Technical Ammonium Nitrate Production Facility, Burrup Peninsula

Burrup Nitrates Pty Ltd

Report and recommendations of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia

Report 1379
January 2011
Environmental Impact Assessment Process Timelines

<table>
<thead>
<tr>
<th>Date</th>
<th>Progress stages</th>
<th>Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/04/09</td>
<td>Level of assessment set (date appeals process completed)</td>
<td></td>
</tr>
<tr>
<td>08/02/10</td>
<td>Proponent document released for public comment</td>
<td>43</td>
</tr>
<tr>
<td>05/04/10</td>
<td>Public comment period closed</td>
<td>8</td>
</tr>
<tr>
<td>08/12/10</td>
<td>Final proponent response to the issues raised</td>
<td>35</td>
</tr>
<tr>
<td>05/01/11</td>
<td>*EPA report to the Minister for Environment</td>
<td>5</td>
</tr>
<tr>
<td>10/01/11</td>
<td>Publication of EPA report</td>
<td>5</td>
</tr>
<tr>
<td>24/01/11</td>
<td>Close of appeals period</td>
<td>2</td>
</tr>
</tbody>
</table>

STATEMENT ON TIMELINES

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

*In this case, the Environmental Protection Authority did meet its agreed timeline objective of 10 weeks for the completion of the assessment and provision of a recommendation to the Minister.

Paul Vogel  
Chairman  
10 January 2011  

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Summary and recommendations

This report provides the Environmental Protection Authority’s (EPA’s) advice and recommendations to the Minister for Environment on the proposal by Burrup Nitrates Pty Ltd to construct and operate a technical ammonium nitrate production facility (TANPF) on Site D within the King Bay/Hearson Cove Industrial Estate. The proposal is located on the Burrup Peninsula approximately 13 kilometres (km) north-west of Karratha.

Section 44 of the Environmental Protection Act 1986 (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- the key environmental factors identified in the course of the assessment; and
- the EPA’s recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the EP Act.

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Air quality;
(b) Biodiversity;
(c) Surface water and groundwater; and
(d) Liquid waste disposal.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

(a) The precautionary principle;
(b) The principle of intergenerational equity;
(c) The principle of the conservation of biological diversity and ecological integrity;
(d) Principles relating to improved valuation, pricing and incentive mechanisms; and
(e) The principle of waste minimisation.

**Conclusion**

The EPA has considered the proposal by Burrup Nitrates Pty Ltd to construct and operate a TANPF on Site D within the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula.

**Air quality**

Under normal operating conditions the TANPF is not expected to be a major source of emissions in the region.

Cumulative 1-hour average nitrogen dioxide (NO₂) ground level concentrations (GLCs) at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be below the relevant National Environment Protection Measure (NEPM) criteria.

The EPA notes that 1-hour average ammonia (NH₃) GLCs are predicted to be below applicable criteria at Hearson Cove, Deep Gorge, Dampier, and Karratha when the TANPF is considered in isolation and is operating under normal or non-routine (upset) conditions.

Given that the NH₃ and PM₁₀ stack emission concentrations from the TANPF ammonium nitrate prilling plant “common stack” are expected to be above those listed in both European Fertilizer Manufacturers Association (EFMA) Best Available Techniques for Pollution Prevention and Control in the European Fertilizer Industry Booklet No. 6: Production of Ammonium Nitrate and Calcium Ammonium Nitrate and the European Commission Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals - Ammonia, Acids and Fertilisers (August 2007) for prilling tower stacks, and those proposed for a similar plant in Western Australia, the EPA does not consider that the TANPF would be achieving best practice emission control performance.

In view of the above, the EPA considers that Condition 5 should be imposed on the proponent to adopt and implement best practice pollution control technology as determined by the Chief Executive Officer of DEC on advice of the Chief Executive Officer of the Office of the EPA to minimise NH₃ and particulate [as total suspended particulates (TSP)] emissions from the TANPF ammonium nitrate prilling plant “common stack”.

The EPA also considers that stack and plant emissions from the TANPF can be adequately regulated through Part V of the EP Act. The EPA expects DEC to incorporate stack emission concentration figures in the Works Approval and Licence that are commensurate with the use of best practice pollution control technology.
Impact of atmospheric emissions on petroglyphs (rock art)

Based on the results obtained from the Pluto LNG Development Cumulative Air Quality Study (SKM, 2006), the CSIRO study on the impact of industrial air emissions on rock art located on the Burrup Peninsula (CSIRO, 2007), and the Burrup Peninsula Air Pollution Study: Report for 2004/2005 and 2007/2008 (CSIRO, 2008), the EPA considers that it is unlikely that the relatively small quantities of NO₂ and NH₃ that would be emitted from the TANPF would have a significant impact on rock art in the surrounding areas.

Biodiversity

Flora and vegetation

Approximately 35 hectares (ha) of vegetation would be cleared during preparation of the TANPF site. The TANPF site adjoins the proposed 5,000 ha Burrup Peninsula Conservation Reserve.

No Declared Rare Flora (DRF) or Priority flora species were identified on the TANPF site during the flora field survey.

The majority of vegetation communities and their associated flora species that are known to occur within the TANPF site are considered to be well represented within the region. Accordingly, the EPA considers that these communities and flora species are unlikely to be significantly affected by the proposed development.

In the case of the Sm vegetation community associated with the supra-tidal flat and saline inlet, it is considered that the vegetation community is adequately reserved for conservation and therefore is unlikely to be adversely affected by construction of the TANPF.

Rehabilitation

The EPA has recommended Condition 6 which provides for ongoing rehabilitation of areas not used for the facility, the management of weeds, and subsequent rehabilitation of the site when operations cease.

Fauna

In view of the presence of large areas of supra-tidal flat to the south and west of the TANPF site, the EPA considers that the loss of approximately 7.6 ha of foraging habitat due to site preparation would not have an adverse impact on migratory and marine bird species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and/or Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). The EPA considers that Condition 7-1 should be imposed on the proponent to employ netting and/or other structures and apparatus to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation.
pond in order to minimise potential impacts on migratory and marine bird species during operation of the TANPF.

Other fauna species are not expected to be adversely affected by the proposed development.

The EPA considers that Condition 7-2 should be imposed on the proponent to ensure that impacts to fauna resulting from exposed trenches and other construction related voids are managed in an environmentally acceptable manner.

**Surface water and groundwater**

**Surface water**

The EPA notes the concern raised in the public submissions in regard to the need for the design of bunding and other mitigation measures to be developed in consultation with the Department of Environment and Conservation (DEC). This can be adequately addressed via regulation under Part V of the EP Act by incorporating this requirement into the Works Approval for the proposal.

**Groundwater**

The proponent has not yet undertaken detailed hydrogeological studies to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas. Although the proponent intends to collect baseline data on groundwater at the TANPF site prior to the commencement of construction, the EPA considers that Condition 8 should be imposed to quantify groundwater, develop management measures for dewatering, establish groundwater monitoring bores and a sampling and monitoring regime, and implement appropriate procedures in the event that trigger levels are exceeded.

**Liquid waste disposal**

The 104 megalitres per year (ML/yr) of purified process condensate wastewater that would be produced by the TANPF would contain approximately 15 parts per million (ppm) (~ 15,000 µg/L) of nitrogen from ammonia (NH₃) and 15 ppm of nitrogen from ammonium nitrate (NH₄NO₃). The nitrogen (N) content of the purified process condensate wastewater would consist of both ammonia as nitrogen (NH₃-N) and nitrate as nitrogen (NO₃-N).

Modelling indicates that the 15,000 µg/L of nitrogen from NH₃ in the purified process condensate wastewater would be diluted down to a concentration of approximately 6.7 µg/L at the edge of the mixing zone. This concentration is well below the trigger value for the protection of 99% of species for NH₃ (as TOTAL NH₃ as NH₃-N) of 500 µg/L listed in the (ANZECC/ARMCANZ, 2000) guidelines.

The proponent has advised that it would make the necessary provisions in consultation with the Water Corporation to facilitate the installation of a sodium metabisulphite dosing station to decompose oxidising biocides prior to discharge into the Water Corporation’s multi user brine return line (MUBRL).
The EPA considers that the discharge of wastewater from the TANPF into the MUBRL can be adequately regulated under Part V of the EP Act.

Although no detailed technical information on the design of the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond was provided by the proponent, the EPA considers that the design of these ponds can be adequately regulated under the requirements of Part V of the EP Act and the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.

The EPA has also recommended conditions relating to the management of acid sulfate soils (Condition 9) and final decommissioning of the site (Condition 10).

The EPA has provided other advice regarding the need for an air quality management strategy for the Burrup Peninsula given that cumulative 1-hour average NO₂ GLCs are approaching the applicable NEPM criteria.

The EPA has therefore concluded that it is unlikely that the EPA’s objectives would be compromised provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is for the construction and operation of a TANPF on Site D within the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula;

2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;

3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA’s objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent’s commitments; and

4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Burrup Nitrates Pty Ltd to construct and operate a TANPF on Site D within the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:
(a) the adoption and implementation of best practice pollution control technology to minimise NH$_3$ and particulate emissions from the TANPF ammonium nitrate prilling plant “common stack”;

(b) rehabilitation and decommissioning of the TANPF site;

(c) installation of netting and/or other structures and apparatus to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond;

(d) ensuring that impacts to fauna resulting from exposed trenches and other construction related voids are managed in an environmentally acceptable manner;

(e) requiring the proponent to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas at least 12 months prior to construction;

(f) requiring the proponent to develop appropriate management measures for dewatering on advice of DEC and the Department of Water in the event that it is required during construction;

(g) requiring the proponent to design, construct, and locate the groundwater monitoring bores within and around the TANPF site in consultation with DEC and the Department of Water, sample/monitor all groundwater bores every six months, set appropriate groundwater monitoring trigger values, and implement appropriate procedures in the event that trigger levels are exceeded; and

(h) requiring the proponent to undertake intrusive ASS investigations prior to the commencement of construction, and to treat and manage ASS in accordance with the requirements of DEC’s draft guideline on the treatment and management of acid sulfate soils and water in acid sulfate soil landscapes (DEC, 2009).
1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by Burrup Nitrates Pty Ltd to construct and operate a technical ammonium nitrate production facility (TANPF) on Site D within the King Bay/Hearson Cove Industrial Estate. The proposal is located on the Burrup Peninsula approximately 13 km north-west of Karratha (Figure 1).

The proposal was referred to the EPA on 11 November 2008, and on 15 April 2009 the level of assessment was set at Public Environmental Review (PER) under section 38 of the EP Act. The PER document was made available for a public review period of eight weeks commencing on 8 February 2010 and ending on 5 April 2010.

The EPA’s decision to assess the proposal at the level of PER was based on four key environmental factors; air quality, biodiversity, surface water and groundwater, and liquid waste disposal.

The proposal was determined to be a controlled action under the EPBC Act as it may impact on a National Heritage listed place (Sections 15B & 15C), listed threatened species and communities (Sections 18 & 18A), and listed migratory species (Sections 20 & 20A). The EPA is undertaking the environmental impact assessment of the proposal under the bilateral agreement between the Commonwealth and Western Australian Governments.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The Conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other advice by the EPA, Section 6 presents the EPA’s conclusions and Section 7, the EPA’s Recommendations.

Appendix 5 contains a summary of submissions and the proponent’s response to submissions and is included as a matter of information only and does not form part of the EPA’s report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.
2. The proposal

The proposal involves the construction and operation of a technical ammonium nitrate production facility (TANPF) on Site D within the King Bay/Hearson Cove Industrial Estate. The proposal is located on the Burrup Peninsula approximately 13 km north-west of Karratha (Figure 1). The TANPF would be located to the east and immediately adjacent to the Burrup Fertilisers Pty Ltd (BFPL) ammonia plant, and would occupy approximately 35 hectares (ha) of the 79 ha within Site D (Figure 2). This location would enable services and utilities to be shared between the TANPF and the BFPL ammonia plant and would result in a smaller project footprint and a reduced environmental impact. A conceptual plant layout is shown in Figure 3.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 5 of the PER document (Burrup Nitrates Pty Ltd, 2010).

Table 1: Summary of key proposal characteristics

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Project life</td>
<td>20+ years.</td>
</tr>
<tr>
<td>Technical ammonium nitrate production facility (TANPF) capacity</td>
<td>350,000 tonnes of technical ammonium nitrate (TAN) per annum.</td>
</tr>
<tr>
<td>Area of project lease</td>
<td>Site D - 79 hectares.</td>
</tr>
<tr>
<td>Area of disturbance</td>
<td>35 hectares.</td>
</tr>
<tr>
<td><strong>Main process units</strong></td>
<td></td>
</tr>
<tr>
<td>Nitric acid plant</td>
<td>Capacity - 760 tonnes per day.</td>
</tr>
<tr>
<td>Ammonium nitrate solution plant</td>
<td>Capacity - 965 tonnes per day.</td>
</tr>
<tr>
<td>TAN prilling plant</td>
<td>Capacity - 915 tonnes per day.</td>
</tr>
<tr>
<td><strong>Storage, loading, and transport</strong></td>
<td></td>
</tr>
<tr>
<td>Liquid ammonia pipeline between the TANPF and the adjacent Burrup Fertilisers Pty Ltd (BFPL) ammonia plant</td>
<td>710 metres long.</td>
</tr>
<tr>
<td>Bagged TAN storage building</td>
<td>Capacity of 1,800 tonnes.</td>
</tr>
<tr>
<td>Bulk TAN storage building</td>
<td>Capacity of 12,000 tonnes.</td>
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<tr>
<td>TAN bagging facility</td>
<td></td>
</tr>
<tr>
<td>Truck bulk loading system</td>
<td></td>
</tr>
<tr>
<td>Nitric acid buffer storage</td>
<td>Two tanks with total capacity of 3,000 cubic metres.</td>
</tr>
<tr>
<td>Ammonium nitrate solution storage</td>
<td>One tank with a capacity of 500 tonnes.</td>
</tr>
<tr>
<td>Wastewater discharge pipeline</td>
<td>Connecting the TANPF to the Water Corporation facility.</td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
</tr>
<tr>
<td>Power requirement</td>
<td>8.5 MW of which 5 MW will be sourced from the adjacent BFPL ammonia plant and approximately 3.5 MW will be generated by excess steam from the nitric acid plant.</td>
</tr>
<tr>
<td>Potable water</td>
<td>2 cubic metres per hour from the Water Corporation.</td>
</tr>
<tr>
<td>Seawater</td>
<td>456 cubic metres per hour from the Water Corporation.</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
</tr>
<tr>
<td>Nitrogen oxides (NOx)</td>
<td>Up to 135 t/yr.</td>
</tr>
<tr>
<td>Nitric acid plant stack - up to 4.2 g/s.</td>
<td></td>
</tr>
<tr>
<td>Nitric acid plant storage tanks - Vents A &amp; B - up to 0.04 g/s each vent.</td>
<td></td>
</tr>
<tr>
<td>Nitrous oxide (N₂O)</td>
<td>Up to 163.7 t/yr, 5.5 g/s.</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>Up to 41 t/yr, 1.3 g/s.</td>
</tr>
<tr>
<td>Methane (CH₄)</td>
<td>Up to 17.8 t/yr, 0.6 g/s.</td>
</tr>
<tr>
<td>Ammonia (NH₃)</td>
<td>Up to 19.5 t/yr.</td>
</tr>
<tr>
<td>Ammonium nitrate prilling plant “common stack” - up to 0.6 g/s.</td>
<td></td>
</tr>
<tr>
<td>Nitric acid plant stack - up to 0.02 g/s.</td>
<td></td>
</tr>
<tr>
<td>Element Description</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
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</tr>
<tr>
<td>PM$_{10}$ particulate matter (as ammonium nitrate dust)</td>
<td>Up to 25.2 t/yr. Ammonium nitrate prilling plant “common stack” - up to 0.8 g/s.</td>
</tr>
<tr>
<td>Sulphur dioxide (SO$_2$)</td>
<td>Trace.</td>
</tr>
<tr>
<td>Carbon dioxide (CO$_2$) [produced]</td>
<td>Up to 532.6 t/yr, 17.8 g/s.</td>
</tr>
<tr>
<td>Total greenhouse gas emissions</td>
<td>Approximately 84,451 tonnes of CO$_2$-e per year.</td>
</tr>
<tr>
<td>Greenhouse gas intensity</td>
<td>Approximately 0.241 tonnes of CO$_2$-e per tonne of TAN.</td>
</tr>
<tr>
<td>Wastewater</td>
<td>Up to 3,104 ML of water per year consisting of up to 3000 ML of sea water blowdown per year and up to 104 ML of purified process condensate per year discharged into the Water Corporation’s multi user brine return line (MUBRL). Up to 24.6 ML of water per year consisting of air conditioning condensate and rainwater from roofs and the parking area will be sent to the clean water pond for evaporation. Up to 9.75 ML of water per year containing impurities will be sent to the contaminated water pond for evaporation.</td>
</tr>
<tr>
<td>Solid waste</td>
<td>Up to 120 kilograms per day (organic matter from the off-specification prills).</td>
</tr>
</tbody>
</table>

Abbreviations:
- CO$_2$-e: carbon dioxide equivalents
- g/s: grams per second
- ML: megalitres (10$^6$ litres)
- MW: megawatts (10$^6$ watts)
- t/yr: tonnes per year

Following the public release of the PER document, the EPA determined that the figure of 747,374 tonnes of CO$_2$-e per year for the Scope 2 greenhouse gas emissions from natural gas-fired electricity generation provided in Table 8.36 of the PER document and the greenhouse intensity figure of 2.28 tonnes of CO$_2$-e per tonne of TAN provided in Section 8.8.3 of the PER document, were both incorrect.

The proponent has informed the EPA that the correct figure for Scope 2 greenhouse gas emissions is 32,780 tonnes of CO$_2$-e per year. Therefore, the total annual greenhouse gas emission figure of 799,045 tonnes of CO$_2$-e per year provided in Table 8.37 of the PER document should in fact be 84,451 tonnes of CO$_2$-e per year. The proponent has also advised that the correct greenhouse intensity figure is 0.241 tonnes of CO$_2$-e per tonne of TAN. These revised figures are reflected in Table 1 above, Appendix 3, and Table 1 in Appendix 4 of this report.

In addition to the above, the proponent’s response to submissions document indicates that water from the clean water pond would be evaporated instead of being discharged to the Water Corporation’s desalination and seawater supply facility (DSSF) as indicated in the PER document. The original quantity of wastewater that would have been discharged from the TANPF is approximately 3,100 ML per year. The revised quantity is approximately 3,104 ML per year consisting of about 3000 ML of sea water blowdown per year and about 104 ML of purified process condensate per year. The quantities of water that would be sent to the clean water pond and contaminated water pond for evaporation would be approximately 24.6 ML/yr and 9.75 ML/yr, respectively. The revised figures are reflected in Table 1 above and in Appendix 4, and Section 3.4 in this report.

The proponent’s response to submissions document also indicates that sewage wastewater would be treated in a dedicated sewage wastewater treatment station. The sanitised clean liquid phase from the station would be sent to a separate evaporation pond and sewage sludge would be collected by authorised personnel using trucks and
transported to an off-site treatment plant. This information is reflected in Section 3.4 in this report.

Following the provision of the above advice, the proponent also advised the EPA that emissions from the TANPF prilling tower would be combined with emissions from drum dryers and the fluid bed cooler prior to entering a drying/cooling scrubber and subsequently being discharged via a “common stack”, rather than being directly discharged through a separate prilling tower stack as indicated in the PER document. As a result of the above change, the proponent has indicated that the TANPF would be designed such that the maximum PM$_{10}$ and NH$_3$ stack emission concentrations from the “common stack” would be limited to 30 mg/Nm$^3$ and 50 mg/Nm$^3$, respectively, which the proponent considers comply with the criteria for stack emission concentrations from “other sources” in the European Fertilizer Manufacturers Association (EFMA) Best Available Techniques for Pollution Prevention and Control in the European Fertilizer Industry Booklet No. 6: Production of Ammonium Nitrate and Calcium Ammonium Nitrate. The proponent also confirmed that under normal operating conditions the PM$_{10}$ and NH$_3$ stack emission concentrations from the “common stack” would be approximately 24 mg/Nm$^3$ and 18 mg/Nm$^3$, respectively. This information is reflected in Table 1 above and in Section 3.1 in this report.

The potential impacts of the proposal initially predicted by the proponent in the PER document (Burrup Nitrates Pty Ltd, 2010) and their proposed management are summarised in Table ES.4 in the Executive Summary of the proponent’s document.
Figure 1: Regional location (Source: Figure 1.1 from Burrup Nitrates Pty Ltd, 2010)
**Figure 2:** Location plan (Source: Figure 4.2 from Burrup Nitrates Pty Ltd, 2010)
Figure 3: Conceptual plant layout (Source: Figure 5.5 from Burrup Nitrates Pty Ltd, 2010)
3. Key environmental factors and principles

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as visual amenity and risk, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA’s opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

(a) Air quality;
(b) Biodiversity;
(c) Surface water and groundwater; and
(d) Liquid waste disposal.

