g/second of ammonia during shutdown.

[1] Physick and Blockley, 2001 and SKM, 2005

3.4.1 *Commissioning Emissions*

Commissioning is scheduled to take five (5) months and will start three (3) months prior to mechanical completion.

Commissioning will involve the testing of all systems within the TANPF independently, or in a given combination including control system, electrical and all process units. This may result in emissions similar to those described above. It is anticipated emissions associated with commissioning will be very short-term in duration.

3.4.2 *Decommissioning Emissions*

Decommissioning activities will involve the recovery of catalyst (platinum) from the heat exchangers and vessels in the nitric acid plant. Since exhaust air cannot be cleaned 100%, minimal nitrate downfall is expected. The decommissioning phase will last approximately 4-6 months.

Some dust may be generated during decommissioning due to removal of concrete structures (in particular stacks) and minor earthworks.

3.4.3 *Non-Routine Air Emission Summary*

Air emissions for each source are detailed in *Table 3.2.*

Table 3.2 ***Non-Routine Operations - Emission Estimates***

Source	NO_x (g/s)	NO_2 (g/s)	PM_{10}(g/s)	NH_3 (g/s)	CO (g/s)
Nitric Acid Plant	39	19.4		0.1	1.3
Prilling Tower			2.4	1.6	
NA Storage Tank Vent A	0.04	0.02			
NA Storage Tank Vent B	0.04	0.02			
Offsite power generation	2.1	1.1	0.058		0.66

1 Emissions of ammonium nitrate dust from the Prilling tower have been modelled as PM_{10}.

2 Assumed a 50% conversion of NO_x to NO_2

A conversion ratio of 2:1 (50%) for NO_x to NO_2 has been conservatively applied. Historical air quality monitoring of NO_x and NO_2 at Dampier on the Burrup Peninsula[2] shows the ratio of NO_x to NO_2 to generally remain well below 3:1 (~30%).

[2] Physick and Blockley, 2001 and SKM, 2005

4 AIR QUALITY LEGISLATION & ASSESSMENT GUIDELINES

4.1 AMBIENT AIR QUALITY GUIDELINES

4.1.1 Western Australian Guidance

In December 2000, the Department of Environment Protection (DEP) defined an interim approach to ambient air quality guidelines. This interim approach was to adopt the National Environment Protection Measures (NEPM) standards for Ambient Air Quality (2003).

In the absence of a NEPM standard, the DEP will adopt the World Health Organisation (WHO) Guidelines for Air Quality (2000), prior to adopting criteria from another jurisdiction.

In the absence of a NEPM standard or a WHO guideline for emissions of ammonia, these emissions have been assessed against the NSW Department of Environment and Climate Change (DECC) guidance.

4.1.2 National Environment Protection Measures

The *National Environment Protection Measure (Ambient Air Quality) 2003* (NEPM) is a Commonwealth Government initiative which aims to achieve nominated standards of air quality within ten years. Air quality standards for six major air pollutants (carbon monoxide, nitrogen dioxide, photochemical oxidants, sulphur dioxide, lead and small airborne particles) have been set. The desired environmental outcome of this NEPM is ambient air quality that allows for the adequate protection of human health and well-being.

All states and territories including Western Australia have adopted the NEPM air quality goals for pollutants. The criteria relating to potential emissions from the facility are outlined in *Table 4.1*. Measurement and concentration averaging periods are based on critical exposure times for health impacts and are thus different for various pollutants.

4.1.3 NSW DECC Guidelines

The NSW DECC publishes impact assessment criteria for air pollutants in document *"Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales" (revised 2005).*

The NSW DECC guidance, has been used for ammonia in the absence of a relevant NEPM standard or WHO guideline.

4.1.4 *Adopted Ambient Air Quality Criteria*

The impact assessment criteria relevant to this Project are presented in *Table 4.1*. These are the criteria, against which the predicted ground level concentrations of pollutants generated by the Project are compared.

Table 4.1 ***Adopted Ambient Air Quality Criteria***

Pollutant	Averaging Period	Maximum Concentration		Maximum Allowable Exceedences
		ppm	µg/m3	
Carbon monoxide[1]	8 hours	9.0	10,000	1 day a year
Nitrogen dioxide[1]	1 hour	0.12	246	1 day a year
	1 year	0.03	62	Nil
Particles as PM_{10}[1]	24 hour	-	50	5 days in a year.
Ammonia[2]	1 hour	-	330	Nil

1. Source: *"National Environment Protection Measure (Ambient Air)" (Amendment 2003)*

2. Source: *"Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (NSW DECC, 2005)*

4.2 *EMISSION STANDARDS AND LIMITS*

Application for an operating licence subject to approval of their development will be made through the WA Environment Protection Authority. Air emission limits are expected to be applied to point sources discharging emissions to atmosphere.

These will be applied in accordance with the requirements of the *Environmental Protection Act 1986* and associated Regulations.

4.3 *VEGETATION GUIDELINES*

Based on air quality guidelines published by the World Health Organisation (WHO, 2000), air pollutants may affect plant physiology, growth and vegetation condition, while individual plants and vegetation types may vary in their sensitivity to a given pollutant.

The WHO has published air quality guidelines which can be used as the basis for considering the impact of NOx on surrounding plant species and vegetation communities. These standards are presented in *Table 4.2*.

Table 4.2 ***WHO Guidelines for Vegetation Impact***

Pollutant	Standard
NO_x - 24 hour	75 µg/m³
NO_x - Annual	30 µg/m³

The WHO standards were developed for the European environment and are based on studies conducted there; however in the absence of any other guidance the WHO standards have been adopted.

5 EXISTING ENVIRONMENT

5.1 CLIMATE AND METEOROLOGY

Long term climatic data is available from a Bureau of Meteorology (BoM) weather station located at Dampier Salt, approximately 9 km south west of the site.

Table 5.1 presents temperature, humidity and rainfall data from this weather station, which consists of monthly average 9am and 3pm readings. Monthly averages of maximum and minimum temperatures are also presented. Rainfall data consists of mean monthly rainfall and the average number of rain days per month.

On average, March is the warmest month in Dampier with a mean daily maximum of 36.2°C. The coolest month is July with a mean daily minimum temperature of 13.4°C.

The mean annual rainfall at Dampier is 252.9 mm. The mean number of annual rain days over this period is 18 days. On average, February is the wettest month with a mean monthly rainfall of 66.4 mm, while October and November are the driest months with an average of 0.5 mm per month.

Table 5.1 Climatic Data for Dampier (1969 – 2008)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Maximum Temperature													
Mean (°C)	35.9	36.0	36.2	34.4	29.9	26.6	26.2	27.7	30.5	32.7	34.3	35.7	32.2
Daily Minimum Temperature													
Mean (°C)	26.1	26.5	25.5	22.8	18.2	15.1	13.4	14.6	16.8	19.7	22.2	24.6	20.5
9 am Mean													
Temperature (°C)	30.9	30.9	30.9	29.1	24.5	21.3	20.2	21.9	24.9	27.5	29.4	30.7	26.8
Humidity (%)	57	60	54	45	44	47	44	43	37	39	41	49	47
3 pm Mean													
Temperature (°C)	33.8	34.3	34.6	32.8	28.4	25.4	25.0	26.3	28.6	30.5	31.8	33.4	30.4
Humidity (%)	50	51	44	37	38	40	35	35	32	37	41	45	40
Rainfall													
Mean (mm)	25.4	66.4	51.5	20.5	25.5	32.4	13.0	5.1	1.3	0.5	0.5	11.5	252.9
Raindays													
Mean (Number)	2.5	4.2	3.0	1.3	1.8	2.1	1.3	0.7	0.2	0.1	0.1	0.7	18.0

1. Station number 005061; Latitude 20.73 S; Longitude 116.75 E
2. Source - Bureau of Meteorology, Commonwealth of Australia.

5.2 *WIND SPEED AND DIRECTION*

The general features of the predominant winds are illustrated in the wind rose diagrams for the 12 month period from January 2005 – December 2005 (*Appendix B*). The wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points – N, NNE, NE, etc. The bar at the top of each wind rose diagram represents winds blowing from the north (i.e., northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. The major features of the annual wind rose is as follows:

- The predominant wind direction during the year is from the west and west-southwest, indicative of onshore coastal sea breezes;
- During spring and summer predominant winds are from the west;
- Autumn is characteristic of variable winds from all sectors;
- Winter is characterised by winds from the east and northeast;
- Highest speeds occur with winds from the west and west-southwest; and
- Lowest speeds occur with winds from the southwest and other quadrants mostly during the night and early morning.

6 AIR EMISSIONS SCREENING ANALYSES

6.1 PILBARA DISPERSION PROCESSES

The Burrup Peninsula and surrounding Pilbara regional area is known for its complex meteorology in a near coastal environment DEP (2002) and DoE (2004). Plumes are sometimes released high enough, and with enough buoyancy to penetrate or partially penetrate an elevated capping of an inversion (or TIBL). On the Burrup Peninsula this often occurs at low elevations given the coastal location and limited opportunity onshore winds have to warm over land.

The following four dispersion processes are considered important:

- Dispersion under convective conditions when buoyant plumes can be mixed to ground level within a short distance of the stacks;
- The influence of the sea breeze with the creation of the Thermal Internal Boundary layer (TIBL) where onshore winds can lead to complex vertical dispersion. For onshore flows during the day time, the relatively cooler, stable onshore air will be warmed by the heated land surface. As such, a region of unstable convective turbulence (the TIBL) will grow with distance downwind. For tall stacks sited at the coast or very buoyant plumes, the plumes will rise above the TIBL and initially be relatively concentrated, not having had an opportunity to disperse. Further inland when the TIBL has grown to the height of these plumes, the plumes will then undergo rapid vertical mixing resulting in relatively high ground level concentrations. Alternatively plumes from short stacks and/or low buoyancy plumes will remain trapped beneath the TIBL resulting in higher ground level concentrations than would otherwise occur. This meteorological condition is expected for plumes associated with the TANPF;
- The influence of the buildings and structures around facilities that may lead to increased dispersion and reduced plume rise from the stacks; and
- The presence of terrain features like rock outcrops, hills and ridges in the surrounding area can impact on dispersion and be subject to elevated concentrations.

6.2 SCREENING APPROACH

On the basis of the expected insignificant emissions and the known complex meteorology on the Burrup Peninsula, ERM's approach to the screening of air emissions from the TANPF is based upon using conservative assumptions combined with simple Gaussian plume dispersion computations.

Along with synthetic "worst case" meteorological data, a screening model can be developed to assess the significance of emissions from the facility. The AUSPLUME v6.0 dispersion model has been used to provide Gaussian based computations for the screening analyses.

The key limiting assumptions inherent in the Gaussian plume dispersion model may be summarised as follows:

- Meteorological parameters remain constant for the period of one hour;
- Meteorological parameters remain fixed over the entire modelling domain, which often includes all regions within 10 km or more of the source;
- In the vertical, most meteorological parameters either remain constant (e.g., wind direction) or vary according to generic formulae (e.g., wind speed, temperature) that are seldom, if ever, validated for the site; and
- The height of the mixing layer remains constant for the entire region.

