Ammonia-Urea Plant, Burrup Peninsula

Dampier Nitrogen Pty Ltd

Report and recommendations
of the Environmental Protection Authority

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Summary and recommendations

Dampier Nitrogen proposes to construct an ammonia–urea plant on the Burrup Peninsula. The plant will have a production capacity of 2300 tonnes/day (t/d) of ammonia and 3500 t/d of urea. This report provided the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage 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.

Relevant environmental factors

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

(a) Flora and Vegetation communities;

(b) Fauna

(c) Atmospheric emissions;

(d) Greenhouse gas emissions;

(e) Wastewater;

(f) Noise;

(g) Risk;

(h) Aboriginal Heritage; and

(i) Amenity.

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

Conclusion

The EPA has considered the proposal by Dampier Nitrogen to construct and operate an ammonia-urea plant of nominal capacity of 2300tpd of ammonia and 3500tpd of urea, on the Burrup Peninsula including a storage site for urea at Dampier Port, export of ammonia and urea from the Port and associated infrastructure and utilities.

The EPA believes the proposal can be implemented and managed to meet its environmental objectives and that there are no "fatal flaws" associated with the proposal.

However, the EPA notes that as the proposal has not reached the final design stage yet, some information relating to the selection of plant is not available. The EPA expects the proponent to provide further information specified in commitments and conditions prior to the granting of a works approval, or as required.

The EPA further notes that a wet season flora survey, some aspects of the fauna survey and some ethnographical surveys are still to be completed and these should be done prior to works approval application. However, the EPA recognizes that the ability to undertake a wet season flora survey depends on there being adequate rainfall, thus such a survey may not be possible prior to construction.

Infrastructure corridors and the supply and return of seawater have not been considered in this proposal and are the responsibility of other proponents.

The EPA also understands that it is the proponent's intention to propose further changes to the proposal in terms of laydown areas, the location of the ammonia storage tank on site, expansion of the urea storage shed at the port and a possible duplication of the plant. These aspects of the proposal have not been considered by the EPA and the EPA will consider the need for an appropriate level of assessment when and if these proposals are made. This Bulletin relates only to the proposal as described in Schedule 1.

The EPA has concluded that the proposal is capable of being managed in an environmentally acceptable manner such that it is most unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Section 4, including the proponent's commitments.

Recommendations

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

1. That the Minister notes that the proposal being assessed is to construct and operate an ammonia-urea plant of nominal capacity of 2300tpd of ammonia and 3500tpd of urea, on the Burrup Peninsula, including a storage site for urea at Dampier Port, export of ammonia and urea from the Port and associated infrastructure and utilities.
2. That the Minister considers the report on the relevant environmental factors 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.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.
5. That the Minister notes the EPA's other advice on management of cumulative impacts from industrial development on the Burrup Peninsula.

Conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Dampier Nitrogen Pty Ltd to construct and operate an ammonia-urea plant on the Burrup Peninsula, is approved for implementation.

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

(a) that the proponent be required to fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) that the proponent be required to fulfil the condition relating to gaseous emissions in order to minimise and identify any impacts from these emissions;

(c) that the proponent be required to fulfil the condition relating to wastewater discharges in order to characterise, minimise and predict any impacts from these emissions;

(d) that the proponent be required to fulfil the condition relating to noise emissions in order to minimise any impacts from these emissions; and

(e) that the proponent be required to fulfil the condition relating to the siting of the urea shed in order to minimise impacts on vegetation in the region.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal by Dampier Nitrogen Pty Ltd (Dampier Nitrogen or DN), to construct an ammonia–urea plant on the Burrup Peninsula. The plant will have a production capacity of 2300 tonnes/day (t/d) of ammonia and 3500 t/d of urea.