The above key factors were identified from the EPA’s consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.4. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

(a) The precautionary principle;
(b) The principle of intergenerational equity;
(c) The principle of the conservation of biological diversity and ecological integrity;
(d) Principles relating to improved valuation, pricing and incentive mechanisms; and
(e) The principle of waste minimisation.
3.1 Air quality

Description

The main sources of atmospheric emissions from the TANPF would be the nitric acid plant and the ammonium nitrate prilling plant. The nitric acid plant would emit NO\textsubscript{X}, N\textsubscript{2}O, NH\textsubscript{3}, CO, and CH\textsubscript{4} and the ammonium nitrate prilling plant “common stack” would emit NH\textsubscript{3} and ammonium nitrate dust (as PM\textsubscript{10}).

Under normal operating conditions the TANPF would generate approximately:

- 135 tonnes of oxides of nitrogen (NO\textsubscript{X}) per year;
- 163.7 tonnes of nitrous oxide (N\textsubscript{2}O) per year;
- 41 tonnes of carbon monoxide (CO) per year;
- 19.5 tonnes of ammonia (NH\textsubscript{3}) per year;
- 25.2 tonnes of ammonium nitrate dust (as PM\textsubscript{10}) per year; and
- 17.8 tonnes of methane (CH\textsubscript{4}) per year.

Additional NO\textsubscript{X} emissions would also be produced at the adjacent Burrup Fertilisers Pty Ltd (BFPL) plant to provide 5 MW of power to the TANPF. These NO\textsubscript{X} emissions were included in the cumulative air quality assessment undertaken for the PER document as a conservative measure.

Emissions of N\textsubscript{2}O and CH\textsubscript{4} from the nitric acid plant have been treated as greenhouse gas emissions by the proponent. Greenhouse gas emissions are considered in Appendix 3 in this report.

NO\textsubscript{X} emissions from the nitric acid plant would be reduced by passing the tail gas through a catalytic abatement reactor (N\textsubscript{2}O/NO\textsubscript{X} reduction unit) prior to discharge. The PER document indicates that the catalytic abatement reactor would utilise best available technology.

Scrubbers would be used in the TANPF ammonium nitrate prilling plant to reduce NH\textsubscript{3} and PM\textsubscript{10} emissions. The expected NH\textsubscript{3} and PM\textsubscript{10} stack emission concentrations from the TANPF ammonium nitrate prilling plant “common stack” will be approximately 18 mg/Nm\textsuperscript{3} and 24 mg/Nm\textsuperscript{3}, respectively, under normal operating conditions (Environmental Resources Management Australia, 2010c & 2010d).

The nearest residences are found in the towns of Dampier and Karratha, which are located 8 km and 13 km away, respectively. Hearson Cove and Deep Gorge which are located approximately 1 km and 1.5 km away, respectively were considered to be receptor locations for air quality modelling purposes as they are recreational and cultural sites that are frequently visited.
A conservative “worst case” screening approach was adopted for air quality modelling in view of the relatively minor atmospheric emissions from the TANPF and the known complex meteorological conditions on the Burrup Peninsula. Conservative assumptions were used and combined with simple Gaussian plume dispersion computations derived from the dispersion model AUSPLUME Version 6.0. The air quality modelling was used to predict NO₂ and NH₃ 1-hour average ground level concentrations (GLCs).

In order to account for other existing sources of NO₂ on the Burrup Peninsula, the proponent determined that an appropriately conservative background 1-hour average NO₂ GLC could be derived by multiplying the 1-hour average NO₂ GLC of 0.02 parts per million (ppm) measured by the then Department of Environmental Protection (DEP) in 1999 during the Pilbara Air Quality Study (DOE, 2004) by three to obtain a figure of 0.06 ppm (or approximately 112.9 µg/m³).

Cumulative air quality modelling for NH₃ emissions was not undertaken by the proponent as there is no hourly monitoring data or other suitable information available for NH₃. The PER document indicates that the existing Woodside LNG facility and the adjacent BFPL plant are likely to be the main current sources of NH₃. However, the proponent considers that existing NH₃ emissions from these sources are low. The proponent also considers that an assessment of the cumulative impacts of NH₃ emissions is not warranted in the context of the screening approach that was adopted because:

- the calculated NH₃ emissions from the TANPF are very low;
- NH₃ has not been a pollutant of historical concern for regulators on the Burrup Peninsula; and
- NH₃ is not associated with long-term chronic health impacts.

The proponent did not consider CO and ammonium nitrate dust (as PM₁₀) emissions from the TANPF in the air quality modelling that was undertaken for the PER document.

When the TANPF is considered in isolation under normal operating conditions NO₂ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be approximately 5.1 µg/m³, 4.7 µg/m³, 3.0 µg/m³, and 2.5 µg/m³, respectively. During non-routine (upset) operating conditions NO₂ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 34 µg/m³, 32 µg/m³, 17 µg/m³, and 14 µg/m³, respectively. All of the above predicted NO₂ GLCs are well below the National Environment Protection Measure (NEPM) standard of 246 µg/m³.

Cumulative air quality modelling predicts that for normal operating conditions, NO₂ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha would be approximately 118 µg/m³, 117.6 µg/m³, 115.9 µg/m³, and 115.4 µg/m³, respectively. During non-routine (upset) operating conditions NO₂ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to
approximately 147 µg/m³, 145 µg/m³, 130 µg/m³, and 127 µg/m³, respectively. All of the above predicted NO₂ GLCs are below the NEPM standard of 246 µg/m³.

The expected NOₓ emission concentration from the TANPF nitric acid plant stack will be approximately 75 parts per million by volume (ppmv) under normal operating conditions (Environmental Resources Management Australia, 2010b).

When the TANPF is considered in isolation under normal operating conditions NH₃ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be approximately 7.7 µg/m³, 6.9 µg/m³, 2.5 µg/m³, and 1.7 µg/m³, respectively. During non-routine (upset) operating conditions NH₃ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 21 µg/m³, 18 µg/m³, 6.7 µg/m³, and 4.4 µg/m³, respectively. All of the above predicted NH₃ GLCs are well below the 1-hour average criteria of 330 µg/m³ adopted by the proponent [from Department of Environment and Conservation (NSW), 2005] in view of the absence of applicable NEPM or World Health Organisation (WHO) criteria.

The expected NH₃ stack emission concentration from the TANPF nitric acid plant stack will be approximately 0.73 mg/Nm³ (i.e. about 1 ppmv) under normal operating conditions (Environmental Resources Management Australia, 2010c).

**Impact of atmospheric emissions on petroglyphs (rock art)**

The CSIRO undertook a study between 2004 and 2008 to assess the potential for industrial air emissions to damage rock art located on the Burrup Peninsula. Part of the study involved fumigating rock samples in a laboratory with NO₂, NH₃, SO₂, and benzene at concentrations around ten times predicted future industrial annual average GLCs (e.g. maximum NO₂ and NH₃ concentrations were 50 parts per billion (ppb) and 40 ppb, respectively) together with toluene and xylene at concentrations around 10 times predicted future industrial weekly and 24 hour average GLCs, respectively (CSIRO, 2007). 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 (SKM, 2009).

**Submissions**

The main concerns that were raised in the submissions related to the potential impact of air emissions on rock art, vegetation, and the surrounding environment.

**Assessment**

The EPA’s environmental objective for this factor is to ensure that emissions do not adversely affect the environment or health, welfare and amenity of nearby land users by meeting statutory requirements and acceptable standards.

The EPA sought advice from the Department of Environment and Conservation (DEC) Air Quality Management Branch (AQMB) in regard to whether the proponent’s derived 1-hour average NO₂ background GLC and air quality modelling methodology were adequate.
DEC’s AQMB advised that the proponent’s derived 1-hour average NO2 background GLC is “inappropriate as it does not attempt to quantify the cumulative impacts of new industries that have been established since 1999”. Therefore, DEC’s AQMB was unable to verify whether the derived 1-hour average NO2 background GLC of 60 ppb (112.9 µg/m³) is conservative. The AQMB also advised that the cumulative air quality modelling undertaken for the Pluto LNG Development (SKM, 2006) predicts that maximum 1-hour average NO2 concentrations on the Burrup Peninsula can be greater than the proponent’s derived figure of 60 ppb.

DEC’s AQMB noted that the cumulative impacts of other industrial sources in the region had not been appropriately addressed in the air quality modelling. The AQMB indicated that the flaw in the screening approach adopted by the proponent is that it used the maximum 1-hour average NO2 GLC measured at Dampier, which is not representative of regional peaks and does not capture the peak cumulative impacts that would be of use in a screening assessment.

DEC’s AQMB advised the EPA that a more appropriate background 1-hour average NO2 GLC which includes cumulative impacts from other industries is the maximum 1-hour average NO2 GLC of 89 ppb (i.e. approximately 167 µg/m³) from the cumulative air quality modelling undertaken for the Pluto LNG Development (SKM, 2006).

When a 1-hour average NO2 background GLC of 167 µg/m³ is added to the incremental NO2 emissions from the TANPF under normal operation conditions, the predicted cumulative 1-hour average NO2 GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha would be approximately 172.1 µg/m³, 171.7 µg/m³, 170 µg/m³, and 169.5 µg/m³, respectively. During non-routine (upset) operating conditions the cumulative 1-hour average NO2 GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 201 µg/m³, 199 µg/m³, 184 µg/m³, and 181 µg/m³, respectively.

The EPA is aware that the maximum predicted cumulative 1-hour average NO2 GLC at Hearson Cove of 172.1 µg/m³ with the TANPF operating under normal conditions represents about 70% of the applicable NEPM standard of 246 µg/m³. The EPA also understands that the maximum predicted cumulative 1-hour average NO2 GLC at Hearson Cove of 201 µg/m³ with the TANPF operating under non-routine (upset) conditions represents about 81.7% of the NEPM standard.

The EPA is concerned that the airshed capacity for NO2 is being approached on the Burrup Peninsula and agrees with advice provided by DEC’s AQMB that:

- the management of cumulative air quality impacts on the Burrup Peninsula is a significant issue that needs addressing; and
- there is also an urgent need for the establishment of an industry funded and managed ambient air quality monitoring network to underpin future environmental impact assessments.

In view of the above, the EPA has advised the Government in Section 5 of this report (Other advice) that an air quality management strategy for the Burrup Peninsula
which encompasses the above requirements needs to be developed and implemented as soon as possible in order to facilitate future environmental impact assessments and to manage the impacts of future industrial development.

The EPA notes that 1-hour average ammonia (NH₃) GLCs are predicted to be below applicable criteria at Hearson Cove, Deep Gorge, Dampier, and Karratha when the TANPF is considered in isolation and is operating under normal or non-routine (upset) conditions.

The European Fertilizer Manufacturers Association (EFMA) Best Available Techniques for Pollution Prevention and Control in the European Fertilizer Industry Booklet No. 2: Production of Nitric Acid (EFMA Booklet No. 2) indicates that new nitric acid plants can achieve a NOₓ stack emission concentration of 100 ppmv under normal operating conditions. However, the European Commission Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals - Ammonia, Acids and Fertilisers (European Commission, 2007) indicates that new nitric acid plants can achieve a NOₓ stack emission concentration of between 5 ppmv and 75 ppmv under normal operating conditions.

The EPA notes that the expected NOₓ stack emission concentration of 75 ppmv from the TANPF nitric acid plant stack is less than the applicable criteria of 100 ppmv listed in EFMA Booklet No. 2 and equal to the maximum figure listed in the (European Commission, 2007) reference document.

The EFMA Best Available Techniques for Pollution Prevention and Control in the European Fertilizer Industry Booklet No. 6: Production of Ammonium Nitrate and Calcium Ammonium Nitrate (EFMA Booklet No. 6) indicates that prilling towers in new plants can achieve NH₃ and particulate stack emission concentrations of 10 mg/Nm³ and 15 mg/Nm³, respectively, under normal operating conditions. It also indicates that new plants can achieve NH₃ stack emission concentrations of 50 mg/Nm³ from all other individual emission points under normal operating conditions. However, the (European Commission, 2007) reference document indicates that prilling towers producing TAN can achieve a NH₃ stack emission concentration in the range of 4.25 to 6.55 mg/Nm³, and a dust stack emission concentration of 5 mg/Nm³.

Following the release of the PER document the EPA was advised by the proponent that emissions from the TANPF prilling tower would be combined with emissions from drum dryers and the fluid bed cooler prior to entering a drying/cooling scrubber and subsequently being discharged via a “common stack”, rather than being directly discharged through a separate prilling tower stack as indicated in the PER document (Environmental Resources Management Australia, 2010c).

The revised final air flow process diagram for the TANPF ammonium nitrate prilling plant is shown in Figure 4 below.
As a result of the above change, the proponent has indicated that the TANPF would be designed such that the maximum NH$_3$ and PM$_{10}$ stack emission concentrations from the “common stack” would be limited to 50 mg/Nm$^3$ and 30 mg/Nm$^3$, respectively. The proponent also confirmed that under normal operating conditions the NH$_3$ and PM$_{10}$ stack emission concentrations from the “common stack” would be approximately 18 mg/Nm$^3$ and 24 mg/Nm$^3$, respectively (Environmental Resources Management Australia, 2010d).

The EPA notes that the proponent considers that since NH$_3$ and PM$_{10}$ emissions from the prilling tower are to be discharged through a “common stack” (rather than a separate prilling tower stack), the emission limits should be those listed for “other individual emission points” in EFMA Booklet No. 6, which are 50 mg/Nm$^3$ and 30 mg/Nm$^3$, respectively.

The proposed maximum and normal operating condition NH$_3$ and PM$_{10}$ stack emission concentration figures are higher than those specified for prilling towers in new plants in EFMA Booklet No. 6 (i.e. 10 mg/Nm$^3$ and 15 mg/Nm$^3$), and well above the applicable respective figures in the (European Commission, 2007) reference document (i.e. NH$_3$ - 4.25 to 6.55 mg/Nm$^3$ and dust - 5 mg/Nm$^3$).

The EPA also notes that the PER document for CSBP Limited’s proposed Kwinana Ammonium Nitrate Production Expansion Project: Phase 2 (Parsons Brinkerhoff and Strategen, 2010) is currently available for public review. This PER document describes a prilling plant configuration in which:

- air from the prilling plant is scrubbed in the prilling air scrubber to remove entrained fine particulates and vaporised ammonia;
• after scrubbing, the prilling air is recycled to the bottom of the prilling tower by the prilling air scrubber fans;

• waste air from the pre-dryer, dryer, and screen and transfer points dust recovery is sent to the final scrubber to be washed to remove ammonium nitrate particulates and ammonia;

• bleed air from the prilling tower air circulation system is also passed to the final scrubber; and

• after treatment, waste air is discharged into the atmosphere via the final scrubber fan to the prilling plant stack located on top of the prilling tower.

The above PER document (Parsons Brinkerhoff and Strategen, 2010) also indicates that the NH₃ and particulate stack emission concentrations from the proposed prilling plant stack will be approximately 1 mg/Nm³ and 7.6 mg/Nm³, respectively, under normal operating conditions.

It is also noted that emissions from CSBP Limited’s proposed prilling plant are generally handled in a similar manner to those from the TANPF ammonium nitrate prilling plant.

Given that the NH₃ and PM₁₀ stack emission concentrations from the TANPF ammonium nitrate prilling plant “common stack” are expected to be above those listed in both EFMA Booklet No. 6 and the (European Commission, 2007) reference document for prilling tower stacks, and those proposed for a similar plant in Western Australia, the EPA does not consider that the TANPF would be achieving best practice emission control performance.

In view of the above, the EPA considers that Condition 5 should be imposed on the proponent to adopt and implement best practice pollution control technology as determined by the Chief Executive Officer of DEC on advice of the Chief Executive Officer of the Office of the EPA to minimise NH₃ and particulate [as total suspended particulates (TSP)] emissions from the TANPF ammonium nitrate prilling plant “common stack”.

The EPA also considers that stack and plant emissions from the TANPF can be adequately regulated through Part V of the EP Act. The EPA expects DEC to incorporate stack emission concentration figures in the Works Approval and Licence that are commensurate with the use of best practice pollution control technology.

Impact of atmospheric emissions on petroglyphs (rock art)

As the air quality modelling undertaken for the PER document did not provide information on annual average NOₓ and NH₃ GLCs on an individual and cumulative basis, the EPA has considered information provided in the Pluto LNG Development Cumulative Air Quality Study (SKM, 2006), the CSIRO study on the potential for industrial air emissions to damage rock art located on the Burrup Peninsula
The EPA understands that the cumulative air quality modelling undertaken for the Pluto LNG Development included NO₂ emissions from the Woodside LNG plant (including Trains 4 & 5), Hamersley Power Station, and the Burrup Fertilisers Pty Ltd Ammonia Plant. For modelling purposes, a total cumulative NOₓ emission rate of approximately 513 grams per second (g/s) from the above sources and the Pluto LNG Development was used. The air quality modelling predicted that cumulative annual average NO₂ GLCs would be below 5 ppb on the Burrup Peninsula. The EPA notes that the (CSIRO, 2008) study determined that the highest annual average NO₂ GLC on the Burrup Peninsula for the period covering January 2007 to August 2008 was 2.8 ppb.

It is evident that the highest annual average NO₂ GLCs derived from the (SKM, 2006) and (CSIRO, 2008) studies are well below the annual average NO₂ concentration of 50 ppb that was used in the (CSIRO, 2007) study, at which no changes to the rock surface colour were observed. The EPA understands that an additional 6.38 g/s of NOₓ would be emitted into the airshed [i.e. about 1.24% more than the baseline emission rate of 513 g/s used in the (SKM, 2006) study] consisting of 4.28 g/s of NOₓ from the TANPF and 2.1 g/s of NOₓ from the generation of 5 MW of power for the TANPF within the adjacent Burrup Fertilisers Pty Ltd ammonia plant. In view of the above, the EPA considers that the small additional input of NOₓ into the airshed from the TANPF and the Burrup Fertilisers Pty Ltd ammonia plant is unlikely to have a significant impact on cumulative annual average NO₂ GLCs, and consequently on rock art on the Burrup Peninsula.

The EPA notes that emissions of NH₃ were not considered in the cumulative air quality modelling undertaken for the Pluto LNG Development. The EPA also notes that cumulative modelling for NH₃ was not undertaken for the PER document for the TANPF. However, the EPA understands that the (CSIRO, 2008) study determined that the highest annual average NH₃ GLC on the Burrup Peninsula for the period covering January 2007 to August 2008 was 0.9 ppb. This figure is well below the annual average NH₃ GLC of 40 ppb that was used in the (CSIRO, 2007) study. In view of the above, and the relatively small additional input of NH₃ into the airshed from the TANPF (i.e. about 0.62 g/s), the EPA considers that the impact of the TANPF on cumulative annual average NH₃ GLCs, and thus on rock art on the Burrup Peninsula, is unlikely to be significant.

Summary

Having particular regard to the:

(a) results obtained from the air quality modelling that was undertaken for the PER document, which was based on conservative assumptions;

(b) advice received from DEC’s AQMB;

(c) EPA’s recommended condition limiting NH₃ and particulate emissions from the TANPF ammonium nitrate prilling plant “common stack”;
(d) regulatory measures available to manage the monitoring and reporting of stack and plant emissions under Part V of the Environmental Protection Act 1986; and

(e) results obtained from the (SKM, 2006), (CSIRO, 2007), and (CSIRO, 2008) reports, and the relatively small load of NO₂ and NH₃ emitted into the atmosphere,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objective for this factor provided that the EPA’s recommended condition is imposed by the Minister for Environment.

3.2 Biodiversity

Description

Flora and vegetation

Preparation of the TANPF site would require approximately 35 hectares (ha) of vegetation to be cleared.

The PER document indicates that five broad vegetation types were identified on the TANPF site during the flora survey. These vegetation types, which correspond to vegetation assemblages previously identified and mapped as occurring within the area by (Trudgen, M.E., 2002), are listed below:

- **AbTeWa** - 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 TANPF site.

- **Sm** - *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 south-east corner of the TANPF site.

- **TeSv** - 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 TANPF site, and is mixed with AbTeWa.

- **AbImTe** - Recorded on the upper slopes of the northern part of the TANPF site. This community is described as an open *Acacia bivenosa* shrubland over gravel and stone. Additional shrub species present include *Indigofera monophylla*. 
The PER document also indicates that the following discrete vegetation communities were also mapped by (Trudgen, M.E., 2002) as occurring within the TANPF site. However, they were not observed to be widespread or dominant during the flora survey.

- **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.
- **AoITw** - *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** - *Temanalia canescens* low open woodland over *Stemodia grossa* low open shrubland.
- **TeAb** - *Triodia epactia* (Burrup form) hummock grassland with scattered *Acacia bivenosa* shrubs.
- **MF** - Mudflat.

A search of the EPBC Act database did not identify any EPBC listed flora species or Threatened Ecological Communities (TECs) within a 10 km radius of the TANPF site.

DEC’s database indicates that no Declared Rare Flora (DRF) species listed under the Western Australian *Wildlife Conservation Act 1950* have been recorded on the Burrup Peninsula. It also indicates that no TECs are listed by DEC as occurring in the vicinity of the TANPF site.

The Priority 1 flora species *Stackhousia clementii* and the Priority 3 species *Terminala supranitifolia*, *Gymnothera cunninghamii*, *Acacia glaucoaesa*, *Hibiscus brachysiphonius*, *Rhynchosia bunagrensis*, and *Themeda* sp. Hamersley Station (ME Trudgen 11431) have been recorded on the Burrup Peninsula.