To partially account for these limitations, the screening assessment adopts a conservative approach for defining model inputs coupled with synthetic "worstcase" meteorological data in order to assess the magnitude of emissions from the TANPF. The screening approach only allows the assessment of hourly average pollutant concentrations due to the synthetic meteorological data file. Predicted concentrations for pollutants with longer averaging times (i.e. 24 hour or annual) will be of the same or lesser magnitude as that of the hourly predictions. On that basis inferences can be made in regard to predicted pollutant impacts with longer averaging times and compliance with relevant criteria.

It should be noted detailed, site-specific dispersion modelling has not been conducted using the Gaussian dispersion model. This is regarded as inappropriate given the complex meteorology and the inability of the Gaussian models to account for sea breezes and TIBL meteorological processes.

6.3 SCREENING MODEL INPUTS

Table 6.1 outlines the assumptions made during the development of the screening model.

Table 6.1 Screening Model Input Assumptions

Input	Assumption adopted	Justification
Physical source characteristics	Point sources (source dimensions - Refer *Appendix A*)	The majority of emissions discharge from point sources. Area and volume sources such as fugitive emissions from wind blown dust, plant buildings etc deemed insignificant due to sealed roads onsite, fully enclosed storage and loading areas and predominantly closed loop production processes.
Emission rates	Refer *Appendix A*	Site-specific constant emission rates have been calculated and adopted based upon engineering process design. Emission rates and subsequent assessment scenarios include routine and non-routine operational conditions.
Meteorology	Synthetic meteorological data file	ERM prepared a synthetic meteorological data file based on MetSamp.met, that was utilised in Ausplume. It systematically lists all probable combinations of wind direction (in 10° segments), wind speed, air temperature, stability class and mixing height. Many of the combinations given in this file are highly unlikely to occur in reality therefore use of this file represents a highly conservative approach. Mixing heights and stability classes within the file represent the combination of known meteorological conditions on the Burrup Peninsula. The maximum ground level concentration predicted using the screening data set is regarded as conservative. This means that it is likely the model over-predicts concentrations expected to occur in reality, assuming that other input data are of good quality.
Terrain	Site-specific terrain file Egan half-height	Site-specific terrain data comprising 10m contour cadastral information for the Burrup Peninsula was utilised.
Receptors	Grid extent: • Approx. 13 km x 13 km Discrete receptors: • Dampier township; • Karratha; • Nickol; • Hearson Cove; and • Deep Gorge.	A grid spacing of x: 129m, y: 132m increments has been applied within the terrain file. Discrete receptors have been chosen on the basis of sensitivity to health impacts and the surrounding environment in order to assess impacts against adopted criteria.

Input	Assumption adopted	Justification
Dispersion coefficients	Pasquill-Gifford (PG) dispersion curves	The P-G have been applied on the basis there are no tall stacks (>100m). The P-G curves can be extrapolated out to distances of about 10 km from the source but with a loss of accuracy due to changes in wind speed, direction, terrain and surface roughness, which would occur as the plume travels over that distance.
Wind direction shear	Default input	Default input
Surface roughness	0.4m (rolling rural)	Surface roughness increases the vertical mixing of the plume and changes the wind-speed profile at elevated heights because of the enhanced mechanical turbulence generated as the air moves over the ground. The upwind and downwind surface characteristics are most important and 0.4m (rolling rural) has been conservatively applied.
Wind profile exponents	Irwin Rural coefficients	Using height and density of building development within a 3 km radius as criteria, more than 50% of this area is rural and rural dispersion coefficients have been used.
Plume rise	Gradual plume rise (with no partial penetration) No gradual plume rise (with partial penetration) Stack-tip downwash	When gradual plume rise is selected, the plume rises gradually to its final height as it travels downwind. Both options have been assessed in combination with partial plume rise (Ausplume cannot simulate both partial penetration and gradual plume rise). Options for both partial plume rise and no partial plume rise have been assessed to observe the impact on emissions.
Building downwash effects	PRIME algorithm	Buildings associated and within the vicinity of the proposed plant are incorporated in the model and calculated using the Building Profile Input Programme (BPIP).
Averaging times	1 hour averages only	Model configured to calculate pollutant concentrations for 1 hour averaging times.
Wet and dry deposition	Not assessed	Dry or wet deposition can be important whenever the source discharges significant amounts of large particles or certain other contaminants (i.e. metals). Not considered important for TANPF key pollutants.

6.4 *REGIONAL AIR QUALITY*

It is important to consider background air quality when considering cumulative impacts on sensitive receptors in the area.

The main air emissions of the Burrup Peninsula arise from combustion of natural gas or other gaseous fuels (DoE, 2004). The most significant pollutants produced by industry on the Burrup Peninsula include oxides of nitrogen (NO_X), carbon monoxide (CO), volatile organic compounds (VOCs), carbon dioxide (CO_2) and small amounts of particulate matter (PM) and sulfur dioxide (SO_2).

Ambient concentrations of air pollutant species were monitored intensively during the Pilbara Airshed Study, conducted by then WA Department of Environmental Protection in 1999 (DoE 2004). This was carried out prior to the construction of the BFPL plant and the Woodside Pluto LNG plant. The 1999 results found that:

- Nitrogen dioxide (NO_2) concentrations were well below the NEPM standards for both 1-hour and annual averages, although data still reflects large NO_X emissions from industrial and other sources such as locomotives, road traffic and aircraft. With new industries adding to the load in the Burrup region ongoing surveillance of emissions will be required.

- Ozone (O_3) concentrations were below the NEPM standards for 1-hour and 4-hour averages. Appreciable levels were recorded on numerous occasions, though these levels were associated with bushfires.

- Carbon monoxide (CO) levels were extremely low and were not considered to ever become a pollutant issue, reflecting the low traffic density and lack of any other sources of incomplete combustion in the area.

- Sulfur dioxide (SO_2) levels were recorded as very low in the region due to the extremely low sulfur content of natural gas with consequent low emissions from industries, with the bulk of SO_2 emissions coming from ships, mainly when in transit.

The application of the 1999 monitoring results to adequately represent current background air quality is inappropriate because of the new industrial air emission sources present on the Peninsula (i.e. Woodside Pluto LNG). These results do however provide an indication of the magnitude of the likely background air quality in the region.

6.4.1 *Burrup Rock Art Monitoring Program*

Overview

Within the Burrup Peninsula, there are a large number of indigenous petroglyphs (rock art). In August 2002, the Western Australian Government established the independent Burrup Rock Art Monitoring Management Committee ("the Committee"). The Committee commissioned a monitoring program, undertaken by CSIRO, to investigate the potential for industrial emissions (from new and existing industrial development on the Burrup Peninsula) to affect the rock art over and above that due to natural weathering.

Duration

To assess the likelihood that air pollution from the industrial area may damage the rock art a study was carried out on the Burrup Peninsula by CSIRO Marine and Atmospheric Research between August 2004 and September 2005 and between February 2007 and September 2008.

Location

The study comprised a total of nine sites. Two of these were located on the northern Burrup Peninsula area and one at Mardie Station approximately 80 km southwest of Dampier, these three sites were considered representative of the local background concentrations in the absence of industrial emissions.

One monitoring site was located in Karratha, approximately 12 km from the Burrup Peninsula. The remaining five monitoring stations were located close to existing industrial regions on the lower Burrup Peninsula.

Concentrations of nitrogen dioxide, sulphur dioxide, nitric acid and ammonia were measured with passive sampling devices, over monthly sampling periods.

Sampling sites are shown on *Figure 6.1.*

Figure 6.1 ***Burrup Rock Art Monitoring Locations***

Monitoring Results

Given the nature of the proposed Technical Ammonium Nitrate Processing Facility (TANPF), the pollutants of interest that are monitored as part of the program are nitrogen dioxide and ammonia.

The key study results from the CSIRO monitoring program are presented in the Burrup Rock Art Monitoring Program - Summary of Study Reports, (SKM 2009). This report indicated that:

- Concentrations of nitrogen dioxide were low at all sites. The highest monthly averaged concentration for nitrogen dioxide at the Peninsula sites was 3.8 parts per billion (ppb) (or 7.1 $\mu g/m^3$). The 'background' concentration, defined by sites not anticipated to be affected by industrial emissions was 0.6 ppb.

- Concentrations of ammonia were very low compared with measurements made at other remote locations. The highest monthly averaged concentration for ammonia at the Burrup Peninsula sites was 3.0 parts per billion (ppb) (or 2.1 $\mu g/m^3$). The 'background' concentration, defined by sites not anticipated to be affected by industrial emissions was 0.5 ppb.

The average and maximum recorded concentrations of ammonia and nitrogen dioxide at each monitoring site are presented in *Table 6.2*.

Table 6.2 *Average and Maximum Monitoring Results*

Monitoring Site	Ammonia (NH_3)		Nitrogen Dioxide (NO_2)	
	Average concentration (ppb)	Maximum concentration (ppb)	Average concentration (ppb)	Maximum concentration (ppb)
2004-2005 Monitoring results				
Site 1	0.3	0.7	0.6	0.9
Site 3	0.5	1.6	0.7	1.1
Site 4	0.4	1.5	1.8	2.8
Site 5	0.4	0.8	2.4	3.5
Site 6	0.5	1.8	1.8	2.6
Site 7	0.4	1.2	1.4	2.1
Site 8	0.4	0.8	2.1	2.8
Site 9[2]	2.6	4.3	2.2	3.8
Site 10	0.8	1.4	0.5	1.1
2007-2008 Monitoring results				
Site 1	1.9	*	0.6	0.9
Site 3	0.3	1.3	0.8	1.1
Site 4	0.5	1.3	2.0	3.2
Site 5	0.7	3.0	2.8	3.8
Site 6	0.9	1.6	1.7	2.9
Site 7	0.6	1.3	1.3	2.0
Site 8	0.6	1.1	2.1	2.9
Site 9[2]	2.4	3.9	2.4	3.7
Site 10	0.6	1.2	0.8	2.2

1. Source: CSIRO (2008)
2. Note: Karratha results (Site 9) have been provided for comparison only
3. * anomalous results
4. ppb parts per billion
5. Site 6 & 7 are located closest to the TANPF

In the absence of hourly or annual background monitoring data, the monthly measured pollutant concentrations provide an indication of the likely magnitude of background air emissions.

6.4.2 *Adopted Pollutant Background Concentrations*

For the purposes of this screening assessment, and the primary consideration of 1 hour pollutant average concentrations, suitable pollutant background concentrations have been adopted on the basis that historical (1998-2000, DEP, 2002) 1 hour pollutant concentrations of NO_2 were measured to be 0.02 ppm (or 37.6 $\mu g/m^3$). The Woodside Pluto LNG facility has commenced operations since 2000 and will be a major new source of NO_2 emissions.

To account for increased air emission sources on the Burrup Peninsula since the 1999 monitoring event, it is considered conservative and appropriate to assume that current background concentrations would be far less than triple 1999 levels. Therefore, the following background concentrations have been adopted:

- NO_2: 0.06 ppm (112.9 $\mu g/m^3$) - 300% of measured 1999 levels.

No hourly monitoring data or other information is available for ammonia. The existing BFPL site and Woodside Pluto LNG facility are likely to be the major existing sources of ammonia and existing emissions are expected to be low.

Assessment of cumulative impacts for ammonia is not considered important in the context of this screening study because:

- Calculated ammonia emissions from the TANPF are estimated to be very low;
- Ammonia has not been a historical primary pollutant of concern for regulators on the Burrup Peninsula; and
- Ammonia is not associated with long-term chronic health impacts.