The assessment of this proposal was begun in 1998 and a Consultative Environmental Review (CER) was released for public review from 26 October 1998 until 23 November 1998. The Department of Environmental Protection (DEP) prepared a list of public submissions and provided these to the then proponent Plenty River Corporation Limited (PRCL) on 9 December 1998. The proponent's responses were not finalized and the proposal was inactive for a number of years. In 2001 PRCL reactivated the proposal. The reactivated proposal included an increase in production capacity for the plant and re-positioning of the plant on the original site. As the changes to the proposal also caused changes to the potential environmental impacts, the EPA determined that a Supplement to the 1998 CER would be required to complete the assessment process. The Supplement was published by the proponent for distribution and targeted public review by stakeholders and interested parties.

The proponent for the proposal has now changed to Dampier Nitrogen Pty Ltd, a consortium of Agrium Inc, Plenty River Corp Ltd and Thiess Pty Ltd.

The proposal required formal assessment as it has the potential to cause significant environmental impacts. The proposed plant will be one of the biggest of its kind in the world and is situated on a greenfields site in a sensitive environment.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors relevant to the proposal. The Conditions and Commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in summary in Section 4 and in detail in Appendix 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 proponent for the proposal is Dampier Nitrogen Pty Ltd which comprises of shareholdings held by Agrium Inc, PRCL and Thiess Pty Ltd.

The ammonia/urea plant is proposed for the north west corner of the King Bay-Hearson Cove Industrial Estate (Figure 1). This is the same project location as proposed in 1998, although the plant layout within the project boundary has changed slightly (Figure 2). Figure 3 shows the two location options being considered for the urea storage shed on Dampier Port Authority land.

The plant and associated infrastructure will be composed of:

- a natural gas supply pipeline from the North West Shelf Liquefied Natural Gas (LNG) Plant (to be located in a multi-user service corridor);
- ammonia plant;
- urea plant;
- fluid bed granulation plant;
- seawater desalination, treatment and storage;
- internal power generation and distribution;
- product storage facilities for ammonia (on-site) and urea (on-site and near wharf);
- pipelines for ammonia export (to be located in a multi-user corridor proposed by others);
- urea formaldehyde storage on site;
- transfer conveyor systems and ship load out facilities for bulk granular urea;
- ship loading facilities for load out of anhydrous (liquid) ammonia; and
- all other utilities and infrastructure required for a world scale plant.

The Water Corporation will supply seawater to the site for process cooling and brine return to King Bay. That project has been assessed separately by the EPA. Multi-user service corridors are not included in this assessment and will be separately assessed with the Department of Mineral and Petroleum Resources (MPR) being proponent for their development. Management of pipeline risk is to be undertaken by individual proponents for their own pipelines. Overall management of the multi-user corridors in the Hearson Cove industrial area will be assumed by LandCorp, with exception of the north-south gas corridor.

The proponent has foreshadowed that further changes to the plant layout as shown in Figure 2 may be proposed. It is anticipated that another laydown area will be required to the south of the plant site. This area will also be required for any future expansion of the plant to two production trains. The position of the bulk ammonia storage tank may also require adjustment. These changes will require further referral to the EPA for environmental assessment. The plant layout shown in Figure 2 has been assessed by the EPA in this report.