No DRF or Priority flora species were identified on the site during the flora field survey. The Priority 3 flora species *Terminala supranitifolia* was recorded by (Astron Environmental Pty Ltd, 2001a) on the adjoining Burrup Fertilisers Pty Ltd.
(BFPL) site in areas containing rock screes and rocky hillsides. This species or its preferred habitat were not located within the TANPF site during the flora field survey.

The 35 ha of vegetation that would be cleared during preparation of the TANPF site adjoins the proposed 5,000 ha Burrup Peninsula Conservation Reserve. The PER document indicates that apart from the vegetation community Sm associated with the supra-tidal flat and saline inlet which is considered to be a significant vegetation community according to (Trudgen, M.E., 2002), the remaining vegetation communities within the TANPF site and their associated flora species are considered to be well represented within the region. Clearing activities would require the removal of approximately 7.6 ha of the Sm vegetation community of which about 100 ha is known to occur on the Burrup Peninsula. Hence, approximately 7.6% of the known distribution of this community would be cleared. Approximately 56 ha (i.e. 56%) of the known distribution of the Sm vegetation community is located within the proposed Burrup Peninsula Conservation Reserve.

The proponent proposes to mitigate potential impacts on flora and vegetation by minimising the amount of vegetation that is permanently cleared during construction, and by preventing the disturbance of flora and vegetation adjacent to work areas and beyond the TANPF site boundary. Visual monitoring would be undertaken during clearing and construction activities. The proponent intends to consult with DEC in regard to the development of suitable management measures for Priority flora.

Rehabilitation

The PER document indicates that the TANPF site would be rehabilitated to the level of an industrial zoned area. Prior to decommissioning, the proponent would develop a decommissioning and final rehabilitation plan which would specify control measures which would be used to guide the management of water resources, landforms, re-vegetation and infrastructure and support facilities during decommissioning.

Equipment, buildings and other facilities, including pipelines connecting the TANPF to the BFPL site would be removed. Surface water ponds would be emptied and cleaned and any remaining contaminated waste would be removed by an approved waste contractor. In the event of a contamination issue being identified before or during the closure of the TANPF, specific closure actions would be included in the plan.

The PER document does not include any information on specific criteria that would be employed by the proponent to judge the success of rehabilitation.

Weeds

The introduced species *Cenchrus ciliaris* (Buffel Grass), *Aerva javanica* (Kapok Bush), and *Vachellia farnesiana* were recorded during the flora and vegetation survey of the TANPF site. None of the above introduced species are Declared Weeds under the *Agricultural and Related Resources Protection Act 1976*. Eleven other weed species that are known to occur on the Burrup Peninsula and may potentially occur within the TANPF site are listed in Table 1 in the proponent’s Preliminary Weed Management Plan in the PER document.
Construction activities have the potential to introduce and spread weeds which could affect flora and vegetation surrounding the TANPF site. The proponent proposes to implement various weed management measures to minimise this risk.

**Fauna**

The clearing of 35 ha of vegetation within the TANPF site would result in the loss of fauna habitat and has the potential to impact a number of conservation significant species listed as occurring in the region.

The fauna field survey recorded 20 bird species and one mammal species (the Euro) on the TANPF site. Of the 20 bird species that were recorded, five are listed under the EPBC Act. These are the Common Greenshank, Common Sandpiper, Rainbow Bee-Eater, Black-Winged Stilt, and Red-Capped Plover. The Common Greenshank, Common Sandpiper, and Rainbow Bee-Eater are currently listed as Migratory and Marine species and the Black-Winged Stilt and Red-Capped Plover are listed as Marine species. The Common Greenshank and Common Sandpiper are also currently listed under the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). The Rainbow Bee-Eater is currently listed under the JAMBA (Environmental Resources Management Australia, 2010a).

Table 7.3 in the PER document lists 42 additional migratory bird species that are listed under the EPBC Act and/or JAMBA, CAMBA, and ROKAMBA as potentially occurring within the TANPF site and other areas on the Burrup Peninsula.

Habitats for migratory and marine bird species in the region are likely to include the tidal mudflats and mangroves of King Bay and Hearson Cove, inter-tidal areas surrounding the Dampier Salt ponds, and other tidal sand and mudflats within the Burrup Peninsula and Karratha region.

The supra-tidal flat located within the TANPF site provides potential foraging habitat for migratory and marine bird species. Approximately 7.6 ha of supra-tidal flat would be directly impacted by clearing during construction. As large areas of supra-tidal flat would remain available to the south and west of the TANPF site, the loss of about 7.6 ha of foraging habitat is not expected to have an adverse impact on migratory and marine bird species.

Five other bird species, the Peregrine Falcon, Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing are listed under the Western Australian *Wildlife Conservation Act 1950* as having the potential to occur within the TANPF site and other areas on the Burrup Peninsula. The Peregrine Falcon is currently listed as a Schedule 1 species and the Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing are listed as Priority 4 fauna species.

The Peregrine Falcon nests on cliffs, crevices or large tree hollows and occurs in a variety of environments including wetlands, plains and timbered watercourses (Pizzey, G & Knight, F., 1997). As nesting habitat is not present within the TANPF...
site, this species is unlikely to be significantly impacted by the proposal. However, the TANPF site may provide potential foraging habitat.

The Australian Bustard is known to occur in grasslands, open shrublands, and open scrublands. This species is relatively common away from settled areas (Pizzey, G & Knight, F., 1997). The Australian Bustard has not been previously recorded within the TANPF site or adjacent BFPL site and according to the PER document is unlikely to occur in the area.

The Bush Stonecurlew occurs in open woodland, coastal scrub, and mangrove fringes (Pizzey, G & Knight, F., 1997). The Bush Stonecurlew has not been previously recorded within the TANPF site or adjacent BFPL site. However, the TANPF site does provide potential foraging habitat for this species.

The Eastern Curlew occurs in tidal mudflats, saltmarshes, and grasslands near water (Pizzey, G & Knight, F., 1997). The TANPF site provides potential habitat for this species.

The PER document indicates that the Flock Bronzewing occurs in flooded claypans, watercourses, and treeless grassy plains, and that it nests on the ground by low bush or tussock. The TANPF site represents potential foraging habitat for this species.

As significant areas of suitable foraging habitat for the Peregrine Falcon, Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing exist elsewhere on the Burrup Peninsula, these species are not expected to be adversely impacted by construction activities on the TANPF site.

Five conservation significant mammal species are listed as occurring in the region; the Northern Quoll, Pilbara Leaf-Nosed Bat, Little North-Western Mastiff Bat, Ghost Bat, and the Western Pebble-Mound Mouse, Ngadj. The Northern Quoll is currently listed as ‘Endangered’ under the EPBC Act and as a Schedule 1 species under the Wildlife Conservation Act 1950. The Pilbara Leaf-Nosed Bat is currently listed as ‘Vulnerable’ under the EPBC Act. The Little North-Western Mastiff Bat is currently listed as a Priority 1 species under the Wildlife Conservation Act 1950. The Ghost Bat and the Western Pebble-Mound Mouse, Ngadj are both currently listed as Priority 4 species under the Wildlife Conservation Act 1950.

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, P. & Knight, F., 2001). The PER document indicates that the Northern Quoll’s preferred rocky eucalypt habitat is not present within the TANPF site. However, the TANPF site may form part of broader foraging habitat within the local area. It is unlikely that the Northern Quoll would be impacted by the proposed development.

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 (Armstrong, K.N., 2001). This includes the confirmed roosts of: Bamboo Creek mine, Copper Hills mine, Klondyke Queen mine, Lalla Rookh mine
and one cave in the Barlee Range Nature Reserve (DEWHA, 2010). A total of 16 observations of bats in flight might indicate additional roost sites, but these require confirmation. There are five road-kill records and each of these may indicate a previously unknown roost. Other unknown roosts may exist in underground mines or natural caves, however, the larger depths of the underground mines in comparison with the shallow depth of the natural caves would mark them as preferred habitat (Armstrong, K.N., 2001).

The PER document indicates that the TANPF site does not contain potential roosting habitat for the Pilbara Leaf-Nosed Bat. While it is unknown if roosting habitat occurs elsewhere on the Burrup Peninsula, the proponent considers that this is unlikely in view of the colony locations described above. The proponent also considers that potential foraging habitat is likely to be abundant within the local area, and that while it is possible that the TANPF site may provide some foraging habitat for the Pilbara Leaf-Nosed Bat, it is unlikely that the removal of 35 ha of potential foraging habitat would have a significant impact on a local population of the species.

The Little North-Western Mastiff Bat is restricted to mangroves and adjacent vegetation along narrow coastal strips (Menkhorst, P. & Knight, F., 2001). It is known to roost in tree hollows and loose bark. The PER document indicates that the TANPF site does not contain mangroves or potential roosting habitat for the Little North-Western Mastiff Bat. However, the TANPF site may form part of foraging habitat within the local area. The proponent’s view is that the proposal is not expected to significantly impact on this species.

The Ghost Bat is known from the Pilbara and Kimberly in Western Australia and requires undisturbed roost caves or mine shafts (Menkhorst, P. & Knight, F., 2001). This species is unlikely to be impacted by the proposal given that roosting habitat is not present within the TANPF site. However, as with the above species the TANPF site may form part of foraging habitat within the local area.

The PER document indicates that the Western Pebble-Mound Mouse, Ngadjji was previously known to occur on the Burrup Peninsula, but is now confined to the central and eastern Pilbara where it is found on stony hilltops and hummock grassland. Nesting sites were not recorded within the TANPF site. In view of the above, the proponent does not expect this species will be significantly impacted by the proposal.

The Pilbara Olive Python is a conservation significant reptile species that is known to occur on the Burrup Peninsula. The Pilbara Olive Python is currently listed as ‘Vulnerable’ under the EPBC Act and as a Schedule 1 species under the *Wildlife Conservation Act 1950*. The Pilbara Olive Python is usually found in rocky areas or gorges and especially rocky habitat associated with water courses. Besides taking refuge in caves and rock crevices they can also be found in hollow logs and burrows beneath rocks (Pilbara Pythons, 2008). The PER document indicates that the Pilbara Olive Python’s preferred habitat is not present within the TANPF site. Hence, it is unlikely to be impacted by the proposed development.

Five species of native terrestrial snails were recorded within the adjacent BFPL site by the WA Museum, all of which have been recorded from other localities elsewhere on the Burrup Peninsula (Sinclair Knight Merz Pty Ltd, 2001). These species were
Quistrachia legendrei, Gastrocopta pilbarana, Rhagada sp ‘12’, P. beltainus, and P. contrarius. The PER document indicates that none of the five snail species are considered to be rare or endangered, nor are they likely to have a distributional range limited to the immediate area surrounding the TANPF site.

Of the five snail species, two species, Quistrachia legendrei and Gastrocopta pilbarana only inhabit the larger rock piles and high hills, and as such are unlikely to be disturbed by site preparation activities on the TANPF site.

The species Rhagada sp ‘12’ has been recorded at a number of locations on the Burrup Peninsula and is considered to occur in varied habitats. Based on previous records from Site E to the north of the TANPF site, potential habitat for this species may occur within the TANPF site. The remaining two species (Pupoides aff. beltainus and P. contrarius) are common to low grassed slopes, with P. contrarius also inhabiting areas subject to marine influence (Sinclair Knight Merz Pty Ltd, 2001), and have been recorded as far south as Shark Bay (Woodside Energy Ltd, 2006). The PER document indicates that in view of the preferred habitat of these two species, and the records of Rhagada sp. at the BFPL site and at Site E to the north, there is the potential for disturbance to these species to occur during site preparation activities.

As both P. beltainus and P. contrarius are known to occur elsewhere on the Burrup Peninsula, the proponent considers that site preparation activities would not result in the removal of a significant area of potential habitat, or affect the distributional range of these two species.

The proposal is likely to result in the removal of potential habitat for Rhagada sp ‘12’. However, given the known records of Rhagada sp. ‘12’ elsewhere on the Burrup Peninsula and presence of potential habitat within the proposed Burrup Peninsula Conservation Reserve it is unlikely that the proposal would result in the removal of a significant area of potential habitat or affect the distributional range of this species.

Management measures that the proponent proposes to implement to mitigate potential impacts on fauna include, but are not limited to:

• minimising the amount of vegetation that is permanently cleared during construction;
• preventing access to, and the disturbance of vegetation adjacent to work areas and beyond the TANPF site boundary;
• undertaking visual monitoring during clearing and construction activities for the presence of fauna, and for disturbance to areas adjacent to work areas and beyond the TANPF site boundary; and
• inspection of all excavations (trenches and voids) left open overnight at the start of each working day to facilitate the removal of any trapped uninjured fauna and the treatment of any injured fauna.
In addition to the above measures, the proponent’s response to submissions document indicates that netting and/or other structures would be used to deter birds, particularly migratory species, from entering the contaminated water pond and interacting with the pond water.

**Submissions**

The main concerns that were raised in the submissions related to the adequacy of the flora and vegetation survey and the Preliminary Terrestrial Vegetation and Flora Management Plan, rehabilitation, and potential impacts on migratory birds and the snail species *Rhagada sp.12*.

**Assessment**

The EPA’s environmental objectives for this factor are to:

- maintain the abundance, diversity, geographic distribution and productivity of flora, vegetation communities, and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge; and

- protect Declared Rare and Priority Flora, and Specially Protected (Threatened) and Priority Fauna consistent with the provisions of the *Wildlife Conservation Act 1950*, and the EPBC Act.

**Flora and vegetation**

The EPA notes that approximately 35 ha of vegetation would be cleared during preparation of the TANPF site which adjoins the proposed 5,000 ha Burrup Peninsula Conservation Reserve.

The EPA also notes that a search of the EPBC Act database did not identify any EPBC listed flora species or TECs within a 10 km radius of the TANPF site.

The EPA is aware that no DRF or Priority flora species were identified on the TANPF site during the flora field survey.

The EPA notes that the majority of vegetation communities and their associated flora species that are known to occur within the TANPF site are considered to be well represented within the region. Accordingly, the EPA considers that these communities and flora species are unlikely to be significantly affected by the proposed development.

In the case of the Sm vegetation community associated with the supra-tidal flat and saline inlet, the EPA understands that only about 7.6% of the known distribution of this community would be cleared during construction, and that approximately 56% of the known distribution is located within the proposed Burrup Peninsula Conservation Reserve. In view of the above, the EPA considers that long-term survival of the Sm vegetation community is unlikely to be adversely affected by construction of the TANPF.
The EPA considers that the proponent’s proposed management measures to mitigate potential impacts on flora and vegetation are adequate.

Rehabilitation

There is a lack of detailed information on rehabilitation in the PER document, particularly in relation to the specific criteria that would be employed by the proponent to judge the success of rehabilitation. The EPA considers that Condition 6 which provides for on-going rehabilitation, establishment of completion criteria, and weed management should be imposed on the proponent in order to ensure the long term success of rehabilitation of the TANPF site.

Weeds

The EPA considers that the proponent’s proposed weed management measures would be adequate in terms of minimising the potential for weeds to be introduced and spread by construction activities.

Fauna

In view of the presence of large areas of supra-tidal flat to the south and west of the TANPF site, the EPA considers that the loss of approximately 7.6 ha of foraging habitat due to site preparation would not have an adverse impact on migratory and marine bird species listed under the EPBC Act and/or JAMBA, CAMBA, and ROKAMBA. The EPA notes that the proponent intends to use netting and/or other structures to deter birds, particularly migratory species, from entering the contaminated water pond and interacting with the pond water. However, the EPA considers that Condition 7-1 should be imposed on the proponent to employ netting and/or other structures and apparatus to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond in order to minimise potential impacts on migratory and marine bird species during operation of the TANPF.

The EPA notes that the Peregrine Falcon, Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing which are listed under the Western Australian Wildlife Conservation Act 1950 are not expected to be adversely affected by the proposed development given that the TANPF site does not include suitable nesting habitat in the case of the Peregrine Falcon, and that large areas of foraging habitat exist elsewhere on the Burrup Peninsula.

The EPA concurs that the Northern Quoll, Pilbara Leaf-Nosed Bat, Little North-Western Mastiff Bat, and Ghost Bat are not expected to be adversely impacted by the proposed development given that the TANPF site does not contain the preferred habitat of the Northern Quoll or suitable roosting habitat for the Pilbara Leaf-Nosed Bat, Little North-Western Mastiff Bat, and Ghost Bat.

Given that the Western Pebble-Mound Mouse, Ngadji, is presently confined to the central and eastern Pilbara and the fact that no nesting sites were recorded within the
TANPF site, the EPA considers that it is unlikely to be affected by the proposed development.

The EPA notes that the Pilbara Olive Python is unlikely to be impacted by the proposed development as its preferred habitat is not present within the TANPF site.

The EPA also notes that the snail species *Quistrachia legendrei* and *Gastrocopta pilbarana* are unlikely to be disturbed by site preparation activities on the TANPF site given that they only inhabit the larger rock piles and high hills.

Site preparation activities would not result in the removal of a significant area of potential habitat, or affect the distributional range of the snail species *P. beltainus* and *P. contrarius* given that they are known to occur elsewhere on the Burrup Peninsula.

The EPA understands from the proponent’s response to submissions document that there is some uncertainty surrounding the taxonomic status of *Rhagada* sp ‘12’, and that past taxonomic analysis of Rhagada specimens collected from the Burrup Peninsula, including Site E to the north of the TANPF site, was inconclusive. The EPA also understands from the above document that the significance of any genetic variations between Rhagada populations on the Burrup Peninsula is unlikely to be resolved until the study currently being undertaken by Biota Environmental Sciences and the University of Western Australia (UWA) is completed.

Although the proposal may result in the removal of potential habitat for *Rhagada* sp ‘12’, the EPA considers that the level of risk to the conservation status of this species is likely to be low in view of the relatively small area that would be cleared, the fact that it has been recorded elsewhere on the Burrup Peninsula, and the presence of potential habitat within the adjoining proposed Burrup Peninsula Conservation Reserve.

While the proponent’s proposed management measures to mitigate potential impacts on fauna other than migratory and marine bird species are noted, the EPA considers that Condition 7-2 should be imposed on the proponent to ensure that impacts to fauna resulting from exposed trenches and other construction related voids are managed in an environmentally acceptable manner.

**Summary**

Having particular regard to the:

(a) results obtained from flora and fauna field surveys and related database searches;

(b) proponent’s proposed management measures to minimise potential impacts on vegetation and fauna; and

(c) EPA’s recommended conditions,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objectives for this factor provided that the EPA’s recommended conditions are imposed by the Minister for Environment.
3.3 Surface water and groundwater

Description

Surface water

Construction activities within the proposed TANPF site would obstruct at least four ephemeral drainage channels which could lead to localised flooding to the north of the site during rain events. New drainage channels would be installed up-gradient to direct water away from the TANPF site. These channels would link with existing natural drainage channels to minimise the risk of flooding and erosion. Natural surface water flows on the TANPF site would be redirected to ensure that flows continue into the supra-tidal flat.

The supra-tidal flat between King Bay and Hearson Cove is known to be subject to flooding from storm surge events. Storm surge estimates for this area obtained from the Bureau of Meteorology’s Karratha Storm Surge Inundation Study using a deterministic regional ocean model and historical cyclone events found that 1:100 year storm events are expected to yield a storm surge of 5 m above AHD, while 1:50 year storm events would produce a storm surge of 4.6 m above AHD.

The final proposed level for the TANPF site, including areas such as the clean water pond, would be 5.5 m AHD which is 0.5 m above the 1:100 year storm surge level. The proponent has taken into account a predicted sea level rise of between 6.7 cm and 20.8 cm by 2040 in determining the final proposed level for the TANPF site. Storage areas would be bunded to provide additional protection against flooding and ballast would be placed on the embankments on the TANPF site to provide protection against erosion during flood events.

Surface water run-off from non-process/storage areas and building roofs would be directed to the clean water pond where it would be evaporated.

Groundwater

Detailed hydrogeological studies were not undertaken by the proponent to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas. The proponent intends to collect baseline data on groundwater at the TANPF site prior to the commencement of construction.

The PER document indicates that groundwater salinities in the region are likely to range between 1,000 and 3,000 mg/L according to the Department of Water Hydrogeological Atlas. Groundwater yields are expected to be low in view of the lithology in the region.

Groundwater flow directions are anticipated to be variable and to generally follow the topography with the exception of deeper fractured zones where the flow direction would be influenced by the fractures. Although there are uncertainties associated with the potential receiving water bodies for groundwater discharge in the area, discharge
to the supra-tidal flat and King Bay is considered to be possible and would be dependent upon the connectivity of the groundwater bearing zones in the area.

The PER document also indicates that the depth to groundwater beneath the TANPF site is expected to be highly variable across the site, with shallow perched water tables occurring during inundation of the lower lying supra-tidal flat during tidal or rain events, and deeper groundwater associated with weathered and fractured zones occurring in areas with higher elevation.

The proponent has not determined the volume of water that would be generated by dewatering during construction should it be required, but expects it to be negligible. The proponent considers that, given the isolated and temporary nature of dewatering, should shallow groundwater exist beneath the TANPF site and dewatering be required, the magnitude of any potential impacts would be small. Water generated by dewatering activities would be directed to temporary settlement ponds and subsequently discharged off-site. Detailed information on the potential environmental impacts of dewatering and the management measures that would be employed to mitigate these impacts was not provided in the PER document.

Leaks from underground pipes or the clean water pond, contaminated water pond, and sewage wastewater treatment station evaporation pond have the potential to contaminate groundwater beneath the TANPF site.