7 SCREENING ASSESSMENT RESULTS

7.1 OVERVIEW

The screening approach only allows the assessment of hourly average pollutant concentrations due to the nature of the synthetic meteorological data file. Predicted concentrations for pollutants with longer averaging times (i.e. 24 hour or annual) will be of the same or lesser magnitude as that of the hourly predictions.

On that basis, provided below are the screening results for hourly NO_2 and NH_3.

7.2 IMPACTS ON AMBIENT AIR QUALITY – ROUTINE EMISSIONS

Emissions to ambient air quality are assessed against NEPM criteria which are prescribed to ensure adequate protection of human health and well-being. As such these criteria are applicable only in areas of human habitation such as residential or recreational areas.

Emissions of NO_2 and NH_3 have been assessed at five receptor locations which representative of areas of human habitation.

The maximum ground level concentration at each sensitive receptor resulting from routine plant operation is presented in *Table 7.1* below.

This table shows that the conservatively predicted incremental emissions from the facility represent less than 5% of the NEPM criteria for NO_2 at all sensitive receptors. Background emissions have conservatively been estimated at 112.9µg/m^3 to allow a cumulative assessment of emissions.

The maximum ground level concentration of NO_2 recorded at a sensitive receptor is 5.06 µg/m^3, with an estimated background of 112.9 µg/m^3 the cumulative concentration at Hearson Cove is estimated at 117.96 µg/m^3 or 48% of the NEPM 1 hour criterion.

The maximum ground level concentration of NH_3 recorded at a sensitive receptor is 7.68 µg/m^3 which represents 2.3% of the NH_3 criterion. No hourly background data was available for ammonia concentrations on the Burrup, however given the low magnitude of incremental emissions, and the small number of existing sources of ammonia, it is not considered that cumulative emissions will exceed the criterion of 330 µg/m^3.

Table 7.1 Maximum Predicted Ground Level Concentrations at Modelled Sensitive Receptors – Routine Operations

	Incremental Concentration (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Criterion (µg/m3)	% of Criterion
NO_x – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	2.5	112.9	115.4	246	46.9%
2. Balmoral Road, Nickol	2.6	112.9	115.5	246	47.0%
3. Dampier	3.2	112.9	116.1	246	47.2%
4. Hearson Cove	4.1	112.9	117.0	246	47.6%
5. Deep Gorge	3.3	112.9	116.3	246	47.3%
NO_x – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	2.5	112.9	115.4	246	46.9%
2. Balmoral Road, Nickol	2.6	112.9	115.5	246	47.0%
3. Dampier	3.0	112.9	115.9	246	47.1%
4. Hearson Cove	5.1	112.9	118.0	246	48.0%
5. Deep Gorge	4.7	112.9	117.6	246	47.8%
NH_3 – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	0.81	NA	NA	330	0.24%
2. Balmoral Road, Nickol	0.90	NA	NA	330	0.27%
3. Dampier	1.1	NA	NA	330	0.33%
4. Hearson Cove	3.7	NA	NA	330	1.1%
5. Deep Gorge	3.0	NA	NA	330	0.92%
NH_3 – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	1.7	NA	NA	330	0.50%
2. Balmoral Road, Nickol	1.9	NA	NA	330	0.56%
3. Dampier	2.5	NA	NA	330	0.76%
4. Hearson Cove	7.7	NA	NA	330	2.3%
5. Deep Gorge	6.9	NA	NA	330	2.08%

1. Increment: Concentration resulting from site activities at modelled sensitive receptor

7.3 *IMPACTS ON AMBIENT AIR QUALITY – NON-ROUTINE EMISSIONS*

Non-routine operations can result in short term elevated concentrations of emissions released to atmosphere. Non-routine emissions have been modelled for NO_2 and NH_3.

The maximum ground level concentration at each sensitive receptor resulting from non-routine plant operation is presented in *Table 7.2* below.

This table shows that the incremental emissions from the facility represent less than 15% of the NEPM criteria for NO_2 at all sensitive receptors. Background emissions have conservatively been estimated at 112.9$\mu g/m^3$ to allow a cumulative assessment of emissions.

The maximum ground level concentration of NO_2 recorded at a sensitive receptor is 34 $\mu g/m^3$, with an estimated background of 112.9 $\mu g/m^3$ the cumulative concentration at Hearson Cove is estimated at 146.9 $\mu g/m^3$ or approximately 60% of the NEPM 1 hour criterion.

The maximum ground level concentration of NH_3 recorded at a sensitive receptor is 20.5 $\mu g/m^3$ which represents 6.2% of the NH_3 criterion.

Table 7.2 Maximum Predicted Ground Level Concentrations at Modelled Sensitive Receptors – Upset Operations

	Incremental Concentration (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Criterion (µg/m3)	% of Criterion
NO_x – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	15	112.9	128	246	52%
2. Balmoral Road, Nickol	16	112.9	129	246	53%
3. Dampier	20	112.9	133	246	54%
4. Hearson Cove	29	112.9	142	246	58%
5. Deep Gorge	22	112.9	135	246	55%
NO_x – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	14	112.9	127	246	51.7%
2. Balmoral Road, Nickol	16	112.9	128	246	52.2%
3. Dampier	17	112.9	130	246	52.8%
4. Hearson Cove	34	112.9	147	246	59.7%
5. Deep Gorge	32	112.9	145	246	58.8%
NH_3 – 1 hour – Gradual Plume Rise Option					
1. Searipple Road, Karratha	2.2	NA	NA	330	0.65%
2. Balmoral Road, Nickol	2.4	NA	NA	330	0.73%
3. Dampier	2.9	NA	NA	330	0.89%
4. Hearson Cove	9.9	NA	NA	330	2.9%
5. Deep Gorge	8.1	NA	NA	330	2.5%
NH_3 – 1 hour – Partial Plume Penetration Option					
1. Searipple Road, Karratha	4.4	NA	NA	330	1.3%
2. Balmoral Road, Nickol	5.0	NA	NA	330	1.5%
3. Dampier	6.7	NA	NA	330	2.0%
4. Hearson Cove	21	NA	NA	330	6.2%
5. Deep Gorge	18	NA	NA	330	5.5%

2. Increment: Concentration resulting from site activities at modelled sensitive receptor

7.4 *IMPACTS ON ROCK ART*

Due to the proximity of a number of rock art sites to the TANPF, the receiving environment is considered to be of medium sensitivity to atmospheric emissions from the operation of the TANPF.

As part of the CSIRO study, rock samples were fumigated in the laboratory with concentrations of pollutants at current, future and at five to ten times the future pollutant estimates.

The maximum concentrations of NO_2 and NH_3 that rock art were subjected to in the fumigation study were 96 $\mu g/m^3$ and 28 $\mu g/m^3$[3] respectively. The study found that there were no changes to the rock surface colour from pollutant concentrations likely to be experienced at the rock art locations.

The maximum hourly concentration of NO_2 from the TANPF under routine operation is 75.8 $\mu g/m^3$, this represents 79% of the maximum concentration NO_2 assessed in the fumigation study – a level at which no changes to rock surface colour were considered likely. As such, the concentrations of NO_2 from the TANPF are not anticipated to have an impact on local rock art.

The maximum hourly concentration of NH_3 from the TANPF under routine operation is 27.4 $\mu g/m^3$, this represents 98% of the maximum concentration NH_3 assessed in the fumigation study. As such, the concentrations of NH_3 from the TANPF are not anticipated to have an impact on local rock art.

7.5 *IMPACTS ON VEGETATION*

There is little available information regarding the impacts of atmospheric emission deposition on Australian vegetation in arid conditions.

WHO standards for impacts on vegetation are applicable to 24 hour and annual averaging periods. Due to the use of a synthetic meteorology data file for this screening study, modelling of emissions over 24 hour and annual averaging periods is not possible. However, given the low magnitude of hourly NO_2 emissions, it is not considered that these criteria will be exceeded.

[3] Conversion from ppb to $\mu g/m^3$ has been undertaken assuming an average lab temperature of 20°C

8 SUMMARY & CONCLUSIONS

8.1 IMPACTS ON AMBIENT AIR QUALITY

8.1.1 Site Preparation & Construction

Emissions to atmosphere associated with site preparation and construction are anticipated to be predominately particulate emissions. These emissions will be short term with construction anticipated to last 30 months.

Emissions of particulate matter from haulage on unsealed roads, and wind erosion from stockpiles and exposed surfaces will be managed through the implementation of a CEMP. As such it is anticipated that residual emissions will be of a small magnitude.

The receiving environment is considered to be of moderate sensitivity to emissions of particulate matter.

Given the small magnitude of emissions and the moderate sensitivity of the receiving environment, emissions to atmosphere from the proposed TANPF are considered to be of **minor** significance.

8.1.2 Commissioning

Commissioning of the facility is anticipated to last approximately 5 months. Emissions to atmosphere are not constant throughout this period, though when they occur, may exceed normal operational emissions for short periods. The magnitude of emissions is considered small based upon their frequency and duration during commissioning.

Areas of permanent habitation i.e. Karratha and Dampier are located greater than 5km from the TANPF. These areas are considered the most important receiving environment associated with impacts to ambient air quality and are of moderate sensitivity to atmospheric emissions from commissioning the TANPF.

Given the small magnitude of emissions and the moderate sensitivity of the receiving environment, emissions to atmosphere from commissioning are considered to be of **minor** significance.

8.1.3 Operation & Maintenance

Air quality emissions associated with the operation of the plant have been assessed to determine the significance of predicted concentrations.

The screening assessment undertaken indicates that the expected emission and associated ground level concentrations at sensitive receptors are of small magnitude.

Areas of permanent habitation i.e. Karratha and Dampier are located greater than 5km from the TANPF. These areas are considered the most important receiving environment associated with impacts to ambient air quality and are of moderate sensitivity to atmospheric emissions from commissioning the TANPF.

Given the small magnitude of emissions and the moderate sensitivity of the receiving environment, emissions to atmosphere from this facility are considered to be of **minor** significance.

8.1.4 *Decommissioning & Abandonment*

Emissions to the atmosphere associated with decommissioning and abandonment of the TANPF are expected to be short term, with decommissioning lasting between 4 and 6 months.

Emissions associated with decommissioning include equipment removal and site rehabilitation. Emissions will be controlled through the implementation of an environmental management plan. As such, emissions are anticipated to be small in magnitude.

Areas of permanent habitation i.e. Karratha and Dampier are located greater than 5km from the TANPF. These areas are considered the most important receiving environment associated with impacts to ambient air quality and are of moderate sensitivity to atmospheric emissions from commissioning the TANPF.

Given the small magnitude of emissions and the moderate sensitivity of the receiving environment, emissions to atmosphere from this facility are considered to be of **minor** significance.

8.2 *Impacts On Rock Art*

The *Burrup Rock Art Monitoring Program – Summary of Study Reports* (SKM, 2009) indicates that there are no known impact assessment criteria for the impact of emissions to atmosphere to rocks of the type that exist on the Burrup Peninsula that contain the rock art.

Based upon the conservative nature of the screening assessment, emissions from the proposed TANPF are considered to be of a small magnitude.

Due to the proximity of a large number of significant rock art sites to the north and south of the TANPF, the receiving environment is considered to be of high sensitivity to atmospheric emissions.