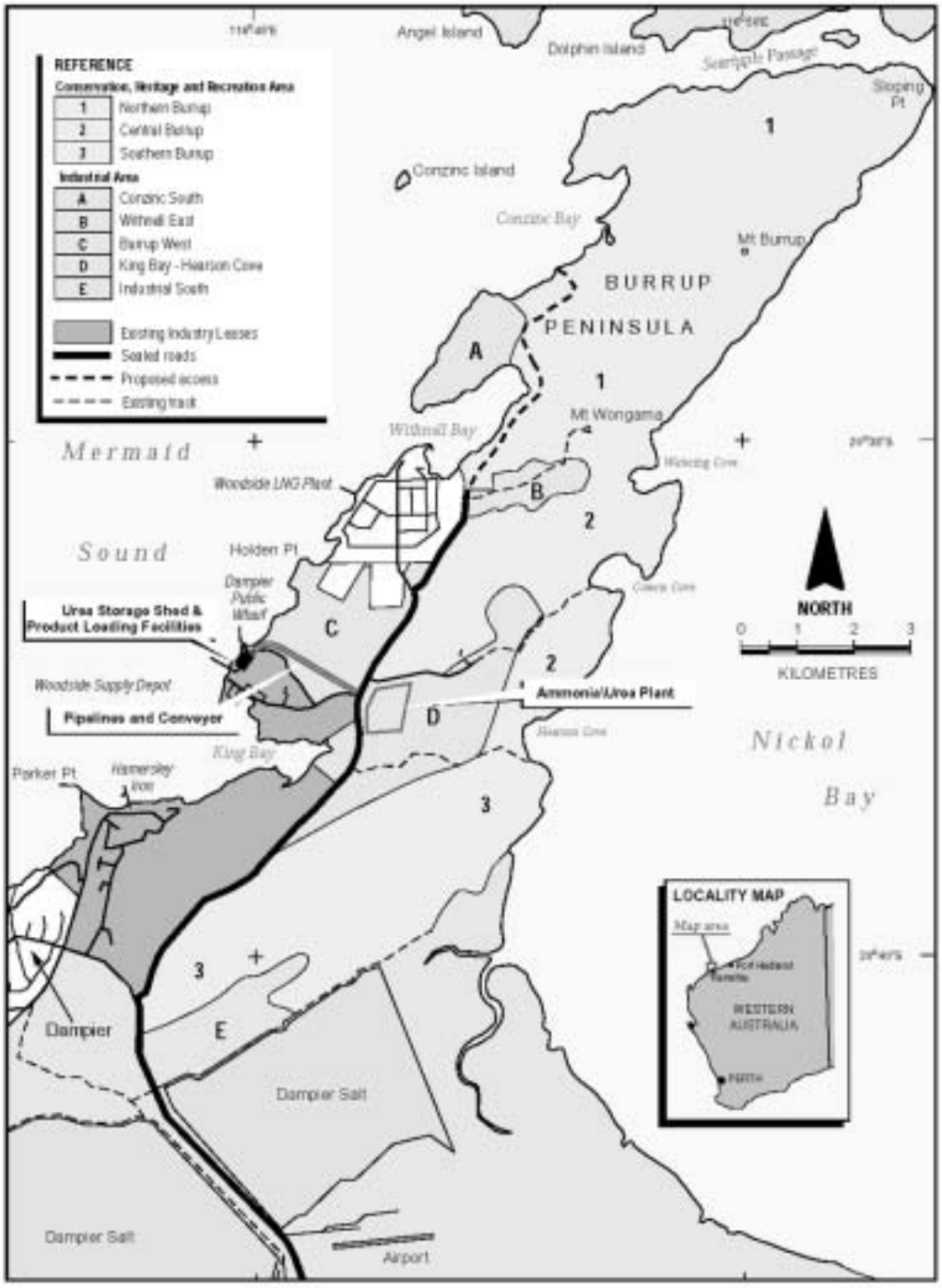

Figure 1: Site location

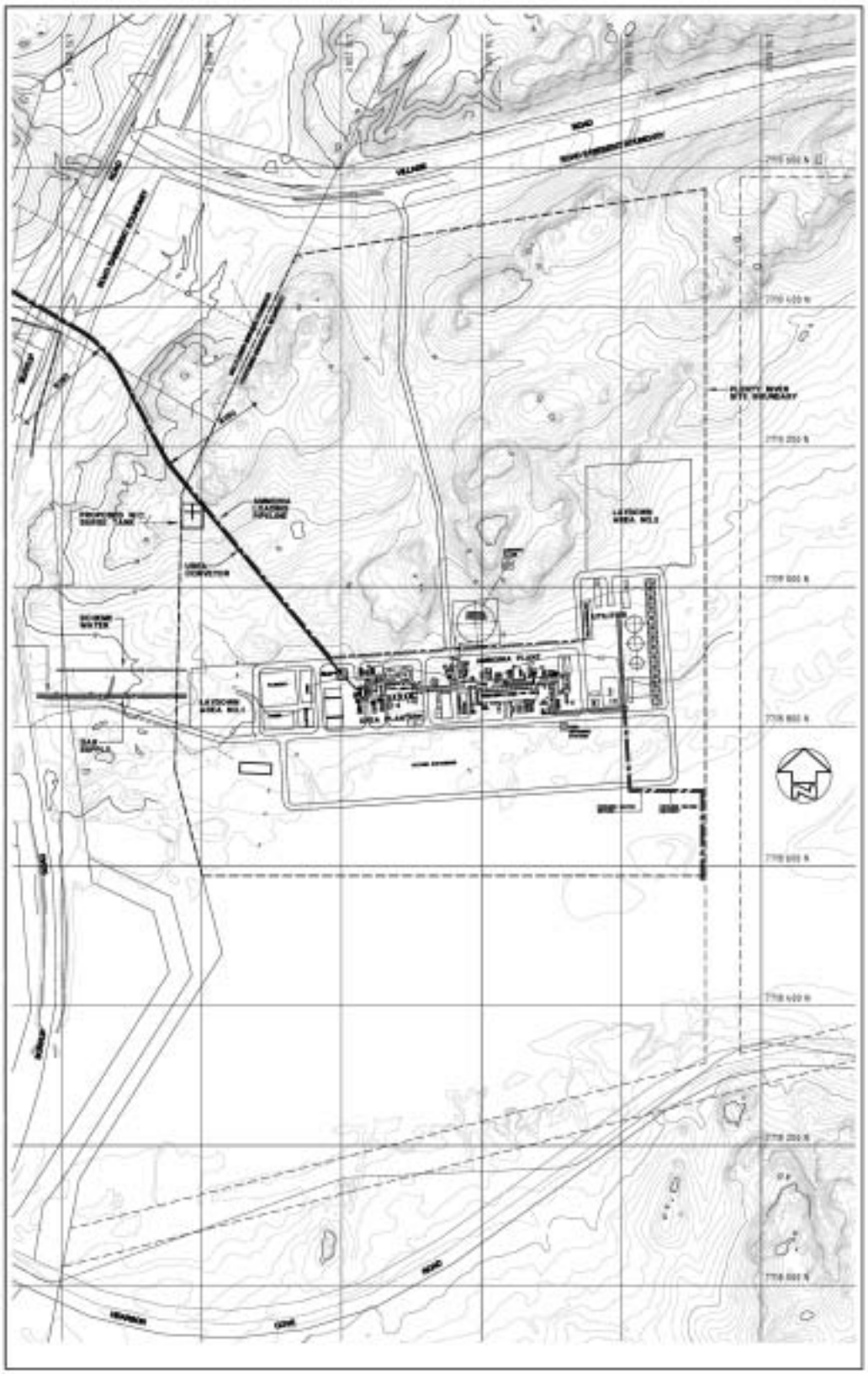

Figure 2: Site layout

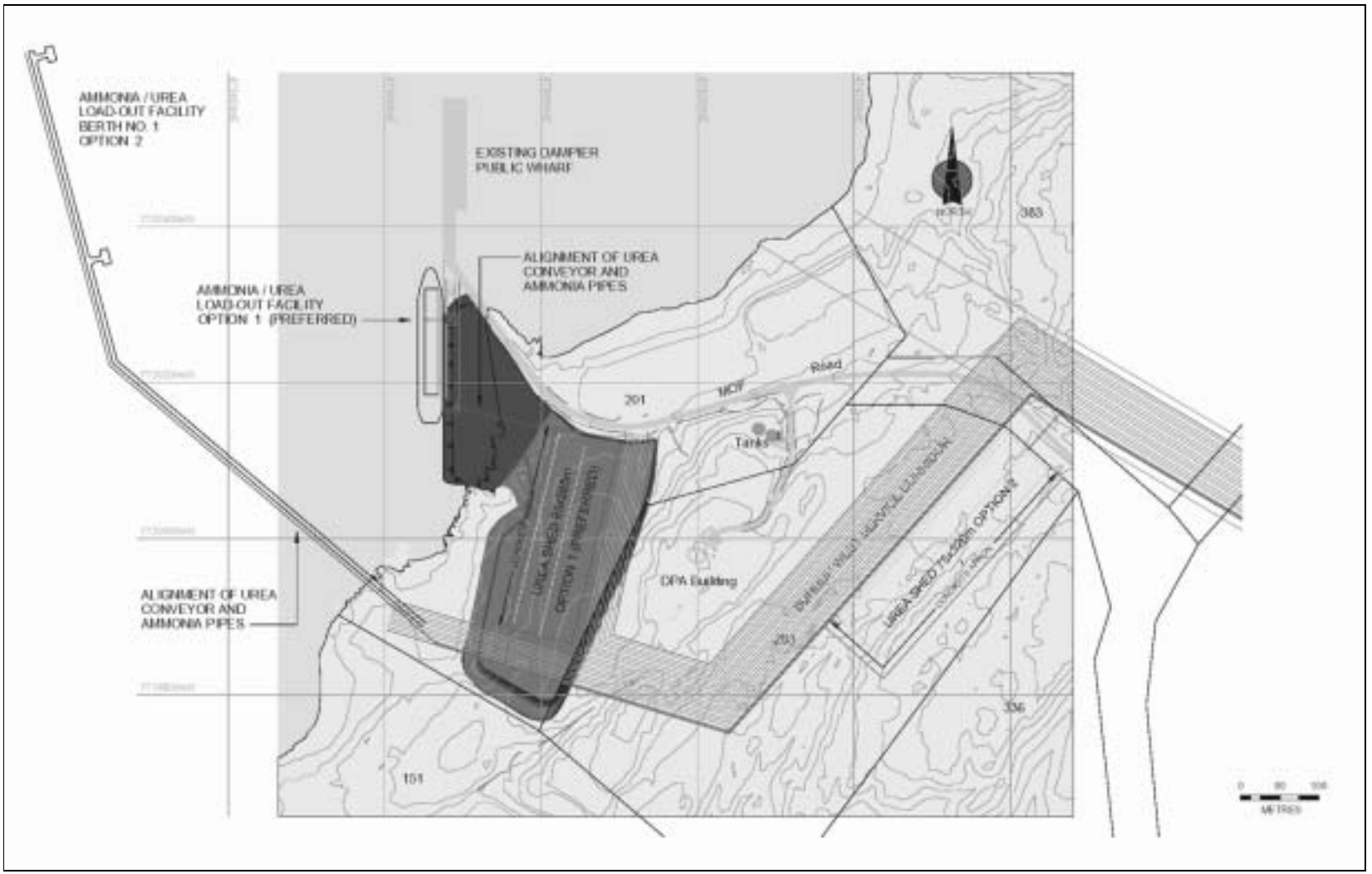

Figure 3: Storage shed site options

In the CER Supplement issued in May 2002, Dampier Nitrogen proposed the layout shown in Figure 3 on land owned by the Dampier Port Authority (DPA) as the preferred location for the proposed urea storage shed. Subsequent to the publication of the CER Supplement, the proponent has foreshadowed the eventual expansion of the urea storage area on the DPA land (Figure 4).

The DPA has in principle allocated a urea shed site configuration as shown in Figure 4, and this forms part of the DPA proposed Port Management Plan. The proposed Port Management plan has not been considered by the EPA yet. The new shed site overlays and extends beyond the original Option 1 shed location (Figure 3). It is the intention of the proponent to obtain approval from the EPA for any reconfigured shed site, via the environmental approval processes. The urea storage shed layout shown in Figure 3 has been assessed by the EPA in this report.

The ammonia plant will use Krupp Uhde technology. The ammonia plant consists of desulphurisation of process gas, primary and secondary reforming units, carbon monoxide conversion unit, carbon dioxide removal unit, methanation unit, compressor, ammonia synthesis unit and ammonia storage. The urea plant consists of carbon dioxide and ammonia compression units, urea synthesis unit, urea storage tank, evaporator, hydrolysis unit, and granulator. Figures 5 & 6 in this Bulletin show the process flow charts for the ammonia and urea plants. A detailed description of the proposal is provided in Section 2 of the Supplement to the 1998 CER (Supplement to CER, 2002).