The proponent’s Preliminary Water Quality Management Plan indicates that groundwater monitoring bores would be installed within and around the TANPF site following the completion of a baseline groundwater study. The location of the groundwater monitoring bores has not been determined yet, and would be finalised after the baseline groundwater study and final detailed plant design have been completed. Groundwater sampling/monitoring of all bores would be undertaken every six months and groundwater monitoring trigger values would be set at a value of 10% above the contaminant concentrations obtained from baseline groundwater quality monitoring.

*Acid sulfate soils*

The acid sulfate soil (ASS) risk map in Planning Bulletin 64 published by the Western Australian Planning Commission (WAPC) indicates that the TANPF site is located within areas of high to moderate and moderate to low risk of ASS occurring within 3 m of the surface. The northern portion of the TANPF site that would be disturbed by construction activities is located within an area of high to moderate risk of ASS occurring within 3 m of the surface.

Sulphuric acid is produced when ASS is exposed to air through disturbance or drainage. This sulphuric acid can release metals and other substances within the soil profile into the surrounding environment.

Construction activities have the potential to disturb ASS and subsequently impact on surface water and groundwater quality.
The proponent intends to complete intrusive investigations prior to the commencement of construction activities and will implement appropriate ASS management measures in accordance with DEC legislative requirements.

**Submissions**

The main concerns that were raised in the submissions related to potential impacts from dewatering during construction, the suitability of the site in view of potential flood impacts from storm surge events and climate change, the need for the design of bunding and other mitigation measures to be developed in consultation with the DEC, the impact on the surface hydrology of surrounding areas, and potential impacts of acid sulfate soil disturbance during construction.

**Assessment**

The EPA’s environmental objectives for this factor are to:

- maintain the quality of groundwater so that existing and potential users, including ecosystem maintenance, are protected;

- maintain the integrity, ecological function and environmental values of watercourses, and to ensure that alterations to surface drainage do not adversely impact native vegetation or flow regimes; and

- ensure surface water does not adversely affect environmental values or the health welfare or amenity of people and land uses.

**Surface water**

The EPA notes that the facility will need to be designed to manage local surface water flows and the potential for flooding.

The EPA also notes that the final proposed level for the TANPF site, including areas such as the clean water pond, would be 5.5 m AHD which is 0.5 m above the 1:100 year storm surge level. The EPA understands that the proponent has taken into account a predicted sea level rise of between 6.7 cm and 20.8 cm by 2040 in determining this level.

The EPA considers that the concern raised in the public submissions in regard to the need for the design of bunding and other mitigation measures to be developed in consultation with DEC can be adequately addressed via regulation under Part V of the EP Act by incorporating this requirement into the Works Approval for the proposal.

**Groundwater**

The EPA notes that the proponent has not yet undertaken detailed hydrogeological studies to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas. Although the proponent intends to collect baseline data on groundwater at the TANPF site prior to the commencement of construction, the EPA considers that Condition 8-1 should be
imposed on the proponent to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas at least 12 months prior to construction.

The EPA recommends that Condition 8-2 be imposed on the proponent to develop appropriate management measures for dewatering on advice of DEC and the Department of Water (DOW) in the event that the information gathered from the hydrogeological studies required by recommended Condition 8-1 indicates that it would be required during construction.

The EPA understands that groundwater monitoring bores would be installed within and around the TANPF site. Given that the location of the groundwater monitoring bores has not been determined yet, the EPA considers that Condition 8-3 should be imposed on the proponent to design, construct, and locate the groundwater monitoring bores in consultation with DEC and the DOW, having regard for the outcomes of the hydrogeological studies required by recommended Condition 8-1 and the DOW’s Water Quality Protection Note 30 on Groundwater Monitoring Bores.

The EPA notes that the proponent intends to sample/monitor all groundwater bores every six months and to set groundwater monitoring trigger values at a value of 10% above the contaminant concentrations obtained from baseline groundwater quality monitoring. The EPA considers that the above monitoring frequency and trigger value criteria should be included as an additional requirement within recommended Condition 8-4 which requires the proponent to sample/monitor all groundwater monitoring bores required by recommended Condition 8-3 every six months. Recommended Condition 8-5 describes the procedures that the proponent would need to follow in the event that the trigger levels referred to in recommended Condition 8-4 are exceeded.

*Acid sulfate soils*

The EPA notes that the northern portion of the TANPF site is located within an area of high to moderate risk of acid sulfate soils (ASS) occurring within 3 m of the surface, and is aware that construction activities have the potential to disturb ASS and subsequently impact on surface water and groundwater quality.

As the proponent has not yet undertaken intrusive ASS investigations, the EPA considers that Condition 9-1 should be imposed on the proponent to undertake these investigations prior to the commencement of construction. The EPA considers that Condition 9-2 should also require the proponent to treat and manage ASS in accordance with the requirements of DEC’s draft guideline on the treatment and management of acid sulfate soils and water in acid sulfate soil landscapes (DEC, 2009), in the event that ASS are disturbed during construction of the TANPF.

**Summary**

Having particular regard to the:

(a) measures that would be employed by the proponent to minimise potential impacts on surface water flows;
(b) final proposed level for the TANPF site of 5.5 m AHD;

(c) lack of hydrogeological information pertaining to the TANPF site and surrounding areas;

(d) potential for ASS to be disturbed during construction; and

(e) EPA’s recommended conditions,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objectives for this factor provided that the EPA’s recommended conditions are imposed by the Minister for Environment.

3.4 Liquid waste disposal

Description

Liquid wastes that would be produced by the TANPF under normal operating conditions include:

- approximately 3,104 ML of water per year consisting of about 3000 ML of sea water blowdown per year and about 104 ML of purified process condensate per year which would be discharged into the Water Corporation’s multi user brine return line (MUBRL);

- approximately 24.6 ML per year of non-contact liquids such as surface water from non-process/storage areas and building roofs, surplus purified process water, non-contaminated wash water, and non-contact process water which would be directed to the clean water pond for evaporation, with no off-site discharge;

- approximately 9.75 ML per year of potentially contaminated liquids such as water from equipment washing and contaminated process water/condensate which would be directed to the contaminated water pond for treatment and evaporation, with no off-site discharge;

- minor volumes of hazardous liquid waste requiring designated on-site storage and handling and disposal by a licensed contractor, such as wastes that could result in a mixture of ammonium nitrate and organic compounds, waste oil from plant machinery, and laboratory waste;

- grey water which would be stored, collected, and disposed of in accordance with all relevant legislative requirements; and

- sewage wastewater which would be treated in a dedicated sewage wastewater treatment station with the sanitised clean liquid phase from the station being sent to a separate evaporation pond and sewage sludge being collected by authorised personnel using trucks and transported to an off-site treatment plant.
The PER document indicates that the contaminated water pond and clean water pond would be designed in accordance with DOW requirements. Detailed technical information regarding the design of the above ponds was not provided in the PER document. Nor was any detailed technical information regarding the design of the sewage wastewater treatment station evaporation pond provided in the proponent’s response to submissions document.

The proponent’s Preliminary Water Quality Management Plan indicates that a wastewater monitoring program would be developed prior to construction and operation. Monitoring for contaminants would be undertaken at the contaminated water pond, clean water pond, and water intake [water sourced from the Water Corporation’s desalination and seawater supply facility (DSSF)]. In addition, all wastewater sent off-site would be monitored for contaminants prior to discharge into the Water Corporation’s MUBRL.

The proponent expects wastewater discharges from the Water Corporation’s DSSF to continue to comply with specific water quality criteria outlined in the ministerial environmental conditions for the DSSF (Ministerial Statement No. 594) even with the inclusion of wastewater from the TANPF.

The proponent has not considered potential impacts on marine fauna and benthic primary producers arising from wastewater discharged from the TANPF on the basis that the Water Corporation’s Ministerial environmental conditions for the DSSF would continue to be complied with, even with the inclusion of wastewater from the TANPF.

Submissions

The main concerns that were raised in the submissions related to the need for:

- information to be provided on the composition of the wastewater that would discharged from the TANPF and whether toxicity and environmental fate tests have been undertaken by the proponent;
- the Works Approval and Licence conditions imposed on the proposal to cover monitoring, alternative disposal options, and a contingency plan;
- recycling of water on site to reduce the amount being discharged into the MUBRL;
- wastewater treatment systems to be appropriately designed, located and managed to prevent mosquito breeding; and
- specific information on the measures that would be used to deter birds from accessing the contaminated water pond.

Assessment

The EPA’s environmental objective for this factor is to ensure that liquid wastes are managed in accordance with the waste management hierarchy (i.e. avoid, minimise,
recycle, treat and dispose) and where this is not possible, are contained and isolated from surface water and groundwater, and that discharges meet statutory requirements and acceptable standards relating to marine water quality.

The proponent’s response to submissions document indicates that the 104 ML/yr of purified process condensate wastewater that would be produced by the TANPF would contain approximately 15 parts per million (ppm) (~15,000 µg/L) of nitrogen from ammonia (NH₃) and 15 ppm of nitrogen from ammonium nitrate (NH₄NO₃). The nitrogen (N) content of the purified process condensate wastewater would consist of both ammonia as nitrogen (NH₃-N) and nitrate as nitrogen (NO₃-N).

The Executive Summary Report (February 2000) for the Water Corporation’s Burrup Peninsula Desalinated and Seawater Supplies Project states that “No process plant will be reliant on the operation of others to effect dilution, chemical or physical change to render the plant’s effluent acceptable for discharge to the marine environment.”

In its submission on the PER document the Water Corporation indicated that it would not accept wastewater streams that would result in the exceedance of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000) trigger values for the protection of 99% of species at the edge of the ocean outfall mixing zone.

The trigger value for the protection of 99% of species for NH₃ (as TOTAL NH₃ as NH₃-N) listed (ANZECC/ARMCANZ, 2000) guidelines is 500 µg/L at a pH of 8. There is no applicable trigger value for the protection of 99% of species for NO₃-N in the guidelines.

The 104 ML/yr of purified process condensate wastewater would be subjected to an approximately 30-fold dilution by being mixed with about 3,000 ML/yr of seawater blowdown from the cooling water system prior to being discharged from the TANPF into the Water Corporation’s MUBRL.

The EPA is aware that recent modelling of the Water Corporation’s DSSF King Bay outfall diffuser has confirmed that the mixing zone is approximately 120 m wide and 400 m long with a minimum initial 86-fold dilution under a maximum flow of 208 ML/day (as allowed under Ministerial Statement No. 594), or approximately 60 m wide and 340 m long with a minimum initial 75-fold dilution under a flow of 44 ML/day which represents the current rate of discharge (Oceanica Consulting Pty Ltd, 2010). With the additional wastewater input from the TANPF (i.e. approximately 8.5 ML/day) the minimum initial dilution of the ocean outfall diffuser would be expected to increase slightly in comparison to the figures applicable to the current rate of discharge. Hence, the purified process condensate wastewater discharged from the TANPF would be subjected to a slightly greater than 2,250-fold total dilution at the ocean outfall diffuser when added to other current wastewater inputs entering the MUBRL, and up to a 2,580-fold total dilution when the ocean outfall is discharging at the maximum allowable rate of 208 ML/day.

However, even if it were subjected to the 2,250-fold overall dilution applicable to the current rate of discharge from the outfall, and ignoring minor background
concentrations of NH₃ in the seawater, the 15,000 µg/L of nitrogen from NH₃ in the purified process condensate wastewater would be diluted down to a concentration of approximately 6.7 µg/L at the edge of the mixing zone. This concentration is well below the trigger value for the protection of 99% of species for NH₃ (as TOTAL NH₃ as NH₃-N) of 500 µg/L at a pH of 8 listed in the (ANZECC/ARMCANZ, 2000) guidelines. The above guidelines indicate that the default pH level for marine inshore waters on the north-west shelf of Western Australia ranges from 8.0 to 8.4.

The EPA notes from the proponent’s response to submissions document that the 3,000 ML/yr of seawater blowdown from the TANPF cooling water system will have an oxidising biocide concentration of 0.1 to 0.2 ppm (i.e. ~ 0.1 to 0.2 mg/L). This concentration would be further diluted by being mixed with the 104 ML/yr of purified process condensate wastewater to a concentration of about 0.0966 to 0.1932 mg/L prior to discharge into the MUBRL. However, given that Ministerial Statement No. 594 indicates that the concentration of oxidising biocides in the wastewater discharged from Water Corporation’s DSSF is to be less than 0.1 mg/L, the proponent has subsequently committed to discharging oxidising biocides from the TANPF at a concentration of less than 0.1 mg/L. The proponent has also advised that it would make the necessary provisions in consultation with the Water Corporation to facilitate the installation of a sodium metabisulphite dosing station to decompose oxidising biocides prior to discharge into the MUBRL.

The 3,000 ML/yr of seawater blowdown from the TANPF cooling water system will also have a scale inhibitor (antiscalant) concentration of 1.2 ppm (i.e. ~ 1.2 mg/L). This concentration would be further diluted by being mixed with the 104 ML/yr of purified process condensate wastewater to a concentration of about 1.16 mg/L prior to discharge into the MUBRL. Approximately 10 kg/day of antiscalant would be discharged from the TANPF into the MUBRL. Ministerial Statement No. 594 indicates that the concentration of antiscalant in the wastewater discharged from Water Corporation’s DSSF is to be less than 2 mg/L. Ministerial Statement No. 594 also indicates that the Water Corporation can accept up to 100 kg/day of antiscalant from the existing BFPL ammonia plant, and potentially, a similar quantity from any other future industrial facility.

The EPA considers that the discharge of wastewater from the TANPF into the MUBRL can be adequately regulated under Part V of the EP Act. The EPA would expect DEC to ensure that the Part V licence for the proposed TANPF specifies that the:

- 104 ML/yr of purified process condensate wastewater that would be discharged from the TANPF into the MUBRL would contain up to 15 ppm (~ 15,000 µg/L) of nitrogen from NH₃ and up to 15 ppm of nitrogen from NH₄NO₃;

- 3,000 ML/yr of seawater blowdown that would be discharged from the TANPF into the MUBRL would have an oxidising biocide concentration of less than 0.1 mg/L, and a scale inhibitor (antiscalant) concentration of up to 1.2 ppm (i.e. ~ 1.2 mg/L);
• proponent would install and operate a sodium metabisulphite dosing station to decompose oxidising biocides to the required concentration as specified above prior to discharge into the MUBRL;

• wastewater would be monitored for contaminants prior to discharge into the MUBRL to ensure compliance with the (ANZECC/ARMCANZ, 2000) guidelines with contingency measures put in place in the event that appropriate trigger levels are exceeded; and

• results of monitoring would be reported to DEC.

The EPA acknowledges that lower limits may also be applied by DEC if considered necessary.

The EPA notes the lack of detailed technical information on the design of the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond. However, the EPA considers that the design of these ponds can be adequately regulated under the requirements of Part V of the EP Act and the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.

The EPA understands from the proponent’s response to submissions document that the design of the TANPF already incorporates inherent water recycling opportunities. The EPA notes that desalinated water would be sourced from the adjacent BFPL ammonia plant and would be used for the closed loop fresh water cooling system and for fire fighting and utility stations. However, clean surface water (i.e. rainwater) would be sent to the clean water pond for evaporation rather than being recycled.

The EPA considers that the mosquito management measures described in the proponent’s response to submissions document adequately address the concerns that were raised by the Department of Health in relation to wastewater treatment systems being appropriately designed, located and managed to prevent mosquito breeding.

Condition 7-1, which the EPA has recommended be imposed on the proponent in Section 3.2 of this report, would ensure that netting and/or other structures and apparatus are in place to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond.

Summary

Having particular regard to the:

(a) information provided in the proponent’s response to submissions document pertaining to the concentration of contaminants in the wastewater that would be discharged from the TANPF;

(b) overall dilution that the TANPF wastewater would be subjected to at the Water Corporation King Bay outfall diffuser;

(c) regulatory measures available to manage the discharge and monitoring of wastewater from the TANPF into the MUBRL under Part V of the EP Act; and
(d) regulatory measures available to manage the design of the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond under Part V of the EP Act and the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objectives for this factor.

### 3.5 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act. Appendix 3 contains a summary of the EPA’s consideration of the principles.

### 4. Conditions

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

**Consultation**

In developing these conditions, the EPA consulted with the proponent and the Department of Environment and Conservation in respect to matters of fact and matters of technical or implementation significance.

#### 4.1 Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Burrup Nitrates Pty Ltd to construct and operate a TANPF on Site D within the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) the adoption and implementation of best practice pollution control technology to minimise NH₃ and particulate emissions from the TANPF ammonium nitrate prilling plant “common stack”;

(b) rehabilitation and decommissioning of the TANPF site;

(c) installation of netting and/or other structures and apparatus to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond;
(d) ensuring that impacts to fauna resulting from exposed trenches and other construction related voids are managed in an environmentally acceptable manner;

(e) requiring the proponent to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas at least 12 months prior to construction;

(f) requiring the proponent to develop appropriate management measures for dewatering on advice of DEC and the DOW in the event that it is required during construction;

(g) requiring the proponent to design, construct, and locate the groundwater monitoring bores within and around the TANPF site in consultation with DEC and the Department of Water, sample/monitor all groundwater bores every six months, set appropriate groundwater monitoring trigger values, and implement appropriate procedures in the event that trigger levels are exceeded; and

(h) requiring the proponent to undertake intrusive ASS investigations prior to the commencement of construction, and to treat and manage ASS in accordance with the requirements of DEC’s draft guideline on the treatment and management of acid sulfate soils and water in acid sulfate soil landscapes (DEC, 2009).

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Works Approval and Licence under Part V of the *Environmental Protection Act 1986*; and


### 5. Other advice

#### 5.1 Cumulative air emission impacts on the Burrup Peninsula

As mentioned in Section 3.1 of this report, cumulative NO₂ GLCs at Hearson Cove are predicted to reach about 70% of the applicable NEPM criteria with the TANPF operating under normal conditions, and 81.7% with the TANPF operating under worst case conditions.

The EPA considers that the management of cumulative air quality impacts on the Burrup Peninsula is a significant issue that needs addressing. There is also an urgent need for the establishment of an industry funded and managed ambient air quality monitoring network to underpin future environmental impact assessments and management measures.

In view of the above, the EPA recommends that Government establishes an air quality management strategy for the Burrup Peninsula which encompasses the above
requirements as soon as possible in order to facilitate future environmental impact assessments and to manage the impacts of future industrial development.
Appendix 1

List of submitters
Organisations:

1. Dampier Port Authority.
4. Department of Indigenous Affairs.
6. Department of State Development.
7. Department of Water.
8. Friends of Australian Rock Art.
10. National Trust of Australia.
12. Royal Western Australian Historical Society.
14. Woodside Energy Ltd.

Individuals:

1. 109 public and pro-forma submissions.
Environmental Resources Management Australia (2010a). Email from Environmental Resources Management Australia to the Office of the Environmental Protection Authority dated 25 June 2010.

Environmental Resources Management Australia (2010b). Email with attached letter from Environmental Resources Management Australia to the Office of the Environmental Protection Authority dated 30 November 2010.

Environmental Resources Management Australia (2010c). Email with attached letter from Environmental Resources Management Australia to the Office of the Environmental Protection Authority dated 8 December 2010.

Environmental Resources Management Australia (2010d). Email from Environmental Resources Management Australia to the Office of the Environmental Protection Authority dated 9 December 2010.