Based upon the research undertaken on behalf of the Rock Art Monitoring Management Committee, and given the small magnitude of emissions and the high sensitivity of the receiving environment, emissions to atmosphere from this facility are considered to be of **moderate** significance.

8.3 *IMPACTS ON VEGETATION*

The magnitude of the impacts on vegetation is considered to be small and the sensitivity of the receiving environment is low. Therefore, the impact of emissions on local vegetation is **not significant**.

8.4 *SAFEGUARDS/MITIGATION MEASURES*

Management measures incorporated within the design of the TANPF to reduce impacts on local air quality for each stage of the development are detailed in the sections below.

8.4.1 *Construction*

Atmospheric emissions associated with construction activities will be managed through the implementation of a Construction Environmental Management Plan (CEMP). Mitigation measures will include:

- The area of land to be disturbed will be the minimum required for construction.
- Exposed surfaces such as stockpiles and cleared areas, and the duration that these areas are exposed, will be minimised.
- Dust suppression techniques and/or watering of unsealed roads, access routes, exposed ground surfaces and stockpiles will be implemented where required

8.4.2 *Operation*

A number of emission reduction options have been incorporated into the design of the TANPF. These include:

- Scrubbers on emission points;
- Enclosed storage and bagging area;
- Tail gas abatement; and
- Sealed onsite haulage roads.

These items are discussed further in *Section 6* of this report. It is also anticipated that BNPL will develop an operational environmental management plan to minimise emissions to atmosphere from the TANPF.

8.5 CONCLUSION

The screening assessment of the TANPF has indicated that the magnitude of expected emissions is low. Predicted hourly pollutant concentrations (incremental and cumulative) at sensitive receptors, under routine and non-routine operations, have indicated that the TANPF will meet the ambient air quality criteria for NO_2 and, NH_3.

On the basis that the magnitude of predicted emissions is low, further site specific detailed plume dispersion modelling is not warranted.

The operation of this facility is not anticipated to have a significant impact on local and regional ambient air quality of the Pilbara region.

Based upon the estimated incremental emissions from the proposed TANPF and the research undertaken on behalf of the Rock Art Monitoring Management Committee this proposed development is not anticipated to have an impact on rock art within the Burrup Peninsula.

9 REFERENCES

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NEPC (2003) "Variation to the National Environment Protection (Ambient Quality) Measure for Particles as $PM_{2.5}$", May 2003.

NSW DEC (2005) "Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW", August 2005

SKM (2005) The Gorgon Gas Development – Air Quality Assessment, April 2005.

SKM (2009) "Burrup Rock Art Monitoring Program - Summary of Study Reports - A report to the Burrup Rock Art Monitoring Management Committee".

William Physick and Adrian Blockley, 2001, An Evaluation of Air Quality Models for the Pilbara Region, June 2001.

Annex A

Emission Estimates

Job Number: 0086269
Title: BNPL - Ammonium Nitrates Plant

Location: Burrup Peninsula, WA

									Emission Rates (g/s)				
Source Description	AUSPLUME Code	X Co-ord	Y Co-ord	Stack Height (m)	Exhaust Temp (degC)	Stack Diameter (m)	Exit Velocity (m/s)	Flowrate (m3/s)	NOx	PM10	NH3	CO	NO2 (50% of NOx)
ROUTINE													
AN Plant Stack - Prilling Tower	ANPLANT	477814	7719329	70	36	2	11.9	33.2		0.8	0.6		0
NA Plant Stack - Absorption Tower	NAPLANT	477733	7719323	54	150	1.4	27.5	41.8	4.2		0.02	1.3	2.1
NA Storage Tank Vent A	VENTA	477684	7719320	15	45	0.5	1	0.22	0.04				0.02
NA Storage Tank Vent B	VENTB	477700	7719336	15	45	0.5	1	0.22	0.04				0.02
Power generation	Power	477361	7719317	30	177	2.6	16.9		2.1	0.058		0.66	1.1
MAXIMUM EMISSIONS													
AN Plant Stack - Prilling Tower	ANPLANT	477814	7719329	70	36	2	11.9	33.2		2.4	1.6		
NA Plant Stack - Absorption Tower	NAPLANT	477733	7719323	54	150	1.4	27.5	41.8	39		0.1	1.3	19.4
NA Storage Tank Vent A	VENTA	477684	7719320	15	45	0.5	1	0.22	0.04				0.02
NA Storage Tank Vent B	VENTB	477700	7719336	15	45	0.5	1	0.22	0.04				0.02
Power generation	Power	477361	7719317	30	177	2.6	16.9		2.1	0.058		0.66	1.1

NPI natural gas boilers: >30MW heat input

Emission Factors	kg/t
Carbon Monoxide	1.82
Oxides of Nitrogen	5.95
PM10	0.16
Sulfur Dioxide	0.035

Gas consumption unit conversion

1.75	TJ/day
1750	GJ/day
44529	m3/day
31170	kg/day
31	tonnes/day

Udhe Source Data							
	AN Plant Stack - Prilling Tower (kg/hr)		NA Plant Stack - Absorption Tower (ppm)		NA Storage Tank Vent (kg/hr))		Molecular weight
	Normal	Max	Normal	Max	Normal	Max	
NH3	2.3	5.4	1	5			17.03052
AN PM10	2.8	8.6					
NOx			75	700	0.144	0.144	46.0055
CO			40	40			28.0101

Annex B

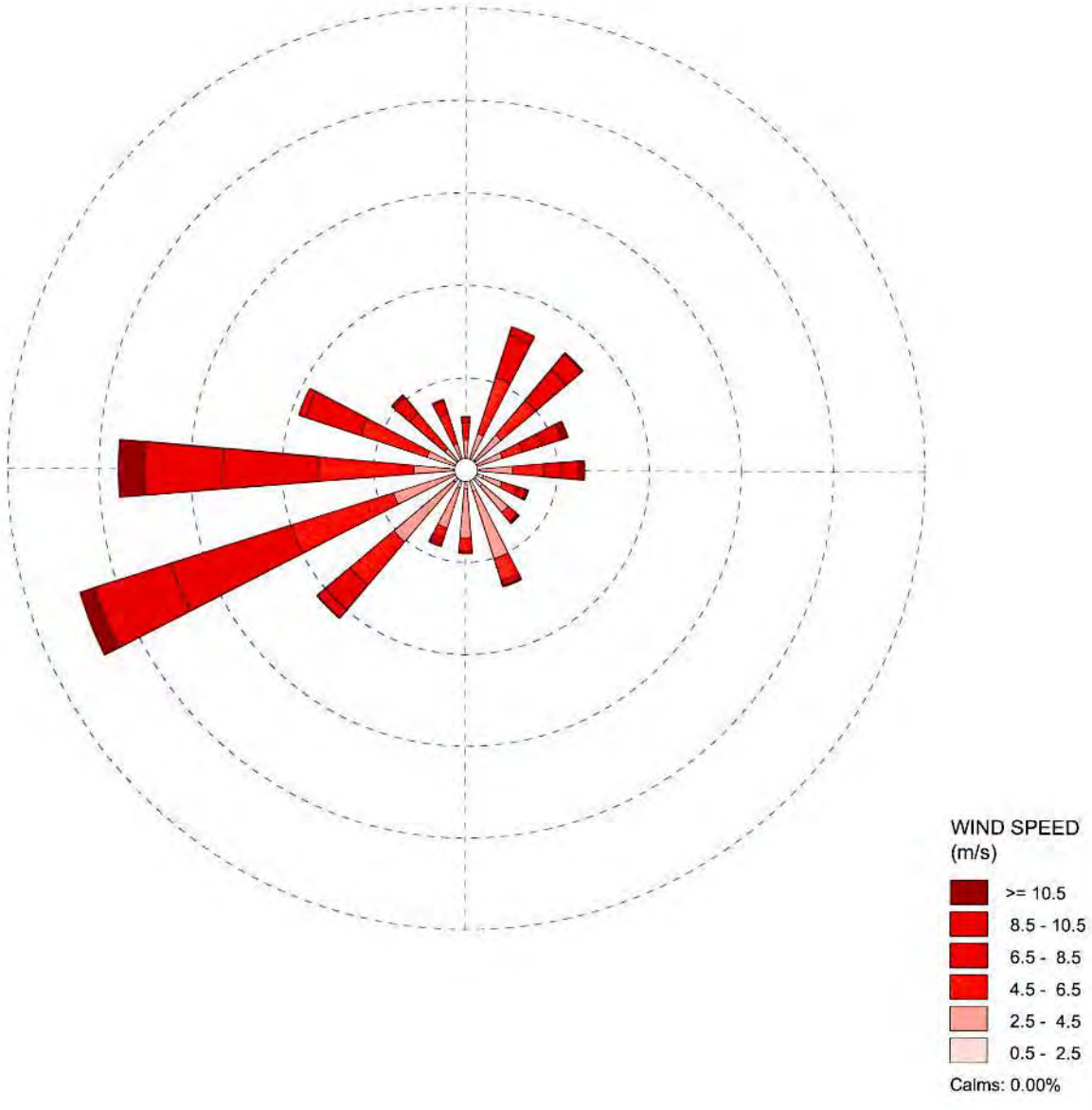
Meteorological Data

WIND ROSE PLOT:

Windrose - Annual

DISPLAY:

Wind Speed
Direction (blowing from)



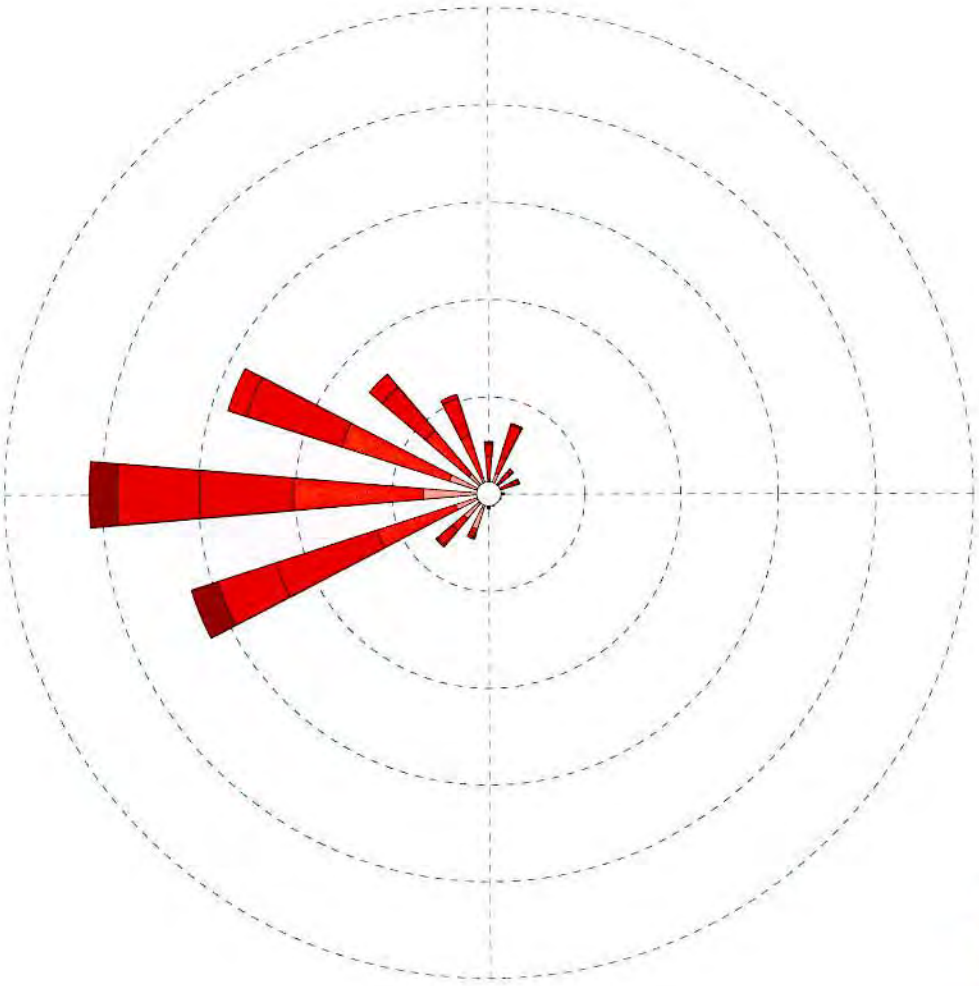
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Jan 1 - Dec 31** **00:00 - 23:00**	**ERM**	
			ERM
		TOTAL COUNT: **8424 hrs.**	
	AVG. WIND SPEED: **5.55 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