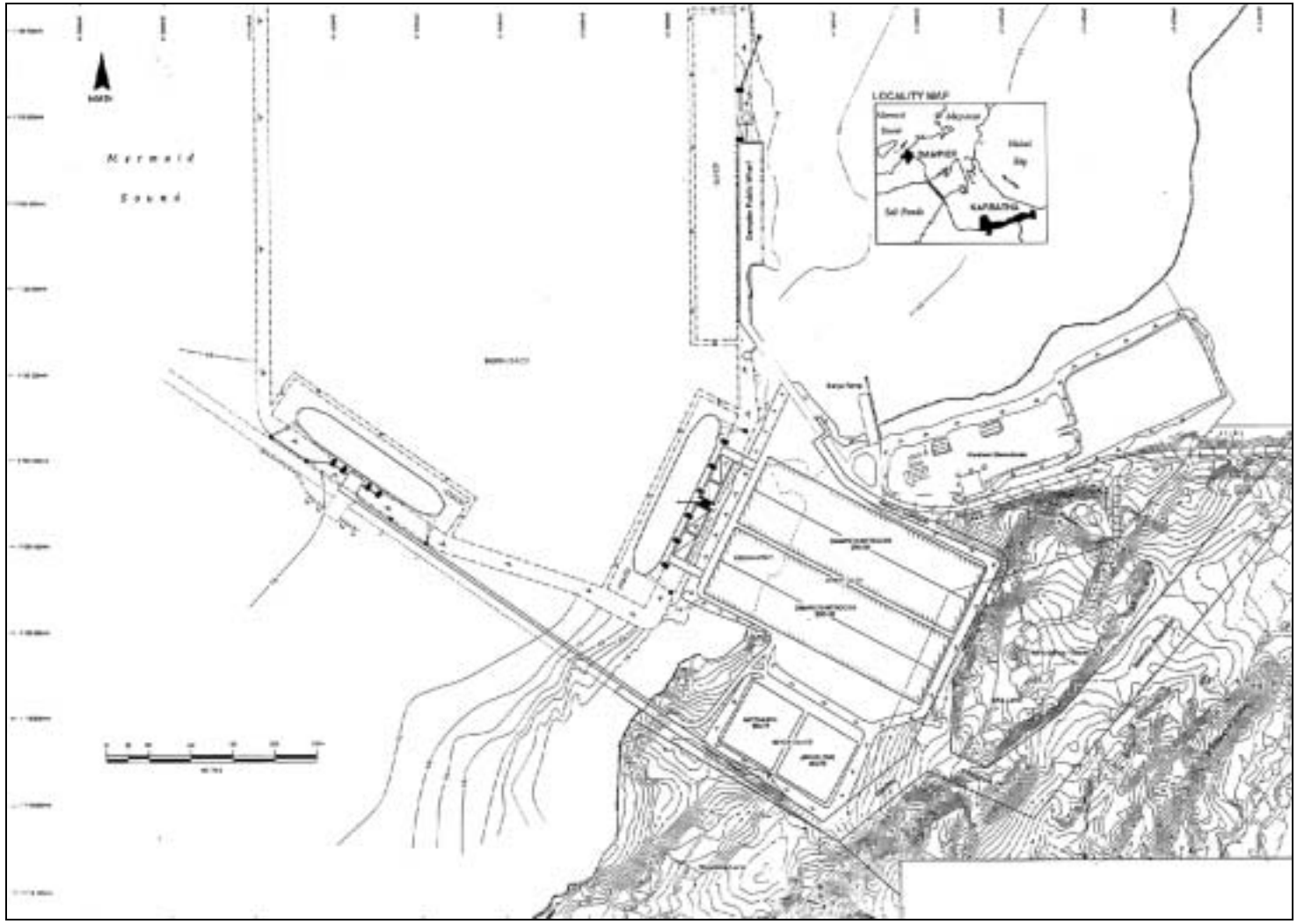

Figure 4: Conceptual Port Development Plan

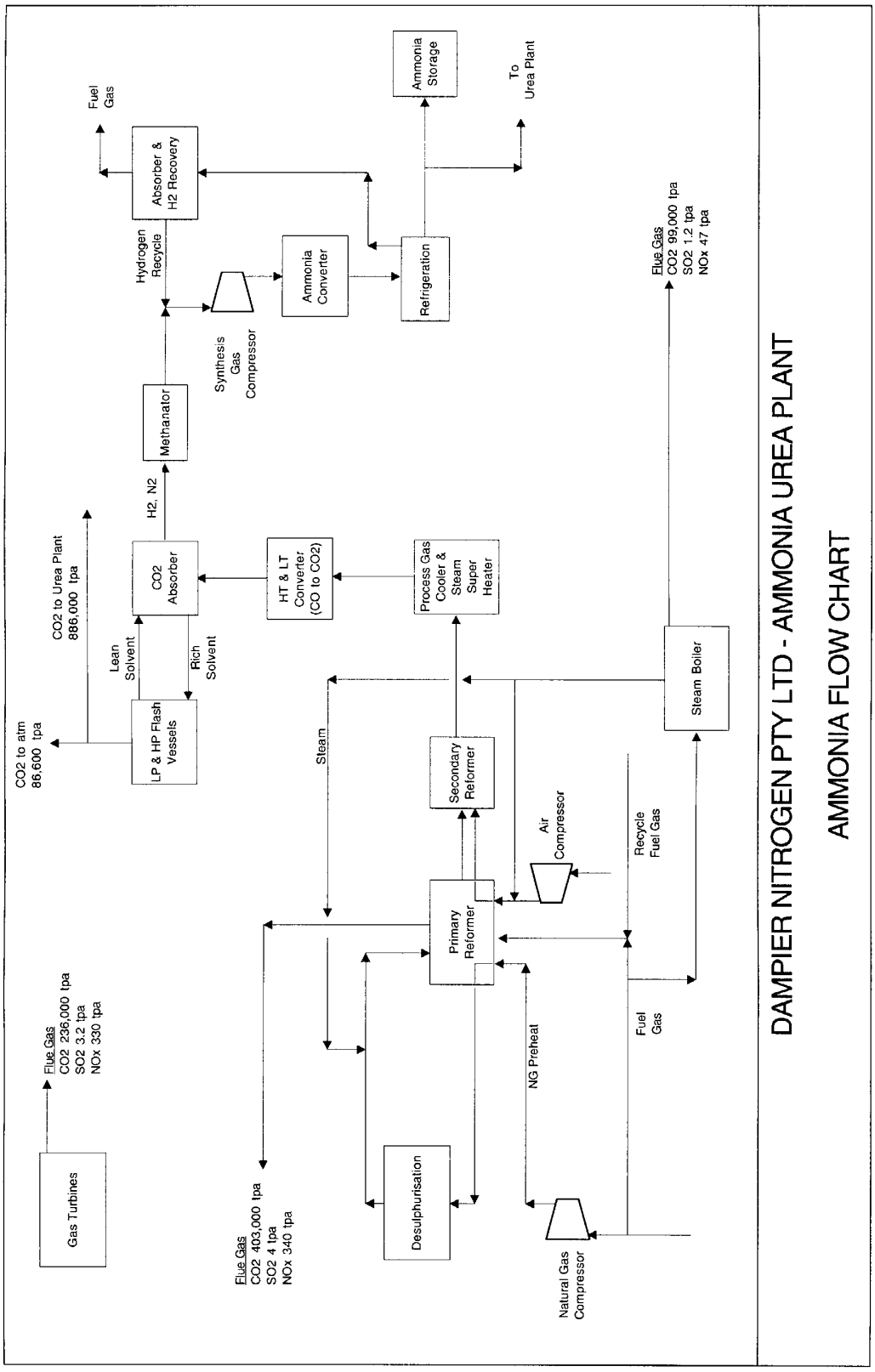