Appendix 3

Summary of identification of key environmental factors and principles
### Summary of identification of key environmental factors and principles

<table>
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<td><strong>BIOPHYSICAL</strong></td>
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<td>Flora and vegetation</td>
<td>Preparation of the TANPF site would require approximately 35 hectares (ha) of vegetation to be cleared.</td>
<td>Department of Environment and Conservation - Environmental Management Branch</td>
<td>In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that flora and vegetation is a relevant environmental factor. Flora and vegetation will be considered under the factor of Biodiversity.</td>
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<td>The PER document indicates that five broad vegetation types were identified on the TANPF site during the flora survey. These vegetation types, which correspond to vegetation assemblages previously identified and mapped as occurring within the area by (Trudgen, M.E., 2002), are listed below:</td>
<td>1. BNPL state that mangrove communities at King Bay, Cowrie Cove and Nickol Bay are all currently being monitored and have been reported as healthy systems. No information is provided to support this statement and there is need for verification that this comment is correct.</td>
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<td>• AbTeWa - High Open to Open Heath of Acacia bivenosa, A. coriacea 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 TANPF site.</td>
<td>2. DEC suggested that full management plans (not preliminary management plans) would be needed to facilitate effective review of the Final PER.</td>
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<td>• Sm - Tecticornia (syn. Halosarcia) spp. Scattered low shrubs to low open heath. Supernidal flats with Tecticornia-Trianthema succulent Dwarf Scrub. The saline inlet runs approximately east-west through the surrounding area.</td>
<td><strong>Department of Environment, Water, Heritage and the Arts</strong></td>
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<td>• Ita - 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 TANPF site.</td>
<td>1. Can you confirm that the 35 ha disturbance area includes the pipeline between the project site and the ammonia facility, and all laydown areas for the project?</td>
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<td>• TeSv - Broadly described as Sporobolus virgincus 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 TANPF site, and is mixed with AbTeWa.</td>
<td>2. Where is the proposed discharge pipeline, which connects to the Water Corporation, located? Does this pipeline already exist or is this an extra disturbance area? It does not seem to appear on the maps for location and layout of the site (See ES4.1, p.VI; Figure ES1 and ES2; also 5.1, p.20 of the PER).</td>
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<td>• AbImTe - Recorded on the upper slopes of the northern part of the TANPF site. This community is described as an open Acacia bivenosa shrubland over gravel and stone. Additional shrub species present include Indigofera monophylla.</td>
<td>3. There is a reference to ‘likely location of the permanent TANPF area’ (see Section 8.3.2 Description and Evaluation of Potential Impacts of the PER). Is there some chance that the final footprint could change, i.e. be located elsewhere within the site? What is the likelihood of this occurring?</td>
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<td>The PER document also indicates that the following discrete vegetation communities were also mapped by (Trudgen, M.E., 2002) as occurring within the TANPF site. However, they were not observed to be widespread or dominant during the flora survey.</td>
<td>4. In the Preliminary Erosion Control and Stormwater Management Plan, please provide more information on acceptance criteria for hydrocarbons, as there needs to be an appropriate benchmark for testing purposes. Reporting should also be clearly labelled as Vegetation Management Contingency, as well as Flora (see p.7 of management plan).</td>
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<td>• ChRe - Corymbia hamersleyana low open forest over Rhagodia eremaea high open shrubland.</td>
<td><strong>5. The Preliminary Terrestrial Vegetation and Flora Management Plan will require more specific information on the nature and timing of visual monitoring of vegetation disturbance (see Section 9 of the PER).</strong> The chart should also be clearly labelled as Vegetation Management Contingency, as well as Flora (see p.7 of management plan).</td>
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<td>• CeTe - Cajanus cinerus open heath to low shrubs over Acacia orthocarpa open shrubland over Triodia epactia hummock grassland.</td>
<td>Public</td>
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<td>• AbTa - Acacia bivenosa high open shrubs over Triodia angusta hummock grassland.</td>
<td>1. The vegetation in the Level 1 Flora and vegetation survey for the PER is not adequately mapped and flora has not been adequately searched for.</td>
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<td>• T - Triodia wiseana hummock grassland.</td>
<td>2. The level 1 flora survey has not adequately mapped the vegetation associations at the site and the Trudgen (2002) mapping on which the vegetation mapping is based, does not include the sample associations. Astron (2001) identified 24 vegetation associations on the adjacent BFPL site. The broad level of vegetation descriptions provided in the PER are not adequate for the purpose of conducting a conservation assessment.</td>
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<td>• AolTw - Acacia bivenosa, Grevillea pyramidalis subsp. pyramidalis scattered tall shrubs over Acacia orthocarpa, Indigofera linnaei, Crotalaria medicaginacea (Burrup for; B65-11) low open shrubland over Triodia wiseana (Burrup form), Chenchus ciliaris hummock grassland/grassland.</td>
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<td>• GpCwTe - Grevillea pyramidalis subsp. pyramidalis open heath over Corchorus walcottii</td>
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</table>
Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors
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scattered low shrubs to low open heath over *Triodia epactia* hummock grassland. | - TcTeSg - *Terminalia canescens* low open woodland over *Stemodia grossa* low open shrubland.  
- TcAb - *Triodia epactia* (Burrup form) hummock grassland with scattered *Acacia bivenosa* shrubs.  
- MF - Mudflat. | 3. There is no evidence that the samphire associations (mapped by Astron at the adjacent BFPL site) occur elsewhere locally or within the region. |  
A search of the EPBC Act database did not identify any EPBC listed flora species or Threatened Ecological Communities (TECs) within a 10 km radius of the TANPF site.  
The DEC database indicates that no Declared Rare Flora (DRF) species listed under the Western Australian *Wildlife Conservation Act 1950* have been recorded on the Burrup Peninsula. It also indicates that no TECs are listed by the DEC as occurring in the vicinity of the TANPF site.  
The Priority 1 flora species *Stackhousia clementii* and the Priority 3 species *Terminala supranitifolia*, *Gymnathera cunninghamii*, *Acacia glaucocaesia*, *Hibiscus brachysiphonius*, *Rhynchosia bungarensis*, and *Themeda sp.* Hamersley Station (ME Trudgen 11431) have been recorded on the Burrup Peninsula.  
No DRF or Priority flora species were identified on the site during the flora field survey. The Priority 3 flora species *Terminala supranitifolia* was recorded by (Astron Environmental Pty Ltd, 2001a) on the adjoining Burrup Fertilisers Pty Ltd (BFPL) site in areas containing rock screes and rocky hillside. This species or its preferred habitat were not located within the TANPF site during the flora field survey. | 5. Other Chenopod taxa which are likely to occur within the site have not been included in the flora list.  
6. Astron and Morgan both identified the priority 1 sp *Stackhousia clementii* as being present on the adjacent BFPL site, yet the PER does not mention this species at all.  
7. The flora and vegetation survey conducted over the TANPF site for the PER is not adequate and should not be accepted by OEPA or DEC.  

Rehabilitation | The PER document indicates that the TANPF site would be rehabilitated to the level of an industrial zoned area. Prior to decommissioning, the proponent would develop a decommissioning and final rehabilitation plan which would specify control measures which would be used to guide the management of water resources, landforms, re-vegetation and infrastructure and support facilities during decommissioning.  
Equipment, buildings and other facilities, including pipelines connecting the TANPF to the BFPL site would be removed. Surface water ponds would be emptied and cleaned and any remaining contaminated waste would be removed by an approved waste contractor. In the event | 1. Decommissioning will bring the site 'back to a level of industrial zoned area' (See Sections ES4.6 and 5.7.7 of the PER). What does this mean? Does this refer to the original state of the site prior to any construction?  
2. Please confirm if there will be a separate rehabilitation plan, or if rehabilitation measures will be included in a final Terrestrial Vegetation and Flora Management Plan (see note on p.7 of Terrestrial Vegetation and Flora) | 1. In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that rehabilitation is a relevant environmental factor. Rehabilitation will be considered under the factor of Biodiversity.  

Department of Environment, Water, Heritage and the Arts

| 1. Decommissioning will bring the site 'back to a level of industrial zoned area' (See Sections ES4.6 and 5.7.7 of the PER). What does this mean? Does this refer to the original state of the site prior to any construction?  
2. Please confirm if there will be a separate rehabilitation plan, or if rehabilitation measures will be included in a final Terrestrial Vegetation and Flora Management Plan (see note on p.7 of Terrestrial Vegetation and Flora) | 1. In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that rehabilitation is a relevant environmental factor. Rehabilitation will be considered under the factor of Biodiversity.  |
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<td>of a contamination issue being identified before or during the closure of the TANPF, specific closure actions would be included in the plan. The PER document does not include any information on specific criteria that would be employed by the proponent to judge the success of rehabilitation.</td>
<td>Management Plan.</td>
<td>In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that fauna is a relevant environmental factor. Fauna will be considered under the factor of Biodiversity.</td>
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<td><strong>Weeds</strong></td>
<td>The introduced species <em>Cenchrus ciliaris</em> (Buffel Grass), <em>Aerva javanica</em> (Kapok Bush), and <em>Vachellia farnesiana</em> were recorded during the flora and vegetation survey of the TANPF site. None of the above introduced species are Declared Weeds under the <em>Agricultural and Related Resources Protection Act 1976</em>. Eleven other weed species that are known to occur on the Burrup Peninsula and may potentially occur within the TANPF site are listed in Table 1 in the proponent’s Preliminary Weed Management Plan in the PER document. Construction activities have the potential to introduce and spread weeds which could affect flora and vegetation surrounding the TANPF site. The proponent proposes to implement various weed management measures to minimise this risk.</td>
<td>No comments were received.</td>
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<td><strong>Fauna</strong></td>
<td>The clearing of 35 ha of vegetation within the TANPF site would result in the loss of fauna habitat and has the potential to impact a number of conservation significant species listed as occurring in the region. The fauna field survey recorded 20 bird species and one mammal species (the Euro) on the TANPF site. Of the 20 bird species that were recorded, five are listed under the EPBC Act. These were the Common Greenshank, Common Sandpiper, Rainbow Bee-Eater, Black-Winged Stilt, and Red-Capped Plover. The Common Greenshank, Common Sandpiper, and Rainbow Bee-Eater are currently listed as Migratory and Marine species and the Black-Winged Stilt and Red-Capped Plover are listed as Marine species. The Common Greenshank and Common Sandpiper are also currently listed under the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). The Rainbow Bee-Eater is currently listed under the JAMBA (Environmental Resources Management Australia, 2010). Table 7.3 in the PER document lists 42 additional migratory bird species that are listed under the EPBC Act and/or JAMBA, CAMBA, and ROKAMBA as potentially occurring within the TANPF site and other areas on the Burrup Peninsula. Habitats for migratory and marine bird species in the region are likely to include the tidal mudflats and mangroves of King Bay and Hearson Cove, inter-tidal areas surrounding the Dampier Salt ponds, and other tidal sand and mudflats within the Burrup Peninsula and Karratha region. The supra-tidal flat located within the TANPF site provides potential foraging habitat for migratory and marine bird species. Approximately 7.6 ha of supra-tidal flat would be directly impacted by clearing during construction. As large areas of supra-tidal flat would remain available to the south and west of the TANPF site, the loss of about 7.6 ha of foraging habitat is not expected to have an adverse impact on migratory and marine bird species. Five other bird species, the Peregrine Falcon, Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing are listed under the Western Australian <em>Wildlife Conservation Act 1950</em> as having the potential to occur within the TANPF site and other areas on the Burrup Peninsula. The Peregrine Falcon is currently listed as a Schedule 1 species and the Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing are listed as Priority 4 fauna species. The Peregrine Falcon nests on cliffs, crevices or large tree hollows and occurs in a variety of environments including wetlands, plains and timbered watercourses (Pizzey, G &amp; Knight, F., 1997). As nesting habitat is not present within the TANPF site, this species is unlikely to be significantly impacted by the proposal. However, the TANPF site may provide potential</td>
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| **Department of Environment and Conservation - Environmental Management Branch** | 1. DEC suggested that full management plans (not preliminary management plans) would be needed to facilitate effective review of the Final PER. 2. DEC recommends that the proponent consults further with DEC and the WA Museum in relation to the impact of the project on habitat suitable for *Rhagada sp.*2 and, if necessary, carry out further surveys to clarify the risk to the conservation of this species. **Department of Environment, Water, Heritage and the Arts** | 1. Can you provide more information as to the likely amount of blasting, including duration and time of year, blast size charges and noise levels? The concern is any likely impacts upon National Heritage rock art sites from vibrations, and upon migratory birds if occurring when these species may be on-site (See Section 5.6.6, PER). 2. Can you please provide more specifics on the storage of NaOH (Sodium hydroxide) and HNO3 (Nitric acid) near the contaminated water ponds (see Section 5.6.5, PER), as this is near an area that may be accessed by birds. How will this material be protected from access by wildlife, or seepage into surface or groundwater? 3. Please provide more specifics on the measures that will be used to deter birds from accessing the contaminated water ponds (see Section 5.6.6, PER). 4. There appears to be an error in the Preliminary Terrestrial Fauna Management Plan, under Reporting - ‘Reporting will identify opportunities for continuous improvement in flora [should say fauna] management on the site’.

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### Preliminary Environmental Factors

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**foraging habitat.**

The Australian Bustard is known to occur in grasslands, open shrublands, and open scrublands. This species is relatively common away from settled areas (Pizzey, G & Knight, F., 1997). The Australian Bustard has not been previously recorded within the TANPF site or adjacent BFPL site and according to the PER document is unlikely to occur in the area.

The Bush Stonecurlew occurs in open woodland, coastal scrub, and mangrove fringes (Pizzey, G & Knight, F., 1997). The Bush Stonecurlew has not been previously recorded within the TANPF site or adjacent BFPL site. However, the TANPF site does provide potential foraging habitat for this species.

The Eastern Curlew occurs in tidal mudflats, saltmarshes, and grasslands near water (Pizzey, G & Knight, F., 1997). The TANPF site provides potential habitat for this species.

The PER document indicates that the Flock Bronzewing occurs in flooded claypans, watercourses, and treeless grassy plains, and that it nests on the ground by low bush or tussock. The TANPF site represents potential foraging habitat for this species.

As significant areas of suitable foraging habitat for the Peregrine Falcon, Australian Bustard, Bush Stonecurlew, Eastern Curlew, and Flock Bronzewing exist elsewhere on the Burrup Peninsula, these species are not expected to be adversely impacted by construction activities on the TANPF site.

Five conservation significant mammal species are listed as occurring in the region. These include the Northern Quoll, Pilbara Leaf-Nosed Bat, Little North-Western Mastiff Bat, Ghost Bat, and the Western Pebble-Mound Mouse, Ngadji. The Northern Quoll is currently listed as ‘Endangered’ under the EPBC Act and as a Schedule 1 species under the Wildlife Conservation Act 1950. The Pilbara Leaf-Nosed Bat is currently listed as ‘Vulnerable’ under the EPBC Act. The Little North-Western Mastiff Bat is currently listed as a Priority 1 species under the Wildlife Conservation Act 1950. The Ghost Bat and the Western Pebble-Mound Mouse, Ngadji are both currently listed as Priority 4 species under the Wildlife Conservation Act 1950.

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, P. & Knight, F., 2001). The PER document indicates that the Northern Quoll’s preferred rocky eucalypt habitat is not present within the TANPF site. However, the TANPF site may form part of broader foraging habitat within the local area. It is unlikely that the Northern Quoll would be impacted by the proposed development.

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 (Armstrong, K.N., 2001). This includes the confirmed roosts of: Bamboo Creek mine, Copper Hills mine, Klondyke Queen mine, Lalla Rock mine and one cave in the Barlee Range Nature Reserve (DEWHA, 2010). A total of 16 observations of bats in flight might indicate additional roost sites, but these require confirmation. There are five road-kill records and each of these may indicate a previously unknown roost. Other unknown roosts may exist in underground mines or natural caves, however, the larger depths of the underground mines in comparison with the shallow depth of the natural caves would mark them as preferred habitat (Armstrong, K.N., 2001).

The PER document indicates that the TANPF site does not contain potential roosting habitat for the Pilbara Leaf-Nosed Bat. Whilst it is unknown if roosting habitat occurs elsewhere on the Burrup Peninsula, the proponent considers that this is unlikely in view of the colony locations.
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<td>described above. The proponent also considers that potential foraging habitat is likely to be abundant within the local area, and that while it is possible that the TANPF site may provide some foraging habitat for the Pilbara Leaf-Nosed Bat, it is unlikely that the removal of 35 ha of potential foraging habitat would have a significant impact on a local population of the species. The Little North-Western Mastiff Bat is restricted to mangroves and adjacent vegetation along narrow coastal strips (Menkhorst, P. &amp; Knight, F., 2001). It is known to roost in tree hollows and loose bark. The PER document indicates that the TANPF site does not contain mangroves or potential roosting habitat for the Little North-Western Mastiff Bat. However, the TANPF site may form part of foraging habitat within the local area. The proponent’s view is that the proposal is not expected to significantly impact on this species. The Ghost Bat is known from the Pilbara and Kimberly in Western Australia and requires undisturbed roost caves or mine shafts (Menkhorst, P. &amp; Knight, F., 2001). This species is unlikely to be impacted by the proposal given that roosting habitat is not present within the TANPF site. However, as with the above species the TANPF site may form part of foraging habitat within the local area. The PER document indicates that the Western Pebble-Mound Mouse, Ngadji was previously known to occur on the Burrup Peninsula, but is now confined to the central and eastern Pilbara where it is found on stony hillsides and hummock grassland. Nesting sites were not recorded within the TANPF site. In view of the above, the proponent does not expect this species will be significantly impacted by the proposal. The Pilbara Olive Python is a conservation significant reptile species that is known to occur on the Burrup Peninsula. The Pilbara Olive Python is currently listed as ‘Vulnerable’ under the EPBC Act and as a Schedule 1 species under the Wildlife Conservation Act 1950. The Pilbara Olive Python is usually found in rocky areas or gorges and especially rocky habitat associated with water courses. Besides taking refuge in caves and rock crevices they can also be found in hollow logs and burrows beneath rocks (Pilbara Pythons, 2008). The PER document indicates that the Pilbara Olive Python’s preferred habitat is not present within the TANPF site. Hence, it is unlikely to be impacted by the proposed development. Five species of native terrestrial snails were recorded within the adjacent BFPL site by the WA Museum, all of which have been recorded from other localities elsewhere on the Burrup Peninsula (Sinclair Knight Merz Pty Ltd, 2001). These species were <em>Quistrachia legendrei</em>, <em>Gastrocopta pilbarana</em>, <em>Rhagada sp. 12</em>, <em>P. beltainus</em>, and <em>P. contrarius</em>. The PER document indicates that none of the five snail species are considered to be rare or endangered, nor are they likely to have a distributional range limited to the immediate area surrounding the TANPF site. Of the five snail species, two species, <em>Quistrachia legendrei</em> and <em>Gastrocopta pilbarana</em> only inhabit the larger rock piles and high hills, and as such are unlikely to be disturbed by site preparation activities on the TANPF site. The species <em>Rhagada sp. 12</em> has been recorded at a number of locations on the Burrup Peninsula and is considered to occur in varied habitats. Based on previous records from Site E to the north of the TANPF site, potential habitat for this species may occur within the TANPF site. The remaining two species (<em>Pupoides aff. beltainus</em> and <em>P. contrarius</em>) are common to low grassed slopes, with <em>P. contrarius</em> also inhabiting areas subject to marine influence (Sinclair Knight Merz Pty Ltd, 2001), and have been recorded as far south as Shark Bay (Woodside Energy Ltd, 2006). The PER document indicates that in view of the preferred habitat of these two species, and the records of <em>Rhagada sp.</em> at the BFPL site and at Site E to the north, there is the potential for disturbance to these species to occur during site preparation activities. As both <em>P. beltainus</em> and <em>P. contrarius</em> are known to occur elsewhere on the Burrup Peninsula, the proponent considers that site preparation activities would not result in the removal of a</td>
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**Preliminary Environmental Factors**

significant area of potential habitat, or affect the distributional range of these two species.

The proposal is likely to result in the removal of potential habitat for *Rhagada* sp. ‘12’. However, given the known records of *Rhagada* sp. ‘12’ elsewhere on the Burrup Peninsula and presence of potential habitat within the proposed Burrup Peninsula Conservation Reserve it is unlikely that the proposal would result in the removal of a significant area of potential habitat or affect the distributional range of this species.

Management measures that the proponent proposes to implement to mitigate potential impacts on fauna include, but are not limited to:

- minimising the amount of vegetation that is permanently cleared during construction;
- preventing access to, and the disturbance of vegetation adjacent to work areas and beyond the TANPF site boundary;
- undertaking visual monitoring during clearing and construction activities for the presence of fauna, and for disturbance to areas adjacent to work areas and beyond the TANPF site boundary; and
- inspection of all excavations (trenches and voids) left open overnight at the start of each working day to facilitate the removal of any trapped uninjured fauna and the treatment of any injured fauna.

In addition to the above measures, the proponent’s response to submissions document indicates that netting and/or other structures would be used to deter birds, particularly migratory species, from entering the contaminated water pond and interacting with the pond water.

### POLLUTION

#### Air Quality

The main sources of atmospheric emissions from the TANPF would be the nitric acid plant and the ammonium nitrate prilling plant. The nitric acid plant would emit NO\(_x\), N\(_2\)O, NH\(_3\), CO, and CH\(_4\), and the ammonium nitrate prilling plant stack would emit NH\(_3\) and ammonium nitrate dust (as PM\(_{10}\)).

Under normal operating conditions the TANPF would generate approximately:

- 135 tonnes of oxides of nitrogen (NO\(_x\)) per year;
- 163.7 tonnes of nitrous oxide (N\(_2\)O) per year;
- 41 tonnes of carbon monoxide (CO) per year;
- 19.5 tonnes of ammonia (NH\(_3\)) per year;
- 25.2 tonnes of ammonium nitrate dust (as PM\(_{10}\)) per year; and
- 17.8 tonnes of methane (CH\(_4\)) per year.

Additional NO\(_x\) emissions would also be produced at the adjacent Burrup Fertilisers Pty Ltd (BFPL) plant to provide 5 MW of power to the TANPF. These NO\(_x\) emissions were included in the cumulative air quality assessment undertaken for the PER document as a conservative measure.

Emissions of N\(_2\)O and CH\(_4\) from the nitric acid plant have been treated as greenhouse gas emissions by the proponent. Greenhouse gas emissions are considered in Appendix 3 in this report.

#### Department of Environment and Conservation - Air Quality Management Branch

1. It is recommended that in addition to monitoring air quality and using NEPM as an interim standard, local species population health be monitored to investigate whether native species are being impacted by air emissions and if NEPM is sufficiently protective.

2. AQMB accept that any nitric acid vapours will be condensed in the closed loop system of the AN solution plant, therefore no emissions of Nitric Acid are expected, however, it is the responsibility of the proponent to ensure that emission levels are maintained at acceptable levels and air quality impacts are low.