Windrose -Jan

DISPLAY:

Wind Speed
Direction (blowing from)



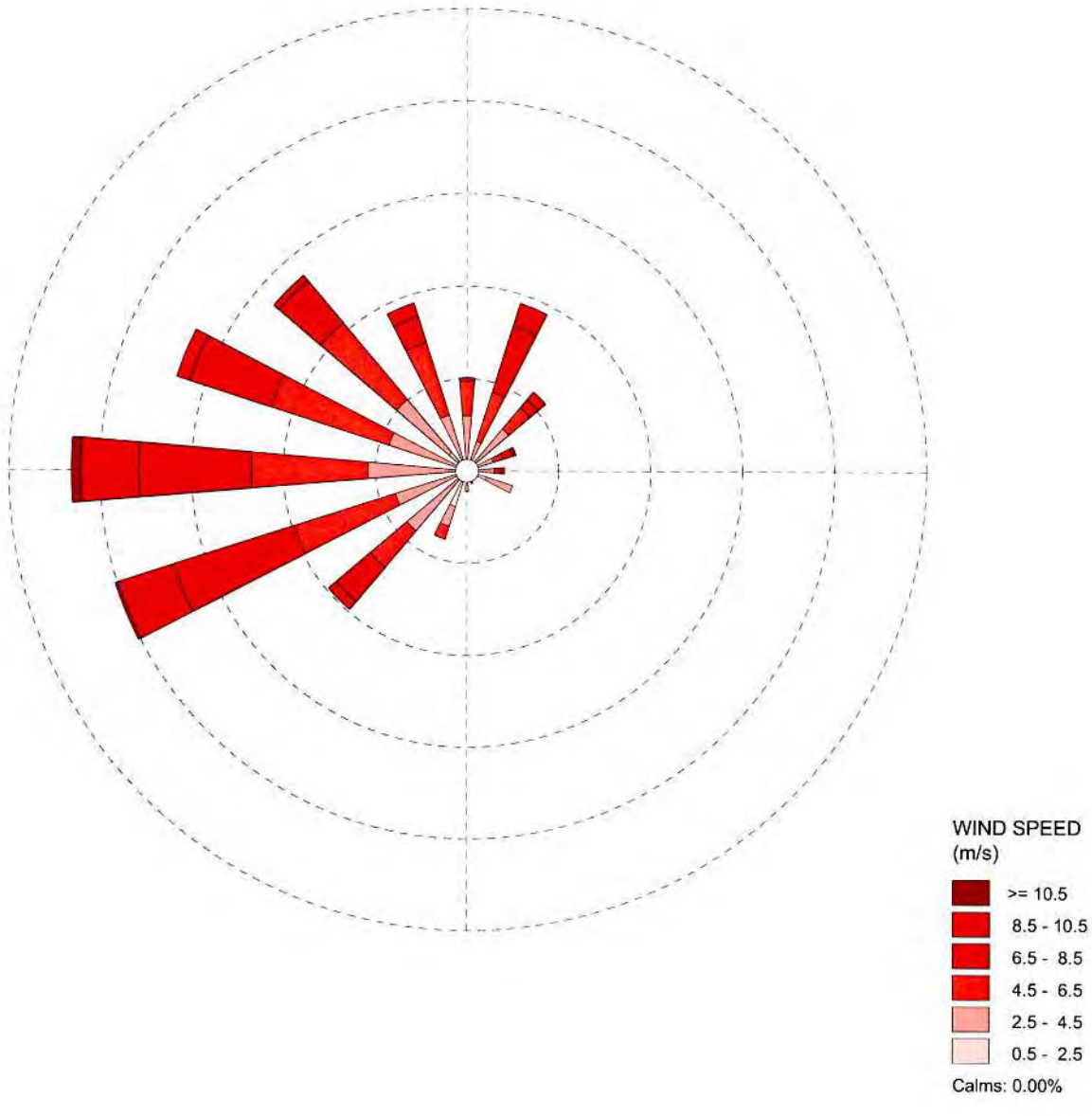
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Jan 1 - Jan 31** **00:00 - 23:00**	**ERM**	
			ERM
		TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **6.27 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

Windrose - Feb

DISPLAY:

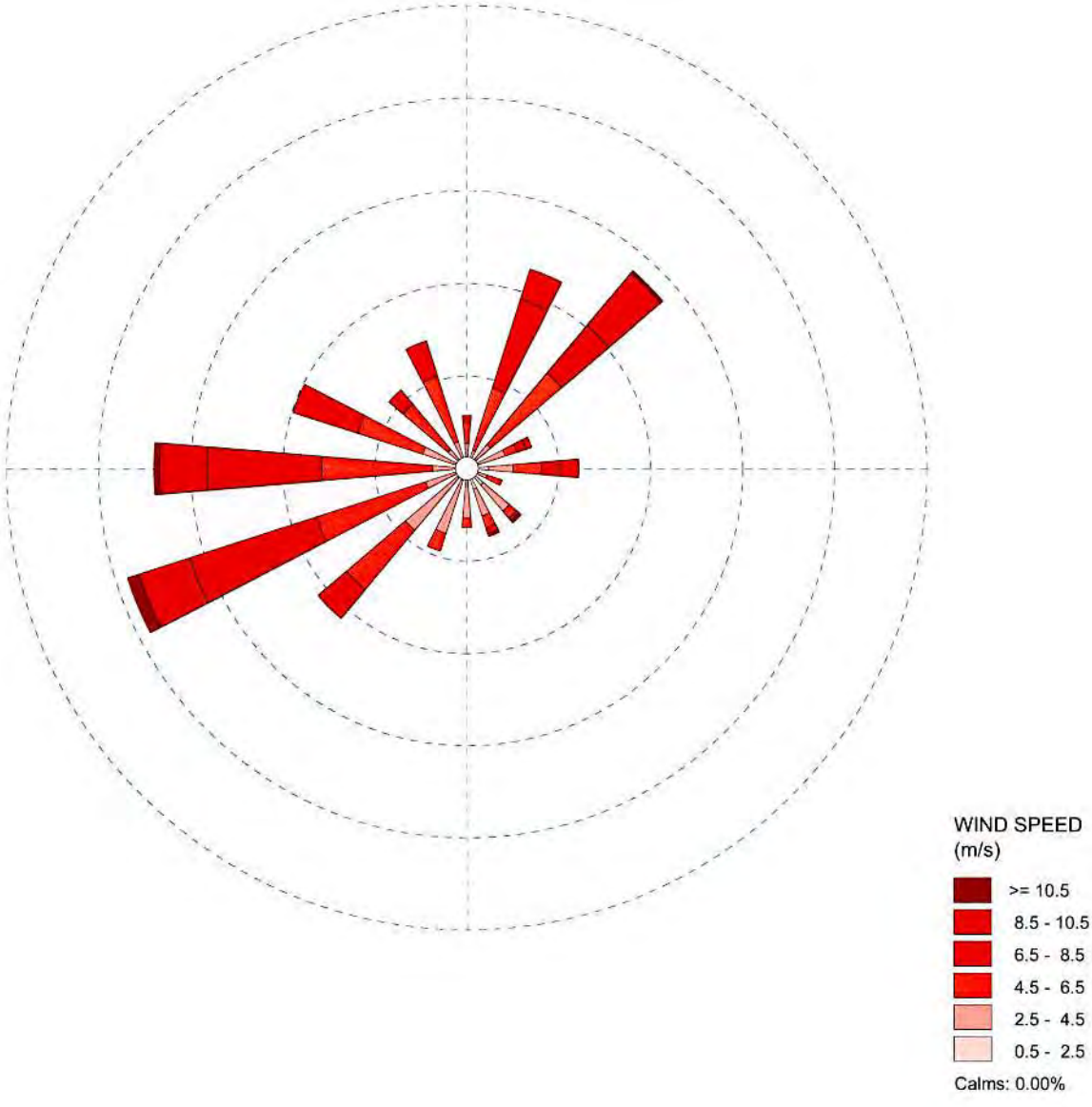
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Feb 1 - Feb 28** **00:00 - 23:00**	**ERM**	
		TOTAL COUNT:	
		672 hrs.	
	AVG. WIND SPEED:	DATE:	PROJECT NO.:
	5.41 m/s	**21/12/2009**	**0086269**

WIND ROSE PLOT:

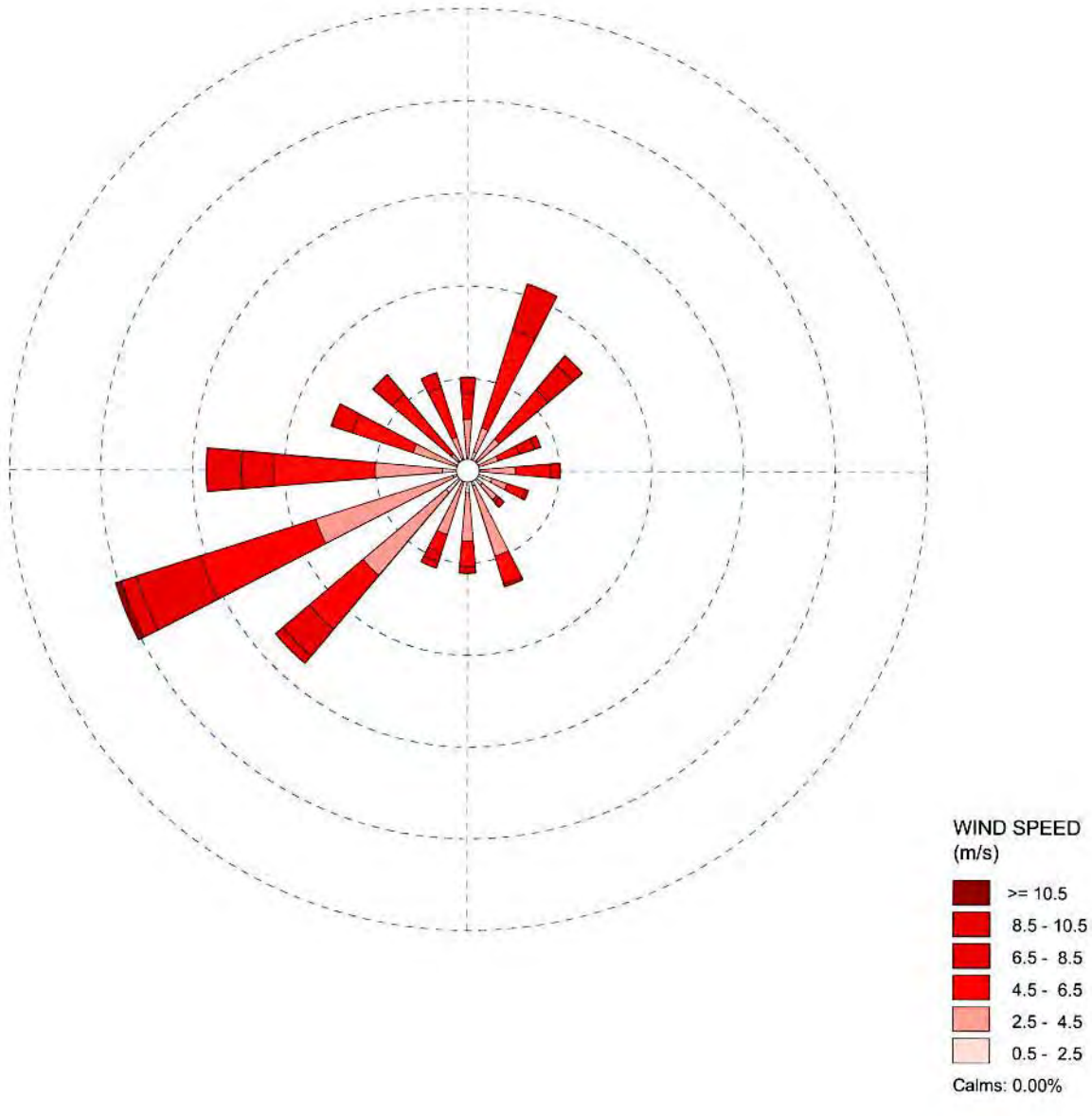
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Mar 1 - Mar 31** **00:00 - 23:00**	**ERM**	
		TOTAL COUNT:	
		744 hrs.	ERM
	AVG. WIND SPEED:	DATE:	PROJECT NO.:
	5.73 m/s	**21/12/2009**	**0086269**

WIND ROSE PLOT:

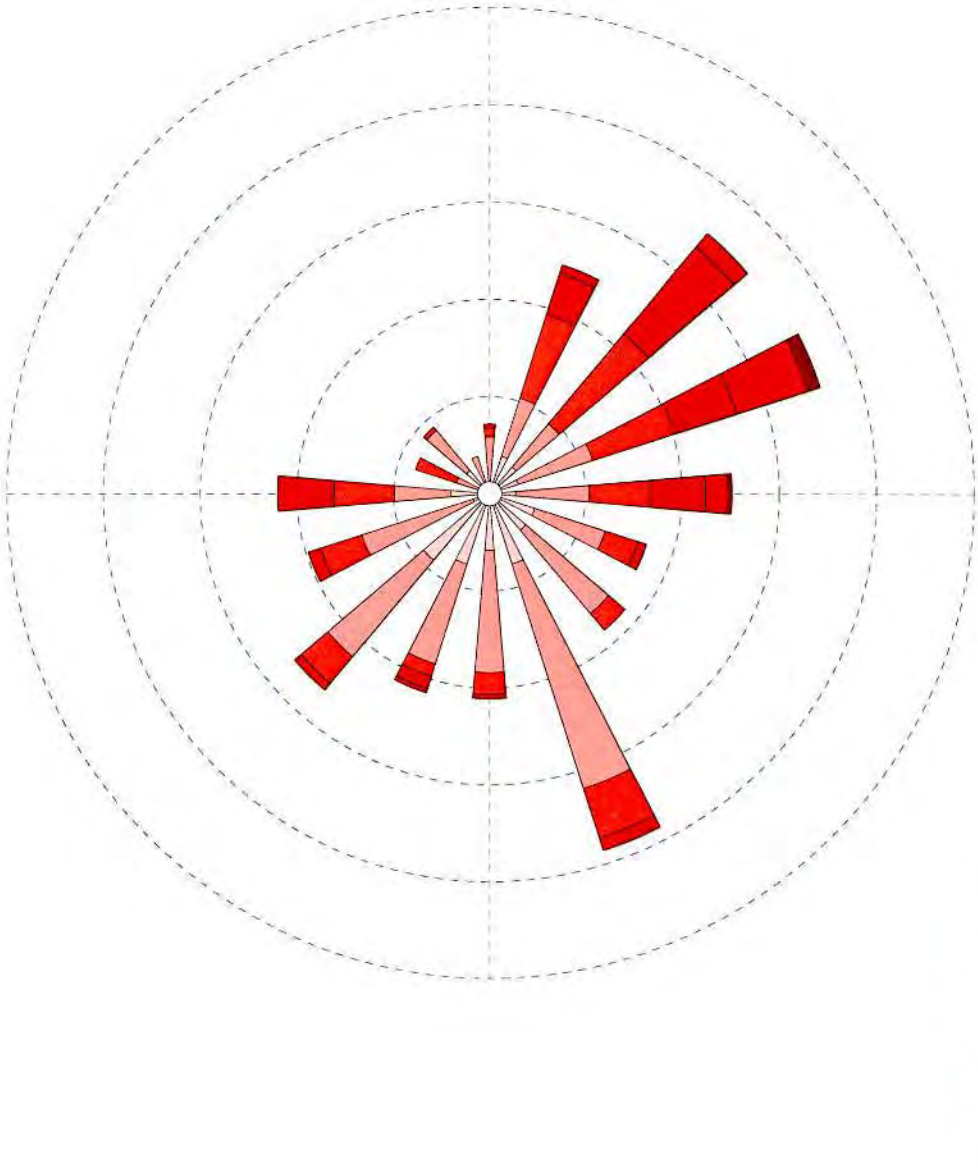
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Apr 1 - Apr 30** **00:00 - 23:00**	**ERM**	
			ERM
		TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **4.71 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

DISPLAY:
Wind Speed
Direction (blowing from)

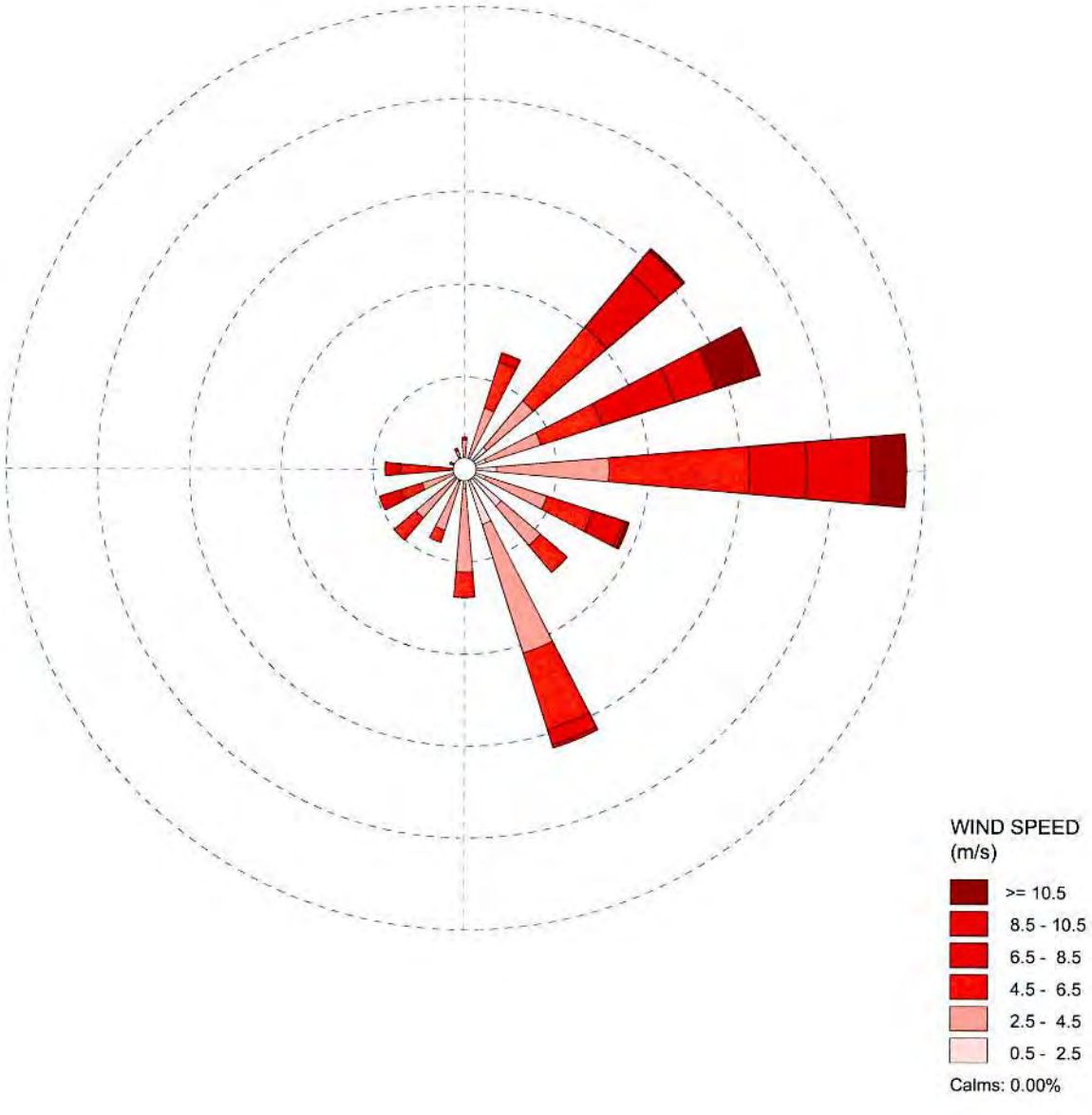


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **May 1 - May 31** **00:00 - 23:00**	**ERM**	
		TOTAL COUNT:	
		744 hrs.	
	AVG. WIND SPEED:	DATE:	PROJECT NO.:
	4.18 m/s	**21/12/2009**	**0086269**