#### Department of Indigenous Affairs

1. Given that dust levels have been elevated in the past and will be elevated more by the TANPF, particularly during construction, DIA believes this requires further investigation. *Section 8.7.11 of the PER should include mitigation measures that include the reinstatement of the Burrup Rock Art Monitoring for dust levels, particularly for sites 5 and 7 (measuring sites either side of Site D).* This would involve:

   - a statement that BNPL will contribute financially to continued rock art and air quality emissions studies by the Burrup Rock Art Monitoring Management Committee, particularly at sites 5 and 7;
NOX emissions from the nitric acid plant would be reduced by passing the tail gas through a catalytic abatement reactor (N2O/NOX reduction unit) prior to discharge. The PER document indicates that the catalytic abatement reactor would utilise best available technology.

Scrubbers would be used in the TANPF ammonium nitrate prilling plant to reduce NH3 and PM10 emissions. The expected NH3 and PM10 stack emission concentrations from the TANPF ammonium nitrate prilling plant “common stack” will be approximately 18 mg/Nm3 and 24 mg/Nm3, respectively, under normal operating conditions (Environmental Resources Management Australia, 2010c & 2010d).

The nearest residences are found in the towns of Dampier and Karratha, which are located 8 km and 13 km away, respectively. Hearson Cove and Deep Gorge which are located approximately 1 km and 1.5 km away, respectively were considered to be receptor locations for air quality modelling purposes as they are recreational and cultural sites that are frequently visited. The proponent considered that the best case scenario approach was adopted for air quality modelling in view of the relatively minor atmospheric emissions from the TANPF and the known complex meteorological conditions on the Burrup Peninsula. Conservative assumptions were used and combined with simple Gaussian plume dispersion computations derived from the dispersion model AUSPLUME Version 6.0. The air quality modelling was used to predict NO2 and NH3 1-hour average ground level concentrations (GLCs).

In order to account for other existing sources of NO2 on the Burrup Peninsula, the proponent determined that an appropriately conservative background 1-hour average NO2 GLC could be derived by multiplying the 1-hour average NO2 GLC of 0.02 parts per million (ppm) measured by the then Department of Environmental Protection (DEP) in 1999 during the Pilbara Air Quality Study (DOE, 2004) by three to obtain a figure of 0.06 ppm (or approximately 112.9 µg/m3).

Cumulative air quality modelling for NH3 emissions was not undertaken by the proponent as there is no hourly monitoring data or other suitable information available for NH3. The PER document indicates that the existing Woodside LNG facility and the adjacent BPFL plant are likely to be the main current sources of NH3. However, the proponent considers that existing NH3 emissions from these sources are low. The proponent also considers that an assessment of the cumulative impacts of NH3 emissions is not warranted in the context of the screening approach that was adopted because:

- the calculated NH3 emissions from the TANPF are very low;
- NH3 has not been a pollutant of historical concern for regulators on the Burrup Peninsula; and
- NH3 is not associated with long-term chronic health impacts.

The proponent did not consider CO and ammonium nitrate dust (as PM10) emissions from the TANPF in the air quality modelling that was undertaken for the PER document.

When the TANPF is considered in isolation under normal operating conditions NO2 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be approximately 5.1 µg/m3, 4.7 µg/m3, 3.0 µg/m3, and 2.5 µg/m3, respectively. During non-routine (upset) operating conditions NO2 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 34 µg/m3, 32 µg/m3, 17 µg/m3, and 14 µg/m3, respectively. All of the above predicted NO2 GLCs are well below the National Environment Protection Measure (NEPM) standard of 246 µg/m3.

<table>
<thead>
<tr>
<th>Preliminary Environmental Factors</th>
<th>Proposal Characteristics</th>
<th>Government Agency and Public Comments</th>
<th>Identification of Key Environmental Factors</th>
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</thead>
<tbody>
<tr>
<td>NOX emissions from the nitric acid plant would be reduced by passing the tail gas through a catalytic abatement reactor (N2O/NOX reduction unit) prior to discharge.</td>
<td>- the studies include colour contrast, spectral mineralogy, ambient air quality and rock microbiology monitoring;</td>
<td>Department of Environment, Water, Heritage and the Arts</td>
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<td>Scrubbers would be used in the TANPF ammonium nitrate prilling plant to reduce NH3 and PM10 emissions.</td>
<td>- recommendation that the Burrup User Group (BUG) develop a coordinated rock art/air quality monitoring program;</td>
<td><strong>1.</strong> Given the potential for cumulative impacts from air emissions on rock art in the National Heritage area, BNPL may wish to seriously consider a funding arrangement with the Burrup Rock Art Management Committee to fund a particular and/or ongoing monitoring studies on the effects of emissions, perhaps targeting rock art sites closest to the proposed TANPF, for a period of time, e.g. two years. Including the specifics of such a proposal in the Air Quality and Dust Management Plan as a mitigation measure would be welcomed by DEWHA (See Table ES4 of the PER).</td>
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<tr>
<td>Cumulative air quality modelling for NH3 emissions was not undertaken by the proponent as there is no hourly monitoring data or other suitable information available for NH3.</td>
<td>that Traditional owners are consulted about whether rock art monitoring should be continued.</td>
<td><strong>2.</strong> Please note that the studies to date on rock art and possible effects from air emissions have been on the rock itself and not a pigment that may have been used to paint rock art (see Sections 8.7.7 and 8.7.9 of the PER). Are there any relevant studies on rock art? Is there any likelihood that air emissions could impact upon such pigment? Is the rock art painted or etched (in the latter case, pigment is not an issue)? Please note that these questions refer to the rock art at sites closest to the proposed TANPF location.</td>
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<tr>
<td>The proponent did not consider CO and ammonium nitrate dust (as PM10) emissions from the TANPF in the air quality modelling that was undertaken for the PER document.</td>
<td></td>
<td><strong>3.</strong> The Preliminary Air Quality and Dust Management Plan needs to include all acronyms used therein, so it may be read as a stand-alone document. For example, there need to be definitions for NEPM, CH4, NH3, etc. See Table 5 of the PER. Is the use of N2O here an error? Should this say NO2? Please also provide more detail on the monitoring interval for stack sampling in Table 5.</td>
<td></td>
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<tr>
<td>When the TANPF is considered in isolation under normal operating conditions NO2 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be approximately 5.1 µg/m3, 4.7 µg/m3, 3.0 µg/m3, and 2.5 µg/m3, respectively. During non-routine (upset) operating conditions NO2 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 34 µg/m3, 32 µg/m3, 17 µg/m3, and 14 µg/m3, respectively. All of the above predicted NO2 GLCs are well below the National Environment Protection Measure (NEPM) standard of 246 µg/m3.</td>
<td></td>
<td><strong>Public</strong></td>
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<tr>
<td>The proponent did not consider CO and ammonium nitrate dust (as PM10) emissions from the TANPF in the air quality modelling that was undertaken for the PER document.</td>
<td><strong>1.</strong> TANPF will significantly add to acidic emissions destroying Burrup Peninsula rock art.</td>
<td><strong>4.</strong> Air pollution is already substantial on the Burrup and any industrial expansion will increase the threat to personal health and to the petroglyphs.</td>
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<tr>
<td>When the TANPF is considered in isolation under normal operating conditions NO2 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be approximately 5.1 µg/m3, 4.7 µg/m3, 3.0 µg/m3, and 2.5 µg/m3, respectively. During non-routine (upset) operating conditions NO2 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 34 µg/m3, 32 µg/m3, 17 µg/m3, and 14 µg/m3, respectively. All of the above predicted NO2 GLCs are well below the National Environment Protection Measure (NEPM) standard of 246 µg/m3.</td>
<td><strong>2.</strong> TANPF acidic emissions will affect natural systems e.g. coral reefs, fisheries, soil acidity and will destroy vegetation.</td>
<td><strong>5.</strong> The TANPF should be relocated away from the Dampier Archipelago (including the Burrup Peninsula) due to elevated and cumulative airborne emissions impacting on the petroglyphs.</td>
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<tr>
<td>The proponent did not consider CO and ammonium nitrate dust (as PM10) emissions from the TANPF in the air quality modelling that was undertaken for the PER document.</td>
<td><strong>3.</strong> The close proximity to rock art and the visual presence and pollution will diminish the integrity of the rock art and the recreational amenity of the area.</td>
<td><strong>6.</strong> The TAN PER lists emissions but there is no indication of the cumulative emissions of the TANPF and surrounding projects and proposed projects.</td>
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<td>Cumulative air quality modelling predicts that for normal operating conditions, NO₂ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha would be approximately 118 µg/m³, 117.6 µg/m³, 115.9 µg/m³, and 115.4 µg/m³, respectively. During non-routine (upset) operating conditions NO₂ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 147 µg/m³, 145 µg/m³, 130 µg/m³, and 127 µg/m³, respectively. All of the above predicted NO₂ GLCs are below the NEPM standard of 246 µg/m³. The expected NOₓ emission concentration from the TANPF nitric acid plant stack will be approximately 75 parts per million by volume (ppmv) under normal operating conditions (Environmental Resources Management Australia, 2010b). When the TANPF is considered in isolation under normal operating conditions NH₃ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to be approximately 7.7 µg/m³, 6.9 µg/m³, 2.5 µg/m³, and 1.7 µg/m³, respectively. During non-routine (upset) operating conditions NH₃ 1-hour average GLCs at Hearson Cove, Deep Gorge, Dampier, and Karratha are predicted to increase to approximately 21 µg/m³, 18 µg/m³, 6.7 µg/m³, and 4.4 µg/m³, respectively. All of the above predicted NH₃ GLCs are well below the 1-hour average criteria of 330 µg/m³ adopted by the proponent [from Department of Environment and Conservation (NSW), 2005] in view of the absence of applicable NEPM or World Health Organisation (WHO) criteria. The expected NH₃ stack emission concentration from the TANPF nitric acid plant stack will be approximately 0.73 mg/Nm³ (i.e. about 1 ppmv) under normal operating conditions (Environmental Resources Management Australia, 2010c). Impact of atmospheric emissions on petroglyphs (rock art) The CSIRO undertook a study between 2004 and 2008 to assess the potential for industrial air emissions to damage rock art located on the Burrup Peninsula. Part of the study involved fumigating rock samples in a laboratory with NO₂, NH₃, SO₂, and benzene at concentrations around ten times predicted future industrial annual average GLCs (e.g. maximum NO₂ and NH₃ concentrations were 50 parts per billion (ppb) and 40 ppb, respectively) together with toluene and xylene at concentrations around 10 times predicted future industrial weekly and 24 hour average GLCs, respectively (CSIRO, 2007). 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 (SKM, 2009). Noise and vibration Noise and vibration would be generated during construction of the TANPF. The construction period is expected to be approximately 30 months long. Sources of noise and vibration during construction include operating earthmoving equipment such as bulldozers and excavators and blasting for site levelling and the excavation of foundation pits. The PER document indicates that blasting would be infrequent and would not result in any significant noise and vibration impacts beyond the TANPF site boundary. At Hearson Cove beach, ground vibration levels are expected to be below acceptable levels prescribed in AS 2187.2, and air blast levels are likely to be well below the applicable criteria within the Environmental Protection (Noise) Regulations 1997. Noise levels due to construction activities are predicted to reach a maximum of about 42 dB(A) at Hearson Cove beach which is less than the amenity criterion level of 50 dB(A) for Hearson Cove beach established by the former Department of Minerals and Petroleum Resources (SKM, 2002). Operational noise The results obtained from noise modelling indicate that operational noise levels at the site boundary would be less than 65 dB(A) and would comply with the requirements of the</td>
<td>Department of Environment, Water, Heritage and the Arts 1. Can you provide more information as to the likely amount of blasting, including duration and time of year, blast size charges and noise levels? The concern is any likely impacts upon National Heritage rock art sites from vibrations, and upon migratory birds if occurring when these species may be on-site (See ES4.3, Box ES.1, p.VII; 5.7.1, p.37 of the PER). Noise and vibration levels associated with the construction and operation of the TANPF are expected to comply with relevant criteria. The EPA considers that this environmental factor does not require further evaluation.</td>
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<td>Environmental Protection (Noise) Regulations 1997</td>
<td>The predicted noise levels at Hearson Cove and Deep Gorge are 35 dB(A) or less, which would comply with the amenity criterion level of 50 dB(A) for Hearson Cove beach referred to above. The proponent will undertake periodic noise monitoring at strategic locations within the TANPF, at the TANPF boundary, and at Hearson Cove and Deep Gorge.</td>
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<td>Surface water and groundwater</td>
<td>Surface water</td>
<td>Construction activities within the proposed TANPF site would obstruct at least four ephemeral drainage channels which could lead to localised flooding to the north of the site during rain events. New drainage channels would be installed up-gradient to direct water away from the TANPF site. These channels would link with existing natural drainage channels to minimise the risk of flooding and erosion. Natural surface water flows on the TANPF site would be redirected to ensure that flows continue into the supra-tidal flat. The supra-tidal flat between King Bay and Hearson Cove is known to be subject to flooding from storm surge events. Storm surge estimates for this area obtained from the Bureau of Meteorology’s Karratha Storm Surge Inundation Study using a deterministic regional ocean model and historical cyclone events found that 1:100 year storm events are expected to yield a storm surge of 5 m above AHD, while 1:50 year storm events would produce a storm surge of 4.6 m above AHD. The final proposed level for the TANPF site, including areas such as the clean water pond, would be 5.5 m AHD which is 0.5 m above the 1:100 year storm surge level. The proponent has taken into account a predicted sea level rise of between 0.7 cm and 20.8 cm by 2040 in determining the final proposed level for the TANPF site. Storage areas would be bunded to provide additional protection against flooding and ballast would be placed on the embankments on the TANPF site to provide protection against erosion during flood events. Surface water run-off from non-process/storage areas and building roofs would be directed to the clean water pond where it would be evaporated. Groundwater Detailed hydrogeological studies were not undertaken by the proponent to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas. The proponent intends to collect baseline data on groundwater at the TANPF site prior to the commencement of construction. The PER document indicates that groundwater salinities in the region are likely to range between 1,000 and 3,000 mg/L according to the Department of Water Hydrogeological Atlas. Groundwater yields are expected to be low in view of the lithology in the region. Groundwater flow directions are anticipated to be variable and to generally follow the topography with the exception of deeper fractured zones where the flow direction would be influenced by the fractures. Although there are uncertainties associated with the potential receiving water bodies for groundwater discharge in the area, discharge to the supra-tidal flat and King Bay is considered to be possible and would be dependent upon the connectivity of the groundwater bearing zones in the area. The PER document also indicates that the depth to groundwater beneath the TANPF site is expected to be highly variable across the site, with shallow perched water tables occurring during inundation of the lower lying supra-tidal flat during tidal or rain events, and deeper groundwater associated with weathered and fractured zones occurring in areas with higher elevation. The proponent has not determined the volume of water that would be generated by dewatering.</td>
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<td>Department of Environment and Conservation - Environmental Management Branch</td>
<td>1. Proponent confirms that potential areas of contamination will be raised to at least 5.5 m AHD and appropriately located to withstand 1 in 100 year storm events. DEC requests that the design of bunding and other mitigation measures be developed in consultation with DEC prior to construction to ensure they are adequate to prevent contaminants leaching into the environment.</td>
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<td>In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that surface water and groundwater is a relevant environmental factor.</td>
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<tr>
<td>Department of Environment, Water, Heritage and the Arts</td>
<td>1. Can you provide more information on how much dewatering is likely to be required on site? How much of the project site is likely to be affected, specifically how much of the supra-tidal flats and associated migratory bird habitat? (See ES4.3, Box ES.1, p.VIII; 8.9.3, p.142 of the PER).</td>
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<td>2. Are the ‘temporary settlement ponds’ referred to for dewatering water the same as the contaminated water ponds, or is this something else? (See 8.9.5, p.144 of the PER).</td>
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<td>3. What is defined as ‘significant’ in terms of the potential amount of dewatering water that may be generated? (See 8.9.5, p.144 of the PER).</td>
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<td>4. Can you please provide more specifics on the storage of NaOH (Sodium hydroxide) and HNO3 (Nitric acid) near an area that may be accessed by birds. How will this material be protected from access by wildlife, or seepage into surface or groundwater? (See Section 5.6.5, PER).</td>
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<td>5. In the Preliminary Erosion Control and Stormwater Management Plan, please provide more information on acceptance criteria for hydrocarbons, as there needs to be an appropriate benchmark for testing purposes. Reporting should also identify opportunities for continuous improvement in vegetation management on-site.</td>
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<td>Dampier Port Authority</td>
<td>1. The construction of the TANPF will increase the proportion of impervious surfaces and significantly alter natural drainage across Site D. These changes could impact on Burrup Rd due to flooding or have flow on effects on upstream/downstream areas. The DPA request further information that demonstrates the proposed development will not increase the risk of flooding and inundation at Burrup Road, as well as considering any potential cumulative impacts of surface hydrology from the TANPF and the proposed Dampier Nitrogen project nearby.</td>
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<td>Friends of Australian Rock Art</td>
<td>1. The land in question is unsuitable for industrial development due to flood impacts associated with cyclonic tidal surge and climate change.</td>
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<td>during construction should it be required, but expects it to be negligible. The proponent considers that, given the isolated and temporary nature of dewatering, should shallow groundwater exist beneath the TANPF site and dewatering be required, the magnitude of any potential impacts would be small. Information on the management measures that would be employed to mitigate any potential environmental impacts arising from dewatering activities was not provided in the PER document. Leaks from underground pipes or the clean water pond, contaminated water pond, and sewage wastewater treatment station evaporation pond have the potential to contaminate groundwater beneath the TANPF site. The proponent’s Preliminary Water Quality Management Plan indicates that groundwater monitoring bores would be installed within and around the TANPF site following the completion of a baseline groundwater study. The location of the groundwater monitoring bores has not been determined yet, and would be finalised after the baseline groundwater study and final detailed plant design have been completed. Groundwater sampling/monitoring of all bores would be undertaken every six months and groundwater monitoring trigger values would be set at a value of 10% above the contaminant concentrations obtained from baseline groundwater quality monitoring.</td>
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<td>1. A risk to the site is the flood and sea level impacts associated with cyclonic surge. 2. The TANPF should be relocated away from the Dampier Archipelago (including the Burrup Peninsula) due to flooding impacts associated with cyclonic tidal surge and sea level rise.</td>
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<td>Acid sulfate soils</td>
<td>The acid sulfate soil (ASS) risk map in Planning Bulletin 64 published by the Western Australian Planning Commission (WAPC) indicates that the TANPF site is located within areas of high to moderate and moderate to low risk of ASS occurring within 3 m of the surface. The northern portion of the TANPF site that would be disturbed by construction activities is located within an area of high to moderate risk of ASS occurring within 3 m of the surface. Sulphuric acid is produced when ASS is exposed to air through disturbance or drainage. This sulphuric acid can release metals and other substances within the soil profile into the surrounding environment. Construction activities have the potential to disturb ASS and subsequently impact on surface water and groundwater quality. The proponent intends to conduct intrusive investigations prior to the commencement of construction activities and will implement appropriate ASS management measures in accordance with Department of Environment and Conservation (DEC) legislative requirements.</td>
<td>Department of Environment and Conservation - Environmental Management Branch</td>
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<td>1. There is the potential for impacts from mobilisation of ASS from construction activities and discharges from the project on the King Bay salt flats and mangroves. DEC recommend that the proponent undertakes monitoring of the mangroves at King Bay to confirm that the mitigation measures are effective and that the proposal does not contribute to cumulative impacts on the King Bay mangroves. DEC also suggests working with adjacent proponents (e.g. Rio, Mermaid Marine etc.) to seek baseline monitoring information. 2. DEC recommend that the proponent commits to confirm the presence of ASS and prepare and implement an ASS management plan (if ASS will be disturbed as a result of the project).</td>
<td>In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that acid sulfate soils is a relevant environmental factor. Acid sulfate soils will be considered under the factor of surface water and groundwater.</td>
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<td>Liquid waste disposal</td>
<td>Liquid wastes that would be produced by the TANPF under normal operating conditions include: • approximately 3,104 ML of water per year consisting of about 3000 ML of sea water blowdown per year and about 104 ML of purified process condensate per year which would be discharged into the Water Corporation’s multi user brine return line (MUBRL); • approximately 24.6 ML per year of non-contact liquids such as surface water from non-process/storage areas and building roofs, surplus purified process water, non-contaminated wash water, and non-contact process water which would be directed to the clean water pond for evaporation, with no off-site discharge; • approximately 9.75 ML per year of potentially contaminated liquids such as water from equipment washing and contaminated process water/condensate which would be directed to the contaminated water pond for treatment and evaporation, with no off-site discharge; • minor volumes of hazardous liquid waste requiring designated on-site storage and handling and disposal by a licensed contractor, such as wastes that could result in a mixture of ammonium nitrate and organic compounds, waste oil from plant machinery, and laboratory waste;</td>
<td>Water Corporation</td>
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<td>1. Commitment 6 of Ministerial Statement No. 594 states that brine and wastewater effluent will only be accepted from industrial process plants: • for which licence and/or Ministerial Conditions have been issued (Part IV or V of the EP Act); • that have provided appropriate toxicity and environmental fate data for all components of the effluent to the satisfaction of the DEC/OEPA; and • which only utilise DEC/OEPA approved process additives (e.g. antiscaleants, corrosion inhibitors etc.). Furthermore, the Water Corporation will not accept wastewater streams that will result in violation of the ANZECC guideline trigger values for the protection of 99% of species at the edge of the outfall mixing zone.</td>
<td>In view of the nature of the concerns that were raised in the comments that were received, the EPA considers that liquid waste disposal is a relevant environmental factor.</td>
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<td>• grey water which would be stored, collected, and disposed of in accordance with all relevant legislative requirements; and</td>
<td>• indicate whether BNPL has undertaken toxicity and environmental fate tests for the wastewater streams it proposes to discharge through the Water Corporation’s MUBRL;</td>
<td>• provide detail on the composition of the waste discharges and likely toxicants within the seawater blow down water; and</td>
<td>• indicate whether BNPL has undertaken toxicity and environmental fate tests for the wastewater streams it proposes to discharge through the Water Corporation’s MUBRL;</td>
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<tr>
<td>• sewage wastewater which would be treated in a dedicated sewage wastewater treatment station with the sanitised clean liquid phase from the station being sent to a separate evaporation pond and sewage sludge being collected by authorised personnel using trucks and transported to an off-site treatment plant.</td>
<td>• demonstrate that BNPL can meet waste avoidance and minimisation principles with respect to minimising toxicants and nutrient loads at source.</td>
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<td>The PER document indicates that the contaminated water pond and clean water pond would be designed in accordance with DOW requirements. Detailed technical information regarding the design of the above ponds was not provided in the PER document. Nor was any detailed technical information regarding the design of the sewage wastewater treatment station evaporation pond provided in the proponent’s response to submissions document.</td>
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<td>The proponent’s Preliminary Water Quality Management Plan indicates that a wastewater monitoring program would be developed prior to construction and operation. Monitoring for contaminants would be undertaken at the contaminated water pond, clean water pond, and water intake [water sourced from the Water Corporation’s desalination and seawater supply facility (DSSF)]. In addition, all wastewater sent off-site would be monitored for contaminants prior to discharge into the Water Corporation’s MUBRL.</td>
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<td>The proponent expects wastewater discharges from the Water Corporation’s DSSF to continue to comply with specific water quality criteria outlined in the ministerial environmental conditions for the DSSF (Ministerial Statement No. 594) even with the inclusion of wastewater from the TANPF. The proponent has not considered potential impacts on marine fauna and benthic primary producers arising from wastewater discharged from the TANPF on the basis that the Water Corporation’s Ministerial environmental conditions for the DSSF would continue to be complied with, even with the inclusion of wastewater from the TANPF.</td>
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<td>2. The PER (Section 2.2.1) states that the Technical Ammonium Nitrate Production Facility (TANPF) Project is a prescribed premise and a Works Approval will be applied for under category 52 of the Environmental Protection Regulations, that relates to electric power generation. In addition, the PER states that:</td>
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<td>• the Preliminary Water Management Plan indicates that the proponent will 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 ponds; and</td>
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<td>• the Preliminary Waste Management Plan indicates that a wastewater monitoring programme will be developed and implemented following final detailed design and that water from the clean surface water pond and seawater blow down will be tested, treated and confirmed as meeting Water Corporation and OEPA acceptance criteria before its release off-site to Water Corporation.</td>
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<td>3. The Water Corporation recommends that a condition be imposed on the Works Approval for a Commissioning Plan to be submitted to DEC, prior to commissioning, that details:</td>
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<td>• commissioning activities;</td>
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<td>• the monitoring regime of wastewater streams;</td>
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<td>• disposal options of wastewater streams; and</td>
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<td>• a contingency plan for wastewater stream disposal. The contingency plan should also address a reduction in load, if marine monitoring data (water, sediment and biota) show unacceptable impacts, or that agreed criteria are not met.</td>
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<td>4. Has the proponent given consideration to reuse/recycling of water on site to reduce the amount of clean surface water being discharged through the MUBRL?</td>
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<td>5. Prior to BNPL discharging waste streams into the Water Corporation’s MUBRL; BNPL will be required to establish a Burrup Peninsula Industrial Water Service Agreement with the Water Corporation. As part of this agreement issues that will be addressed include shutdown for maintenance and the installation of online continuous monitoring by BNPL.</td>
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| **Department of Health**<br>1. DOH have concerns over the proponents intent to truck sewage offsite from the permanent facility. DOH does not consider the trucking of sewage offsite a suitable permanent arrangement and given 30 month construction period, it may also be inappropriate during long term construction.<br>2. Alterations to topography (e.g. earthworks, pipeline install etc.) that enhance retention of rainwater and runoff should be avoided in order to minimise opportunities for mosquitoes to breed.<br>Poorly designed water holding infrastructure and wastewater treatment systems can give rise to very significant number of mosquitoes. Wastewater treatment systems will need to be appropriately designed, located and managed to prevent mosquito breeding.<br>3. All drainage and stormwater ponds proposed for the TANPF are to be designed to limit the potential for mosquito breeding. The Chironomid midge and mosquito risk assessment guide for constructed water bodies (Midge Research Group, 2007) should be referred to during design/planning to ensure on-site mosquito breeding is minimised.<br>**Department of Environment, Water, Heritage and the Arts**<br>1. Please provide more specifics on the measures that will be used to deter birds from accessing the contaminated water ponds (see Section 5.6.6, PER).<br>2. What are the ‘agreed limits’ or the process by which limits may be agreed for possible contaminants in the clean water surface pond? (See Section 8.9.5, PER).<br>3. The report refers to Water Corporation water quality criteria and Ministerial Conditions, and that water sent offsite by BNPL must meet these criteria and conditions (see Section 8.9.3, PER). Can you please provide these criteria and conditions so that it is possible to see the standards that water must meet prior to being sent offsite? This includes the standards that must be met by water discharged from King Bay.<br>4. The Preliminary Waste Management Plan will require more specific information on the nature and timing of monitoring, to ensure mitigation requirements are met.<br>**Dampier Port Authority**<br>1. The DPA recommends that the proponent consults with the Burrup Users Group (BUG) to ensure the relevant local industry and government stakeholders are aware of the intended use and any potential individual or cumulative impacts to water quality in King Bay.<br>**Greenhouse gas emissions**<br>Operation of the TANPF would result in the production of approximately:<br>• 51,671 tonnes of CO$_2$-e per year from Scope 1 greenhouse gas emissions from tail gases (CO$_2$, N$_2$O, and CH$_4$); and<br>• 32,780 tonnes of CO$_2$-e per year from Scope 2 greenhouse gas emissions from the combustion of gas for electricity generation.<br>No comments were received.<br>In view of the relatively small total quantity of greenhouse gases that would be produced by the TANPF, the EPA considers that this environmental factor does not require further evaluation.
## Preliminary Environmental Factors