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

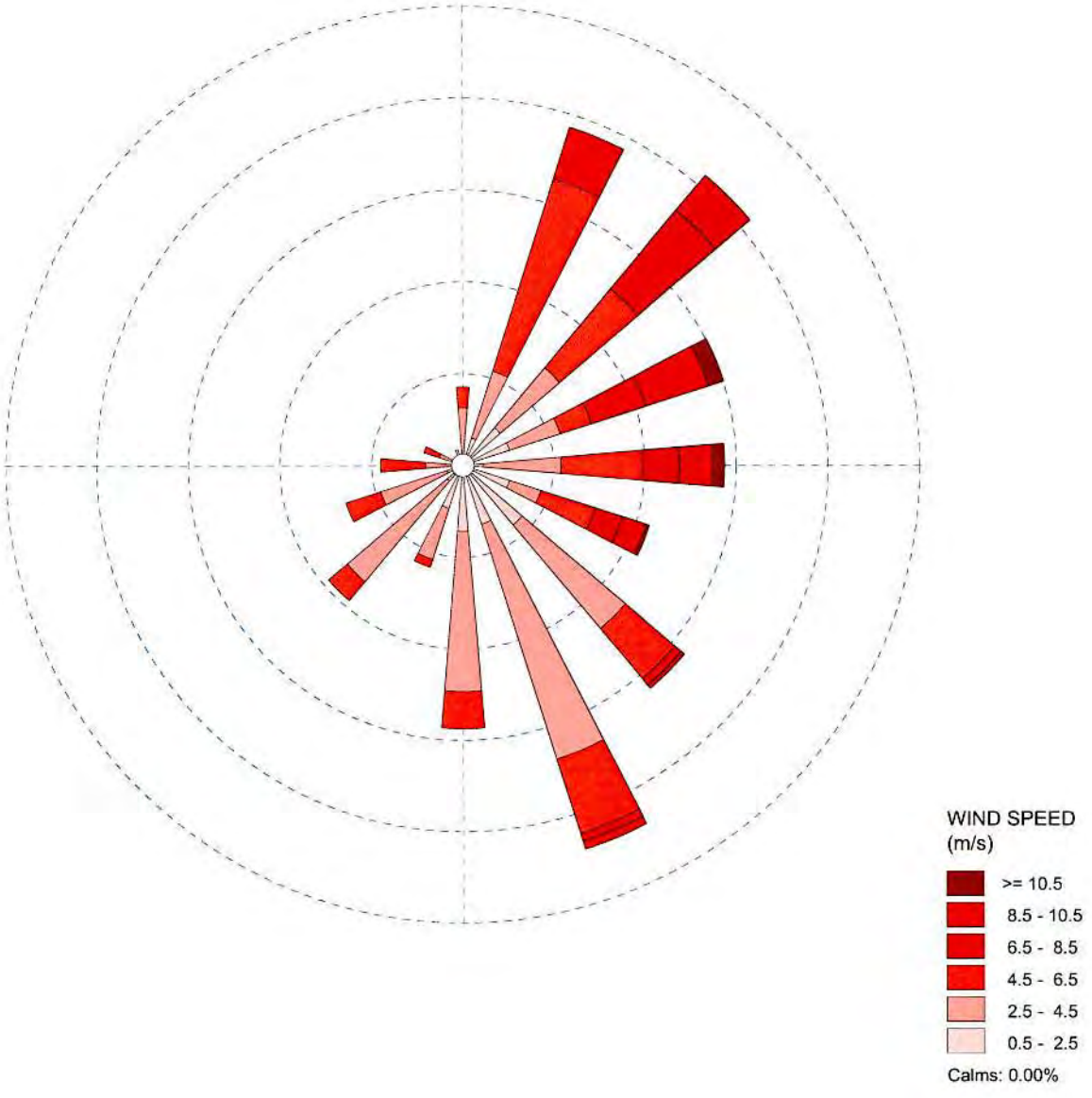
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2005** **Jun 1 - Jun 30** **00:00 - 23:00**	COMPANY NAME: **ERM**	
			ERM
		TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **4.92 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

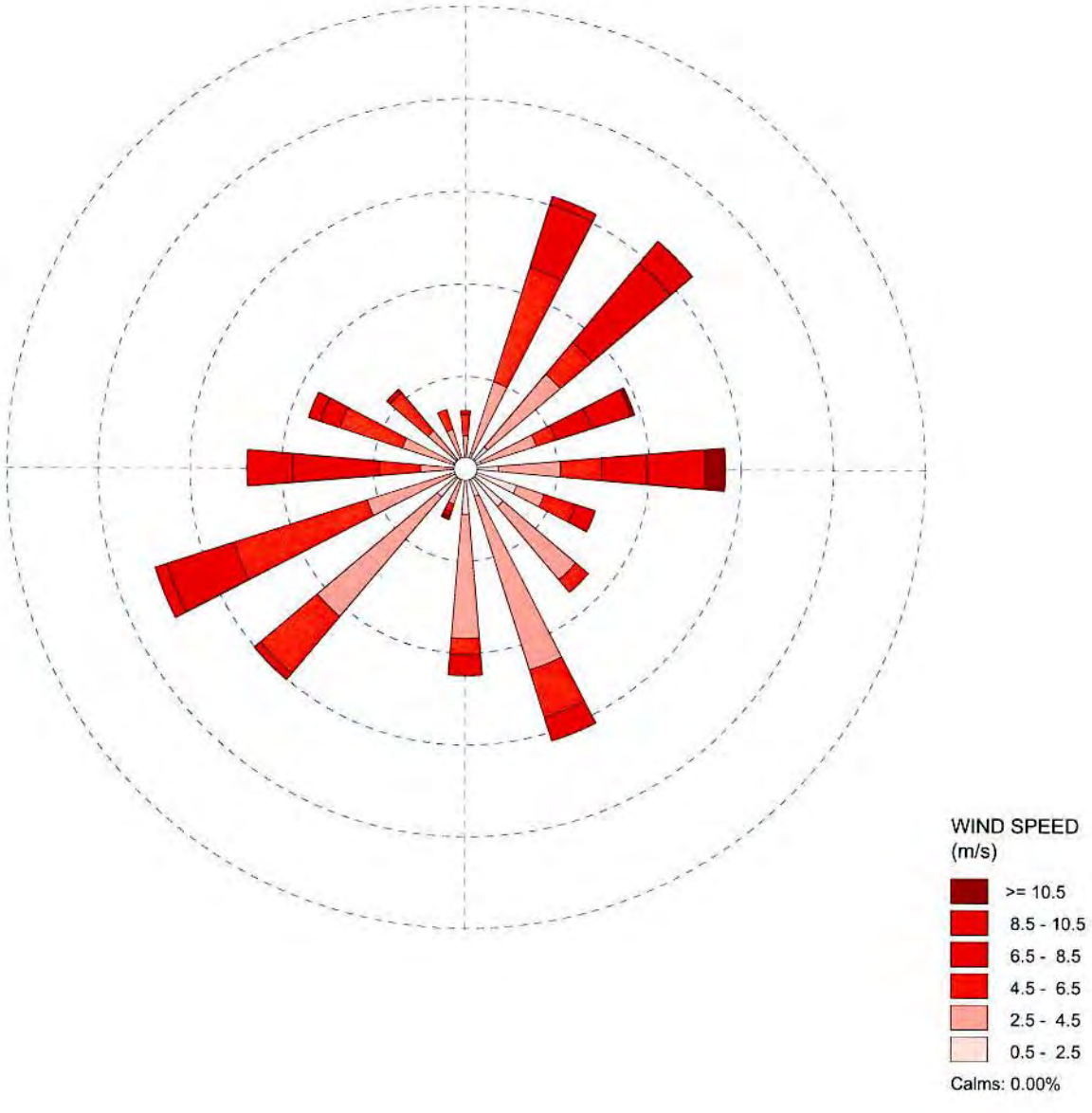
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2005** **Jul 1 - Jul 31** **00:00 - 23:00**	COMPANY NAME: **ERM**	
			ERM
		TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **4.38 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

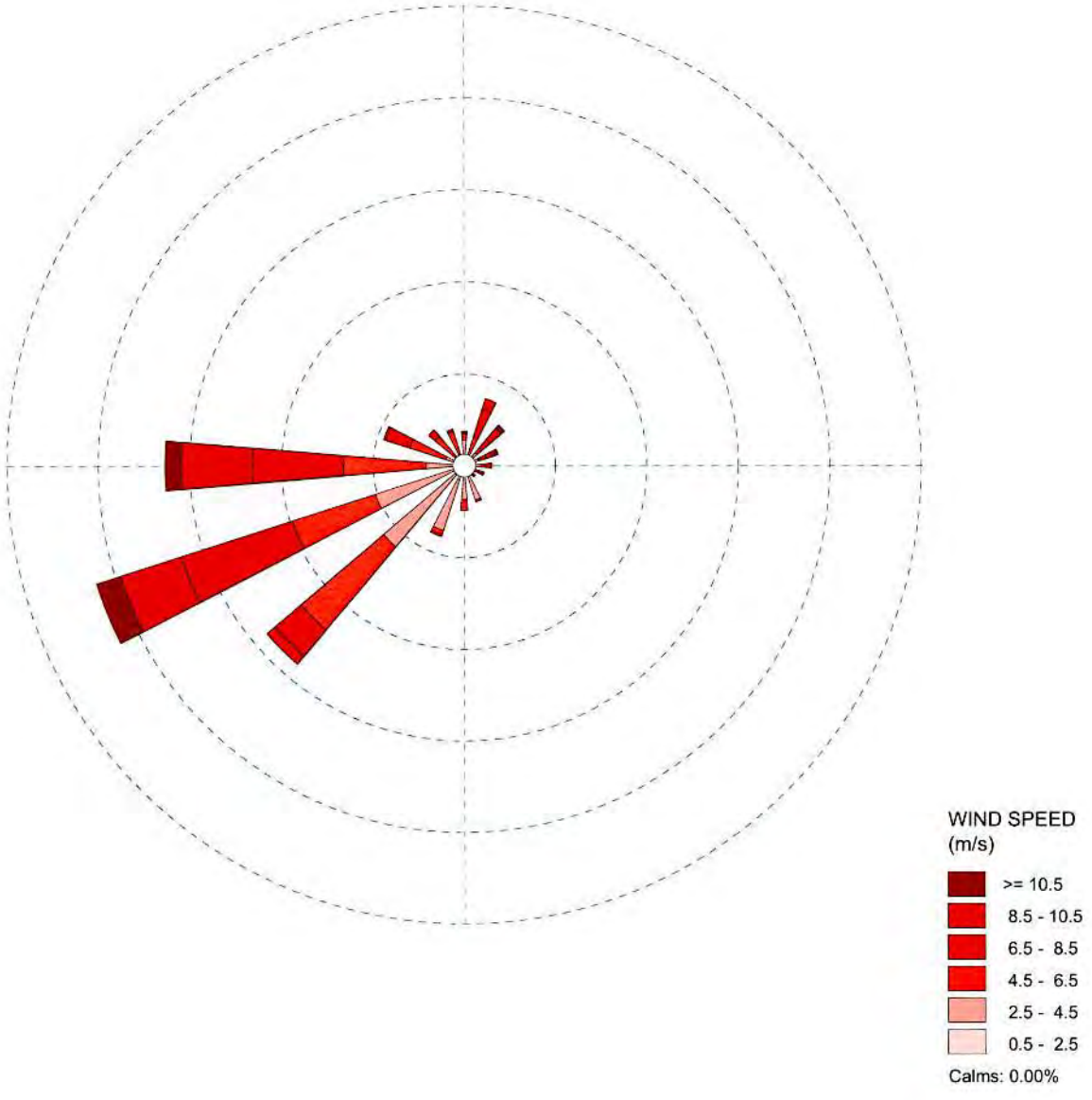
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2005** **Aug 1 - Aug 31** **00:00 - 23:00**	COMPANY NAME: **ERM**	
			ERM
		TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **4.82 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

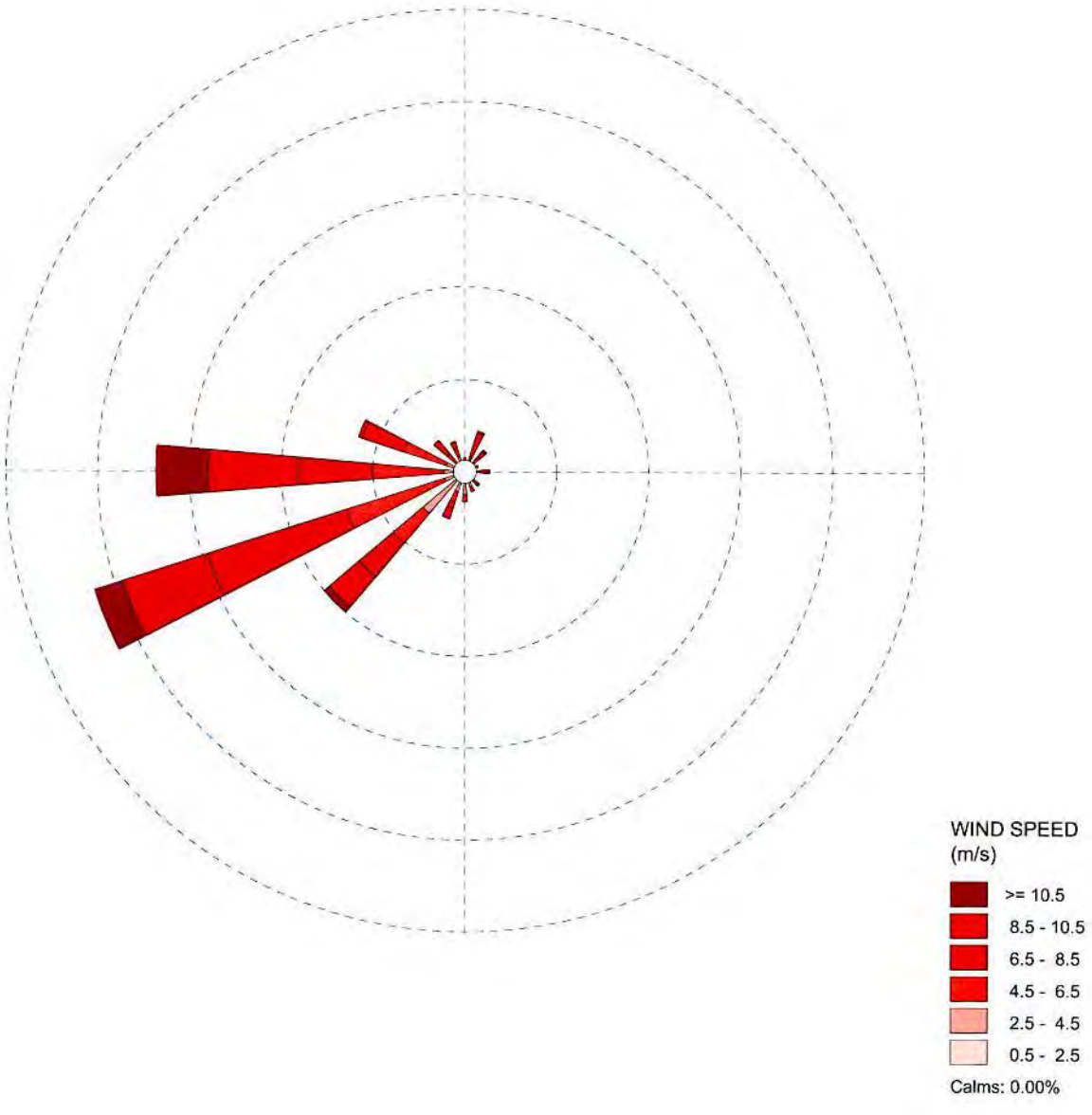
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Sep 1 - Sep 30** **00:00 - 23:00**	**ERM**	
			ERM
		TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **5.77 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

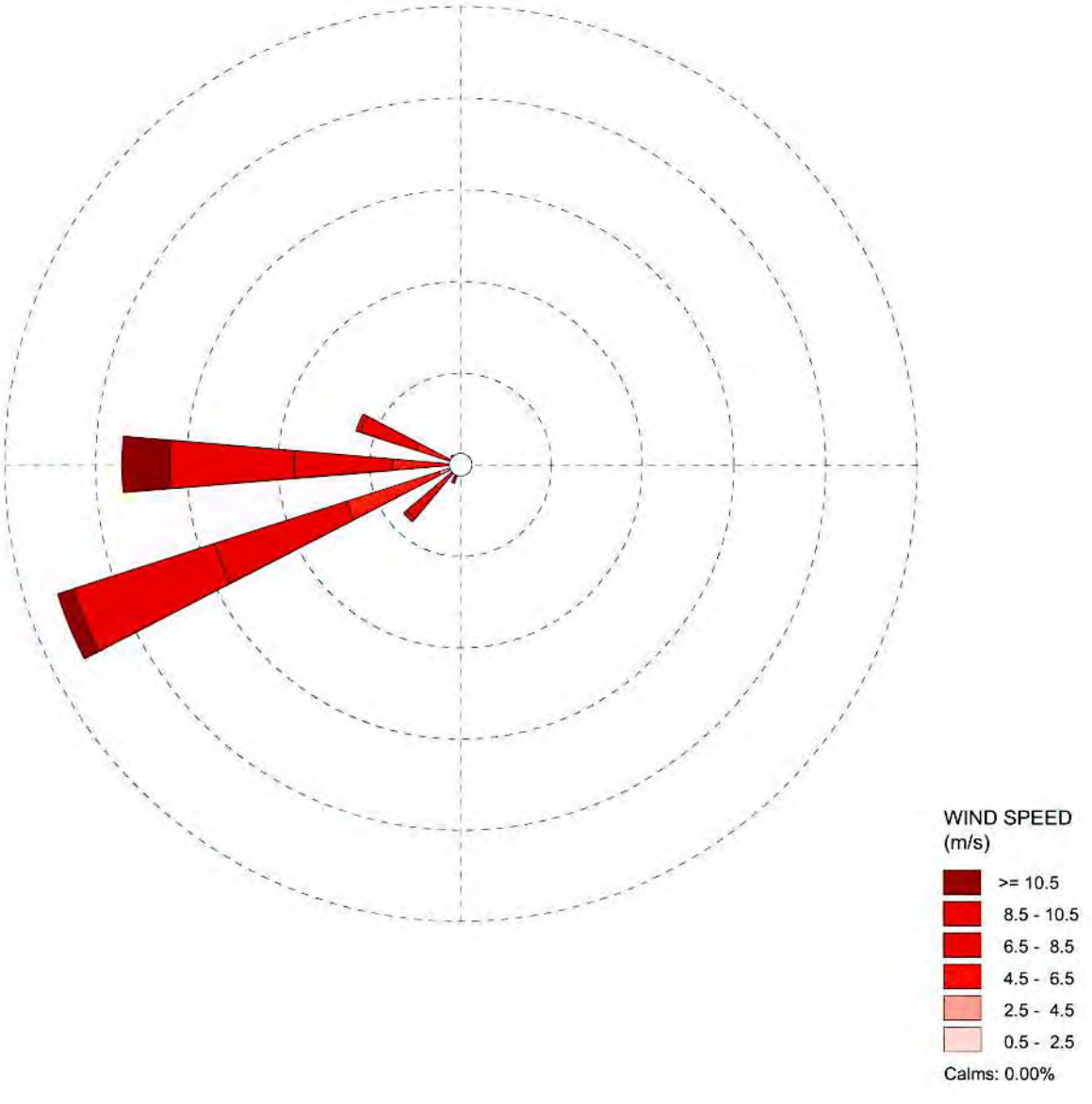
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Oct 1 - Oct 31** **00:00 - 23:00**	**ERM**	
			ERM
		TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **6.79 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

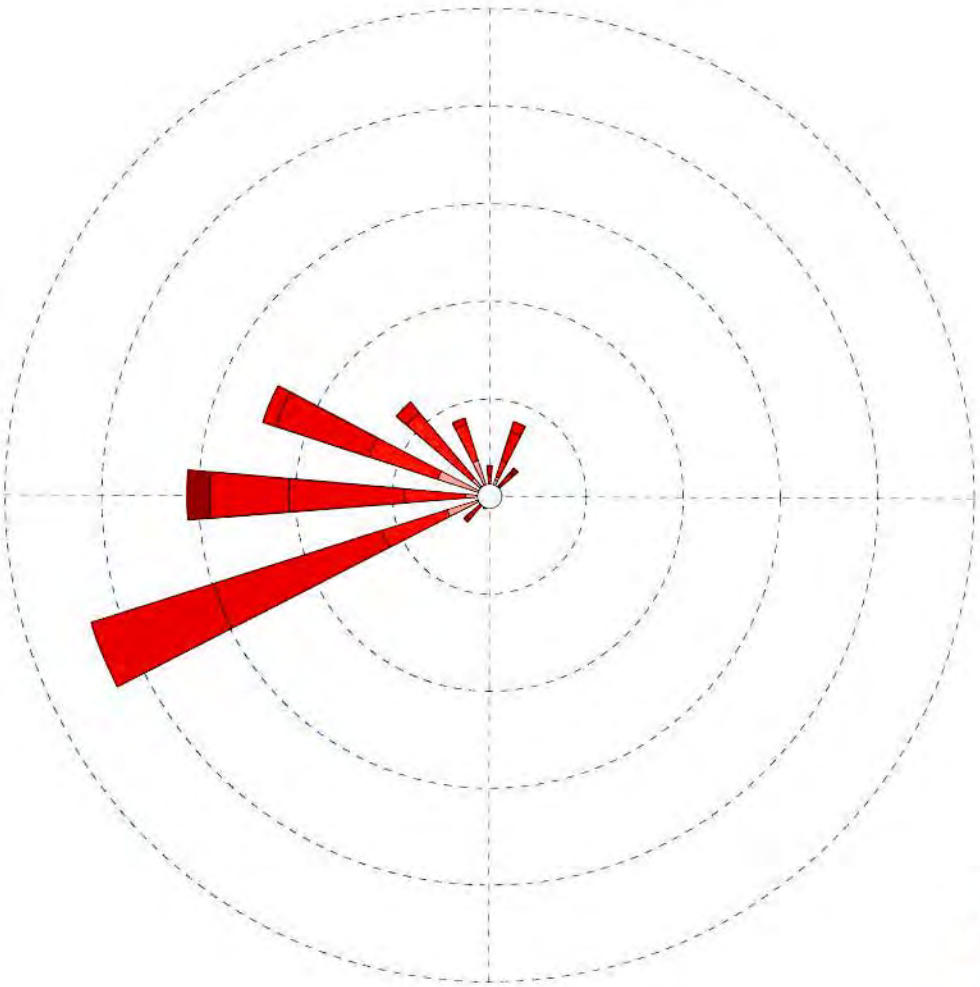
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005 **Nov 1 - Nov 30** **00:00 - 23:00**	**ERM**	
		TOTAL COUNT: **720 hrs.**	ERM
	AVG. WIND SPEED: **7.53 m/s**	DATE: **21/12/2009**	PROJECT NO.: **0086269**

WIND ROSE PLOT:

DISPLAY:
Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 10.5
- 8.5 - 10.5
- 6.5 - 8.5
- 4.5 - 6.5
- 2.5 - 4.5
- 0.5 - 2.5

Calms: 0.00%

COMMENTS:

DATA PERIOD:
2005
Dec 1 - Dec 31
00:00 - 23:00

COMPANY NAME:
ERM

TOTAL COUNT:
408 hrs.

AVG. WIND SPEED:
6.59 m/s

DATE:
21/12/2009

PROJECT NO.:
0086269