Total greenhouse gas emissions would be approximately 84,451 tonnes of CO$_2$e per year. The greenhouse intensity of TAN production would be approximately 0.241 tonnes of CO$_2$e per tonne of TAN.

### SOCIAL SURROUNDINGS

**Risk and hazards**

Operation of the TANPF would increase the risk of individual human fatality in surrounding areas.

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<table>
<thead>
<tr>
<th>Department of State Development</th>
<th>Department of Environment, Water, Heritage and the Arts</th>
<th>Water Corporation</th>
<th>Friends of Australian Rock Art</th>
<th>Woodside Energy Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DSO is broadly supportive of the project. The proponent currently has a CQRA in with the Department of Mines and Petroleum Resources Safety Branch. They have indicated that there may be a slight adjustment of the site plan to elongate the plant footprint to the east (but still within Site D), though it is unlikely any movement to the south will be required.</td>
<td>1. Can you confirm that the actual distance between the proposed TANPF and the currently operating ammonia plant is 600 m? (See Table 5.5 of the PER). Can you confirm this as a safe distance, as per Section 8.11.4 of the PER, in the event of an ammonia release or a detonation? 2. Can you confirm the separation distance of the bagged prill stacks in storage on-site as 1 m for small bags of bulk product and not less than 7 m for pyramidal stacked bags? (See Sections 5.5.3 and 8.11.3 of the PER). Can you also confirm the size of ‘small bags’ of bulk product? Please note that the information concerning these distances is difficult to understand in the document and further clarity, e.g. a table that states the bag sizes, stack configurations and distances, may assist.</td>
<td>1. Can the proponent provide details of management measures that will be put in place to ensure public safety from plant operations and safety to surrounding sites.</td>
<td>1. The storage of diesel and operation of diesel trucks in and around the TANPF represents significant risks to the plant and consequently the surrounding industry, environment, heritage and human life. FARA are concerned about the location of on-site diesel generators due to the possibility of contamination. 2. BHL have a poor record of reporting and containing ammonia leaks at the BFPL facility. Given BHL’s poor track record FARA believe that the procedures outlined in Section 9.4.5 will not sufficiently safeguard staff, visitors to the area and the surrounding environment. 3. In the event of an explosion, FARA are concerned about the impact this may have on the adjacent BFPL Ammonia plant, surrounding areas such as rock art (e.g. Deep Gorge), other industry and Hearson Cove, as well as potential impact on human life.</td>
<td>1. Woodside request a copy of the risk assessment be provided for the purpose</td>
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The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation.
<table>
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</table>
| Visual amenity                   | The TANPF (particularly the 67 m high prilling tower) would be visible to from numerous locations in surrounding areas including Burrup Road, Hearson Cove Road, Village Road, and the Hearson Cove barbeque area. | Department of Environment and Conservation - Environmental Management Branch  
1. DEC recommends that the proponent considers aspects of plant layout/design and/or other measures to mitigate impacts on visual amenity at Hearson Cove and Deep Gorge. DEC recommends consideration of possibly relocating the prilling tower to a less prominent position in the landscape, as well as any other potential mitigation measures. | The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation. |
| Heritage                         | Aboriginal heritage      | Department of Indigenous Affairs  
1. Section 8.4.7 of the PER should recommend that additional visual amenity mitigation measures take place, and specifically that there will be investigation of planting of vegetation around Site D to mitigate visual impact, in particular on Deep Gorge. |  |
|                                  |                          | Friends of Australian Rock Art  
1. The proposed TANPF will further negatively impact on the visual assets of the cultural and recreational features of the Burrup and Hearson Cove. |  |
|                                  |                          | Public  
1. The close proximity to rock art and the visual presence and pollution will diminish the integrity of the rock art and the recreational amenity of the area.  
2. The proposed development will be intrusive and it is not possible to conceal the 67m prilling tower. |  |
|                                  |                          |                                  |  |

of providing further comment to the OEPA once the risk assessment is complete.

Public

1. Ammonium nitrate can occasionally be unstable. The proposed TANPF will add significant quantities of explosives which may impact on other volatile operations on the Burrup Peninsula.

2. The risk of accidental or deliberate explosive reaction is not considered in the PER. An accident could have a ripple effect with the BFPL ammonia tanks located immediately to the west and would presents danger to human life and rock art.

3. Diesel trucks will be used to transport TAN, as well as diesel generators being used on site. Diesel mixed with TAN is an explosion and presents danger to human life and rock art.

4. There needs to be strict regulation of safety procedures and environmental pollution, as well as independent external monitoring and reporting of compliance.

The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. The EPA notes that construction activities would not impact on aboriginal heritage sites.

The PER document indicates that none of the registered engraving sites are located within Site D. The proponent’s response to submissions document indicates that Site 19212 L is incorrectly depicted in Figure 7.19 in the PER document as...
<table>
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<td>occurring within Site D. The correct location of this site is depicted in Figure D.2 in Annex D in the proponent’s response to submissions document. Figure D.2 shows that Site 19212 L is not located within Site D.</td>
<td>statement that BNPL will provide those reports to DIA. BNPL has also not applied for a s18 approval to disturb the land.</td>
<td>containing engravings or rock art. The EPA considers that potential impacts on sites within Site D containing artefacts and shell middens can be adequately managed under Section 18 of the Aboriginal Heritage Act 1972. Potential impacts of gaseous emissions from the TANPF on rock art will be considered under the factor of air quality. In view of the above, the EPA considers that this environmental factor does not require further evaluation.</td>
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<tr>
<td>Potential impacts of gaseous emissions from the TANPF on aboriginal rock art (petroglyphs) are discussed under the environmental factor of air quality above. National heritage The Dampier Archipelago, including the Burrup Peninsula, is listed as a National Heritage Place under the Commonwealth EPBC Act in recognition of the significant aboriginal heritage values of the area. The National Heritage Place borders Site D, but does not enter it, and is listed on the National Heritage List as an Indigenous class site (Place ID: 105727).</td>
<td>National heritage The Dampier Archipelago, including the Burrup Peninsula, is listed as a National Heritage Place under the Commonwealth EPBC Act in recognition of the significant aboriginal heritage values of the area. The National Heritage Place borders Site D, but does not enter it, and is listed on the National Heritage List as an Indigenous class site (Place ID: 105727). Other types of sites such as artefact scatters and middens are also protected and should not be disturbed without approval from the Minister for Indigenous Affairs.</td>
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<td>Non-indigenous heritage A search of the Heritage Council of Western Australia’s State Register of Heritage Places identified the Burrup Peninsula and Hearson Cove site (Site No. 08663), which makes up part of the larger Dampier Archipelago Rock Art Precinct (Site No. 16867). These registered heritage sites are located approximately 600m from the eastern boundary of Site D.</td>
<td>2. The statement that none of the registered engraving sites are located inside Site D is incorrect. Sites 11722 and 19473, which are registered engraving sites are within Site D, as well as Site 19212L. This sentence should be deleted from the PER.</td>
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<td>3. Text within the PER (as opposed to the Preliminary Aboriginal Heritage Management Plan) does not clearly demonstrate intent to comply with the Aboriginal Heritage Act 1972 (AHA). For example, the PER states that none of the registered engraving sites are located inside Site D (p78 of the PER). However, it is not only engravings that are protected under the AHA. Other types of sites such as artefact scatters and middens are also protected and should not be disturbed without approval from the Minister for Indigenous Affairs.</td>
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<td>4. BNPL has yet to engage in discussions with the DIA regarding undertaking the approval process.</td>
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<td>5. It appears that the currently planned footprint of the plant could affect Sites DIA19226 and DIA19212L. Information included also suggested the plant footprint is on top of Site DIA23383, which is a closed area. Further clarification is needed.</td>
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<td>6. Figure 7.20 of the PER is confusing. It does not include rock engraving site 19212 L. It is not appropriate to have a map that only shows engraving sites, this should be removed or altered.</td>
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<td>7. Table 8.38 of the PER should include under the mitigations measures for Indigenous heritage: statements that heritage surveys have been conducted and are continuing to take place with Traditional Owners and that either BNPL will provide reports to DIA so that a s18 is not required, or an s18 will be undertaken.</td>
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<td>8. In addition to bussing in and out personnel and conducting cultural awareness training, DIA suggests that there be Codes of Conduct for all BNPL employees and contractors to instruct that severe disciplinary measures will be imposed upon anyone found interfering with Aboriginal heritage sites and would be liable under AHA and EPBC Act.</td>
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<td><strong>Department of Environment, Water, Heritage and the Arts</strong></td>
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<td>1. Can you provide more information as to the likely amount of blasting, including duration and time of year, blast size charges and noise levels? The concern is any likely impacts upon National Heritage rock art sites from vibrations, and upon migratory birds if occurring when these species may be on-site (See ES4.3, Box ES.1, p.VII; 5.7.1, p.37 of the PER).</td>
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<td>2. Has there been any consultation with the Burrup Rock Art Management Committee and/or other appropriate authority, on the subject of the rock art sites within the National Heritage boundary, to date?</td>
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<td>3. <strong>Table 5.5 of the PER</strong> states that the nearest rock art site within the National Heritage boundary is 400m from the proposed TANPF site. <em>Can you confirm where this site is located? The location does not appear on Figure</em></td>
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<td>5.1 of the PER. Can you also confirm if this site is located at Deep Gorge or elsewhere? (See Section 5.2.4, PER).</td>
<td>4. Please confirm that there is no environmental management plan for National Heritage and that mitigation management measures to protect National Heritage will appear in the Aboriginal Heritage Management Plan, the Air Quality and Dust Management Plan, and the Traffic Management Plan? (See Annex G, PER).</td>
<td>5. In the Preliminary Aboriginal Heritage Management Plan, performance indicators should also refer to National Heritage. For example, ‘maintain the condition of integrity of known Aboriginal Heritage and National Heritage sites within and adjacent to the TANPF site…’ (see p.4 of the PER). The monitoring program may also require conformance with any Commonwealth Ministerial conditions.</td>
<td>Ngarluma Aboriginal Corporation</td>
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<td>1. Given the heritage significance of all Ngarluma Country, BNPL has to demonstrate that it has properly considered how to minimise any adverse impact by the proposal on heritage values. Given BNPL’s failure to consult to date with NAC about the Project, it cannot demonstrate that any Aboriginal heritage matters have been considered or addressed. NAC notes that it is one of the stakeholders listed in the proponents PER document as being consulted. NAC has not been consulted.</td>
<td>2. NAC recommend that a Cultural Heritage and Environmental Management Plan (CHEMP) is developed (within the proponents proposed environmental management system set out in the PER) which should include:</td>
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<td>• NAC to prepare CHEMP and then settled in consultation with BNPL;</td>
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<td>• CHEMP is implemented in partnership with NAC during construction, operation and closure;</td>
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<td>• BNPL is to engage (as consultants) up to four Ngarluma people, as nominated by NAC board from time to time, to operate as Environmental Monitors attending environmental surveys, inspections and audits during all phases of work;</td>
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<td>• the nominated NAC monitors must be included by the proponent in the planning, consultation and proponents decision making process associated with all environmental surveys, audits, inspections and preparation of environmental reports to government agencies;</td>
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<td>• all reports and management plans are to be provided to NAC to review and approve prior to finalisation between BNPL and NAC;</td>
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<td>• the proponent is to meet six-monthly with the NAC board to review the construction, operation and closure of the project;</td>
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<td>• BNPL must construct, operate and close the project carrying out recommendations of NAC that are affordable to BNPL, consistent with environmental best practice and not in direct contravention with regulatory conditions;</td>
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<td>• BNPL must resource the costs of compliance with, and operation and implementation of these conditions (above) including the costs for NAC and its heritage, environmental, legal and other advisors and consultants; and</td>
<td>3. BNPL must resource the costs of compliance with, and operation and implementation of these conditions (above) including the costs for NAC and its heritage, environmental, legal and other advisors and consultants; and</td>
<td>3. BNPL must resource the costs of compliance with, and operation and implementation of these conditions (above) including the costs for NAC and its heritage, environmental, legal and other advisors and consultants; and</td>
<td>3. BNPL must resource the costs of compliance with, and operation and implementation of these conditions (above) including the costs for NAC and its heritage, environmental, legal and other advisors and consultants; and</td>
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<td>• prior to commencement BNPL is to have an agreement with NAC that incorporates the above 10 conditions.</td>
<td>4. Prior to commencement BNPL is to have an agreement with NAC that incorporates the above 10 conditions.</td>
<td>4. Prior to commencement BNPL is to have an agreement with NAC that incorporates the above 10 conditions.</td>
<td>4. Prior to commencement BNPL is to have an agreement with NAC that incorporates the above 10 conditions.</td>
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| NAC recommend that the Heritage and environmental management plans include the creation and ongoing operation of a joint environmental management board comprising BNPL, NAC environmental and heritage consultants and NAC and Ngarluma people representatives. | 5. NAC recommend that the Heritage and environmental management plans include the creation and ongoing operation of a joint environmental management board comprising BNPL, NAC environmental and heritage consultants and NAC and Ngarluma people representatives. | 5. NAC recommend that the Heritage and environmental management plans include the creation and ongoing operation of a joint environmental management board comprising BNPL, NAC environmental and heritage consultants and NAC and Ngarluma people representatives. | 5. NAC recommend that the Heritage and environmental management plans include the creation and ongoing operation of a joint environmental management board comprising BNPL, NAC environmental and heritage consultants and NAC and Ngarluma people representatives. |

| There is the potential for accidental or deliberate explosive reaction that could directly impact the National Heritage listed place. | 4. There is the potential for accidental or deliberate explosive reaction that could directly impact the National Heritage listed place. | 4. There is the potential for accidental or deliberate explosive reaction that could directly impact the National Heritage listed place. | 4. There is the potential for accidental or deliberate explosive reaction that could directly impact the National Heritage listed place. |

| A single holistic management regime, uniting the cultural and environmental strategies of the listed place and the surrounding industrial land is required. This would require an independent committee to oversee the implementation and evaluation of the management plan. | 5. A single holistic management regime, uniting the cultural and environmental strategies of the listed place and the surrounding industrial land is required. This would require an independent committee to oversee the implementation and evaluation of the management plan. | 5. A single holistic management regime, uniting the cultural and environmental strategies of the listed place and the surrounding industrial land is required. This would require an independent committee to oversee the implementation and evaluation of the management plan. | 5. A single holistic management regime, uniting the cultural and environmental strategies of the listed place and the surrounding industrial land is required. This would require an independent committee to oversee the implementation and evaluation of the management plan. |

### Friends of Australian Rock Art

1. FARA strongly supports the relocation of the facility to an alternative location that does not threaten the archaeological or anthropological sites of the Burrup Peninsula. For example - Colin Barnett has indicated that preliminary planning in the late 1990s had already designated a large and flat area of approx 4,000 hectares with the appropriate zoning and infrastructure in place (Colin Barnett, 7 April 2007. Address to the National Trust of Australia [WA]).

2. FARA oppose the location of the proposed TANPF due to potential impacts on National Heritage listed values of the surrounding area and aboriginal heritage values of the area (e.g. impacts of airborne emissions on petroglyphs).

3. No site assessment as to the heritage values involving a determination by the Minister of Indigenous Affairs has been referred or concluded.

4. FARA is concerned about the potential impact the TANPF may have on World Heritage values for the area FARA is not convinced that sufficient procedures are in place to protect ancient Burrup rock art (FER Section 8.10.3 and Table 8.38). Consideration of further industrial development of the Burrup Peninsula should be delayed until its World Heritage value/.nominations have been completed or rejected.

### Royal Western Australian Historical Society

1. RWAHS want to ensure that BNPL complies with the AHA.

### Public

1. The TANPF should not be built on the Burrup Peninsula due to its proximity to the surrounding National heritage site.
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<td>2. There are insufficient procedures in place to protect the ancient Burrup Rock art from what is deemed ‘moderate negative impact’. Any further development will affect the integrity of the rock art and the recreational amenity of the area.</td>
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<td>3. It is inappropriate and irresponsible to consider any further industrial development on the Burrup Peninsula until World Heritage has been accepted or rejected. The TANPF should be rejected at any location on the Burrup Peninsula, or indeed the Dampier Archipelago National Heritage area.</td>
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<td>4. The proximity to the National Heritage listed area has the potential to destroy some of the most significant rock art on the Burrup Peninsula.</td>
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<td>5. The TANPF should be relocated away from the Dampier Archipelago (including the Burrup Peninsula) due to World Heritage values attributed to the area.</td>
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<td>6. The TANPF should be relocated away from the Dampier Archipelago (including the Burrup Peninsula) due to National Heritage values of the surrounding area.</td>
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<td>7. The TANPF should be relocated away from the Dampier Archipelago (including the Burrup Peninsula) due to the land zoning of the area no longer being applicable, being in conflict with current and future heritage values.</td>
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<td>8. The TANPF should be relocated away from the Dampier Archipelago (including the Burrup Peninsula) due to no site assessment of heritage values involving a determination by the DIA.</td>
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<tr>
<td>Light overspill</td>
<td>Light overspill from the TANPF has the potential to impact on the amenity of Hearson Cove, deep Gorge, and surrounding areas at night-time. Light overspill also has the potential to impact on birds, reptiles and amphibians, and mammals. Lighting for the TANPF will be designed in full compliance with appropriate guidelines and Australian Standard AS 4282:1997: Control of the Obtrusive Effects of Outdoor Lighting.</td>
<td>Friends of Australian Rock Art 1. FARA are concerned about the potential light spill impact on evening and night-time activities at Hearson Cove.</td>
<td>The EPA considers that the concerns that were raised have been adequately addressed by the response provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation.</td>
</tr>
<tr>
<td>Recreation and tourism</td>
<td>Construction and operation of the TANPF has the potential to impact on recreation and tourism activities in surrounding areas.</td>
<td>Friends of Australian Rock Art 1. FARA are concerned about the location of the TANPF disturbing or preventing tourism activities, as well as community, cultural and recreational interests.</td>
<td>The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation.</td>
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</table>
| Traffic                          | Construction and operation of the TANPF would result in an increase in traffic volumes on Burrup Road and Village Road. | Department of Environment, Water, Heritage and the Arts  
1. The Preliminary Traffic Management Plan will require more specific information on the nature and timing of monitoring to ensure mitigation requirements are met.  
Dampier Port Authority  
1. The DPA request more detailed information on the potential impacts and cumulative impacts of the proposed TANPF to traffic volume and flow with particular regard to the periodicity of traffic along Burrup Road.  
Friends of Australian Rock Art  
1. FARA seeks clarification on the impact on road infrastructure as a result of BNPL's proposed trucking of TAN. FARA is concerned that the increased traffic from the addition of the TANPF and other developments (e.g. Woodside) represents a volatile scenario.  
Royal Western Australian Historical Society  
1. RWAHS request more information from BNPL on the nature and extent of the ‘moderate’ impacts associated with traffic from the project. | The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation. |
<table>
<thead>
<tr>
<th>Principle</th>
<th>Relevant Yes/No</th>
<th>If yes, Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. The precautionary principle</strong>&lt;br&gt;Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by -&lt;br&gt;a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and&lt;br&gt;b) an assessment of the risk-weighted consequences of various options.</td>
<td>Yes</td>
<td>The proposal has the potential to impact flora, vegetation, and fauna. Therefore, monitoring and management measures should be implemented to detect changes and avoid significant impacts. The EPA has recommended that a number of conditions be imposed on the proponent in relation to managing impacts on fauna and rehabilitation.</td>
</tr>
<tr>
<td><strong>2. The principle of intergenerational equity</strong>&lt;br&gt;The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</td>
<td>Yes</td>
<td>The EPA has considered the impact of the proposal on the health, diversity and productivity of the environment. Biodiversity is a relevant environmental factor in this EPA assessment report. The EPA has recommended that a number of conditions be imposed on the proponent in relation to managing impacts on fauna and rehabilitation.</td>
</tr>
<tr>
<td><strong>3. The principle of the conservation of biological diversity and ecological integrity</strong>&lt;br&gt;Conservation of biological diversity and ecological integrity should be a fundamental consideration.</td>
<td>Yes</td>
<td>The proposal would result in the loss of approximately 35 ha of vegetation and has the potential to affect biological diversity and ecological integrity. Biodiversity is a relevant environmental factor addressed in this report.</td>
</tr>
<tr>
<td><strong>4. Principles relating to improved valuation, pricing and incentive mechanisms</strong>&lt;br&gt;(1) Environmental factors should be included in the valuation of assets and services.&lt;br&gt;(2) The polluter pays principles - those who generate pollution and waste should bear the cost of containment, avoidance and abatement.&lt;br&gt;(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.&lt;br&gt;(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.</td>
<td>Yes</td>
<td>The proponent would be required to manage the gaseous and particulate emissions, noise emissions, and liquid and solid wastes generated by the proposed development. The proponent should bear the costs associated with meeting their obligations in this regard.</td>
</tr>
<tr>
<td><strong>5. The principle of waste minimisation</strong>&lt;br&gt;All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.</td>
<td>Yes</td>
<td>The proposal would generate gaseous, particulate, liquid, and solid wastes. Hence, the proponent would be expected to address the waste hierarchy and minimise the generation of unavoidable wastes. The EPA has recommended that a condition be imposed on the proponent to limit ammonia and particulate emissions from the ammonium nitrate prilling plant “common stack”.</td>
</tr>
</tbody>
</table>
Appendix 4

Recommended Environmental Conditions
and Nominated Decision-Making Authorities
Nominated Decision-Making Authorities

Section 44(2) of the *Environmental Protection Act 1986* (EP Act) specifies that the EPA’s report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA’s recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

<table>
<thead>
<tr>
<th>Decision-making Authority</th>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Minister for Indigenous Affairs.</td>
<td>Approval to disturb Aboriginal heritage sites under Section 18 of the <em>Aboriginal Heritage Act 1972</em>.</td>
</tr>
<tr>
<td>5. Director General, Department of State Development.</td>
<td>Approvals relating to site access and land tenure.</td>
</tr>
</tbody>
</table>

Note: In this instance, agreement is only required with DMA No. 2 and DMA No. 3 since they are Ministerial DMAs.
Recommended Environmental Conditions
RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)

TECHNICAL AMMONIUM NITRATE PRODUCTION FACILITY,
BURRUP PENINSULA
SHIRE OF ROEBOURNE

Proposal: The proposal is for the construction and operation of a technical ammonium nitrate production facility (TANPF) on Site D within the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula. The proposal is located approximately 13 kilometres north-west of Karratha.

The proposal is further documented in Schedule 1 of this statement.

Proponent: Burrup Nitrates Pty Ltd

Proponent Address: Level 8, 225 St Georges Terrace, PERTH WA 6000.

Assessment Number: 1764

Report of the Environmental Protection Authority: 1379

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal Implementation

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the Environmental Protection Act 1986 is responsible for the implementation of the proposal.

2-2 The proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.
3 **Time Limit of Authorisation**

3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.

3-2 The proponent shall provide the Chief Executive Officer of the Office of the Environmental Protection Authority with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4 **Compliance Reporting**

4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-2 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the compliance assessment plan required by condition 4-1 at least 6 months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

1. the frequency of compliance reporting;
2. the approach and timing of compliance assessments;
3. the retention of compliance assessments;
4. the method of reporting of potential non-compliances and corrective actions taken;
5. the table of contents of compliance assessment reports; and
6. public availability of compliance assessment reports.

4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-5 The proponent shall advise the Chief Executive Officer of the Office of the Environmental Protection Authority of any potential non-compliance within seven days of that non-compliance being known.
The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the first compliance assessment report fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first compliance report.

The compliance assessment report shall:

1. be endorsed by the proponent’s Managing Director or a person delegated to sign on the Managing Director’s behalf;
2. include a statement as to whether the proponent has complied with the conditions;
3. identify all potential non-compliances and describe corrective and preventative actions taken;
4. be made publicly available in accordance with the approved compliance assessment plan; and
5. indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Air Quality

5-1 The proponent shall adopt and implement best practice pollution control technology as determined by the Chief Executive Officer of the Department of Environment and Conservation on advice of the Chief Executive Officer of the Office of the Environmental Protection Authority to minimise ammonia (NH₃) and particulate [as total suspended particulates (TSP)] emissions from the TANPF ammonium nitrate prilling plant “common stack”.

6 Rehabilitation

6-1 The proponent shall undertake rehabilitation to achieve the following outcomes:

1. The project area shall be non-polluting and shall be constructed so that its final shape, stability, surface drainage, resistance to erosion and ability to support local native vegetation are comparable to natural landforms within the local area.
2. Native vegetation areas disturbed through implementation of the proposal, shall be progressively rehabilitated with vegetation composed of plant species native to the Burrup Peninsula from propagating material of local provenance (local provenance is defined as seed or plant material collected within 50 kilometres of the proposal).
3. Areas not currently supporting native vegetation shall be rehabilitated to the original land use or a use approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

4. The percentage cover of living vegetation in all rehabilitation areas shall be comparable with that of nearby undisturbed land.

5. No new species of weeds (including both declared weeds and environmental weeds) shall be introduced into the area as a result of the implementation of the proposal.

6. The coverage of weeds (including both declared weeds and environmental weeds) within the rehabilitation areas shall not exceed that identified in baseline monitoring undertaken prior to the commencement of operations, or exceed that existent on comparable, nearby land which has not been disturbed during implementation of the proposal.

6-2 Rehabilitation activities shall continue until such time as the requirements of condition 6-1 are demonstrated by inspections and reports to have been met for a minimum of five years, to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation.

7 Fauna

7-1 The proponent shall employ such structures and apparatus as are necessary and agreed by the Department of Environment and Conservation to deter birds from entering the contaminated water pond, clean water pond, and sewage wastewater treatment station evaporation pond.

7-2 During construction of the TANPF the proponent shall ensure that the following requirements are met:

1. Fauna refuges are to be placed in the trenches and other construction related voids at intervals not exceeding 50 metres.

2. The proponent shall employ at least two “fauna-clearing people” that are appropriately licensed by the Department of Environment and Conservation to remove fauna from the trenches and other construction related voids.

3. Inspection and clearing of fauna from trenches and other construction related voids by fauna clearing people shall occur at least twice daily and not more than half an hour prior to backfilling of trenches and other construction related voids, with the first daily inspection and clearing to be completed no later than 3.5 hours after sunrise, and the second inspection and clearing to be undertaken daily between the hours of 3:00 pm and 6:00 pm.
4. In the event of rainfall, the proponent shall, following the clearing of fauna from the trenches and other construction related voids, pump out any pooled water in the open trenches and other construction related voids (with the exception of groundwater) and discharge it via a mesh (to dissipate energy) to adjacent vegetated area, having regard for Department of Environment and Conservation draft guideline on the treatment and management of acid sulfate soils and water in acid sulfate soil landscapes (DEC, 2009) and any subsequent revisions.

5. Within 14 days following completion of the construction activities requiring the use of open trenches and other construction related voids, the proponent shall provide a report on fauna found, both dead and alive, within the TANPF site boundary to the Chief Executive Officer of the Office of the Environmental Protection Authority.

8 Groundwater

8-1 The proponent shall undertake detailed hydrogeological studies commencing at least 12 months prior to the commencement of construction to quantify groundwater quality, groundwater flow directions, and the depth to groundwater beneath the TANPF site and in surrounding areas.

8-2 The proponent shall develop appropriate management measures for dewatering to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and the Department of Water in the event that the information gathered from the hydrogeological studies required by condition 8-1 indicates that dewatering would be required during construction.

8-3 The proponent shall design, construct, and locate groundwater monitoring bores to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and the Department of Water, having regard for the outcomes of the hydrogeological studies required by condition 8-1 and the Department of Water’s Water Quality Protection Note 30 on Groundwater Monitoring Bores.

8-4 The proponent shall sample/monitor all groundwater bores required by Condition 8-3 every six months and shall set groundwater monitoring trigger values at a value of 10% above the baseline contaminant concentrations obtained from the hydrogeological studies required by condition 8-1.

8-5 In the event that monitoring required by condition 8-4 indicates an exceedance of trigger levels:

1. The proponent shall report such findings to the Chief Executive Officer of the Office of the Environmental Protection Authority within 7 days of the exceedance being identified.
2. The proponent shall provide evidence which allows determination of the cause of the exceedance.

3. If determined by the Chief Executive Officer of the Office of the Environmental Protection Authority to be project attributable, the proponent shall submit actions to be taken to address the exceedance within 7 days of the determination being made to the Chief Executive Officer of the Office of the Environmental Protection Authority.

4. The proponent shall implement actions to address the exceedance and shall continue until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.

5. The proponent shall submit bi-annually, or at a frequency defined to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority, the results of monitoring required by condition 8-4 to the Chief Executive Officer of the Office of the Environmental Protection Authority, until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that reporting may cease.

8-6 The proponent shall make the monitoring reports required by condition 8-5(5) publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

9 Acid sulfate soils

9-1 The proponent shall undertake intrusive acid sulfate soils investigations prior to the commencement of construction.

9-2 In the event that acid sulfate soils are disturbed during construction of the TANPF, the proponent shall treat and manage acid sulphate soils in accordance with the requirements of the Department of Environment and Conservation draft guideline on the treatment and management of acid sulfate soils and water in acid sulfate soil landscapes (DEC, 2009) and any subsequent revisions.

10 Decommissioning

10-1 Prior to undertaking ground-disturbing activities, the proponent shall:

1. describe the rationale for the siting and design of plant and infrastructure as relevant to environmental protection;

2. prepare a conceptual plan of the final landform at closure;

3. prepare a plan for a care and maintenance phase; and

4. prepare an initial plan for the management of noxious materials following closure.
At least six months prior to the anticipated date of closure, the proponent shall meet the following decommissioning criteria.

1. removal or, if agreed in writing by the appropriate regulatory authority, retention of plant and infrastructure agreed in consultation with relevant stakeholders; and

2. identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities.

Closure is defined as production has ceased and, plant and infrastructure removed, and contaminated areas remediated.

Notes

1. The Minister for Environment will determine any dispute between the proponent and the Office of the Environmental Protection Authority over the fulfilment of the requirements of the conditions.

2. The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the Environmental Protection Act 1986.

References

The Proposal (Assessment No. 1764)

The proposal involves the construction and operation of a technical ammonium nitrate production facility (TANPF) on Site D within the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula. The proposal is located approximately 13 kilometres (km) north-west of Karratha (Figure 1). The TANPF would be located to the east and immediately adjacent to the Burrup Fertilisers Pty Ltd (BFPL) ammonia plant, and would occupy 35 hectares (ha) of the 79 ha within Site D (Figure 2). A conceptual plant layout is shown in Figure 3.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 5 of the PER (Burrup Nitrates Pty Ltd, 2010).

Table 1: Summary of key proposal characteristics

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Project life</td>
<td>20+ years.</td>
</tr>
<tr>
<td>Technical ammonium nitrate production facility (TANPF) capacity</td>
<td>350,000 tonnes of technical ammonium nitrate (TAN) per annum.</td>
</tr>
<tr>
<td>Area of project lease</td>
<td>Site D - 79 hectares.</td>
</tr>
<tr>
<td>Area of disturbance</td>
<td>35 hectares.</td>
</tr>
<tr>
<td><strong>Main process units</strong></td>
<td></td>
</tr>
<tr>
<td>Nitric acid plant</td>
<td>Capacity - 760 tonnes per day.</td>
</tr>
<tr>
<td>Ammonium nitrate solution plant</td>
<td>Capacity - 965 tonnes per day.</td>
</tr>
<tr>
<td>TAN prilling plant</td>
<td>Capacity - 915 tonnes per day.</td>
</tr>
<tr>
<td><strong>Storage, loading, and transport</strong></td>
<td></td>
</tr>
<tr>
<td>Liquid ammonia pipeline between the TANPF and the adjacent Burrup Fertilisers Pty Ltd (BFPL) ammonia plant</td>
<td>710 metres long.</td>
</tr>
<tr>
<td>Bagged TAN storage building</td>
<td>Capacity of 1,800 tonnes.</td>
</tr>
<tr>
<td>Bulk TAN storage building</td>
<td>Capacity of 12,000 tonnes.</td>
</tr>
<tr>
<td>TAN bagging facility</td>
<td></td>
</tr>
<tr>
<td>Truck bulk loading system</td>
<td></td>
</tr>
<tr>
<td>Nitric acid buffer storage</td>
<td>Two tanks with total capacity of 3,000 cubic metres.</td>
</tr>
<tr>
<td>Ammonium nitrate solution storage</td>
<td>One tank with a capacity of 500 tonnes.</td>
</tr>
<tr>
<td>Wastewater discharge pipeline</td>
<td>Connecting the TANPF to the Water Corporation facility.</td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
</tr>
<tr>
<td>Power requirement</td>
<td>8.5 MW of which 5 MW will be sourced from the adjacent BFPL ammonia plant and approximately 3.5 MW will be generated by excess steam from the nitric acid plant.</td>
</tr>
<tr>
<td>Potable water</td>
<td>2 cubic metres per hour from the Water Corporation.</td>
</tr>
<tr>
<td>Seawater</td>
<td>456 cubic metres per hour from the Water Corporation.</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
</tr>
<tr>
<td>Nitrogen oxides (NOx)</td>
<td>Up to 135 t/yr.</td>
</tr>
<tr>
<td>Nitric acid plant stack - up to 4.2 g/s.</td>
<td></td>
</tr>
<tr>
<td>Nitric acid plant storage tanks - Vents A &amp; B - up to 0.04 g/s each vent.</td>
<td></td>
</tr>
<tr>
<td>Nitrous oxide (N2O)</td>
<td>Up to 163.7 t/yr, 5.5 g/s.</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>Up to 41 t/yr, 1.3 g/s.</td>
</tr>
<tr>
<td>Methane (CH4)</td>
<td>Up to 17.8 t/yr, 0.6 g/s.</td>
</tr>
<tr>
<td>Ammonia (NH3)</td>
<td>Ammonia nitrate prilling plant “common stack” - Refer to Condition 5.</td>
</tr>
<tr>
<td>Nitric acid plant stack - up to 0.02 g/s.</td>
<td></td>
</tr>
<tr>
<td>Particulate matter [as total suspended particulates (TSP)]</td>
<td>Ammonia nitrate prilling plant “common stack” - Refer to Condition 5.</td>
</tr>
<tr>
<td>Sulphur dioxide (SO2)</td>
<td>Trace.</td>
</tr>
<tr>
<td>Element</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Carbon dioxide (CO₂) [produced]</td>
<td>Up to 532.6 t/yr, 17.8 g/s.</td>
</tr>
<tr>
<td>Total greenhouse gas emissions</td>
<td>Approximately 84,451 tonnes of CO₂-e per year.</td>
</tr>
<tr>
<td>Greenhouse gas intensity</td>
<td>Approximately 0.241 tonnes of CO₂-e per tonne of TAN.</td>
</tr>
<tr>
<td>Wastewater</td>
<td>Up to 3,104 ML of water per year consisting of up to 3000 ML of sea water blowdown per year and up to 104 ML of purified process condensate per year discharged into the Water Corporation’s multi user brine return line (MUBRL).</td>
</tr>
<tr>
<td></td>
<td>Up to 24.6 ML of water per year consisting of air conditioning condensate and rainwater from roofs and the parking area will be sent to the clean water pond for evaporation.</td>
</tr>
<tr>
<td></td>
<td>Up to 9.75 ML of water per year containing impurities will be sent to the contaminated water pond for evaporation.</td>
</tr>
<tr>
<td>Solid waste</td>
<td>Up to 120 kilograms per day (organic matter from the off-specification prills).</td>
</tr>
</tbody>
</table>

**Abbreviations**

- CO₂-e carbon dioxide equivalents
- g/s grams per second
- ML megalitres (10⁶ litres)
- MW megawatts (10⁶ watts)
- t/yr tonnes per year

**References**


**Figures (attached)**

Figure 1: Regional location (Source: Figure 1.1 from Burrup Nitrates Pty Ltd, 2010).

Figure 2: Location plan (Source: Figure 4.2 from Burrup Nitrates Pty Ltd, 2010).

Figure 3: Conceptual plant layout (Source: Figure 5.5 from Burrup Nitrates Pty Ltd, 2010).

Note - The above mentioned Figures 1 to 3 are as included in the main body of this report.
Appendix 5

Summary of Submissions and Proponent’s Response to Submissions