Figure 5: Process flow chart – ammonia plant

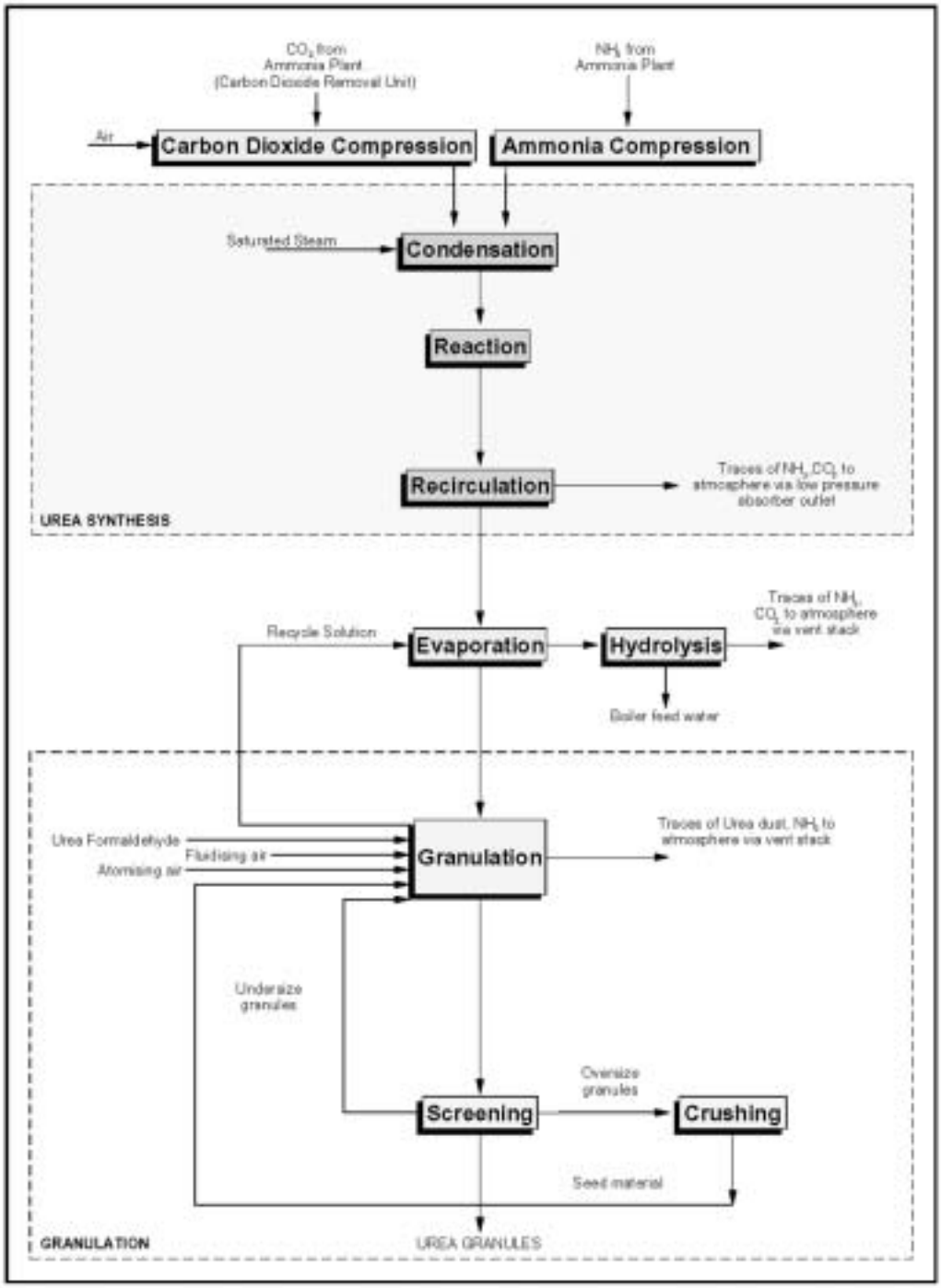

Figure 6: Process flow chart – urea plant

The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Summary of key proposal characteristics

Characteristic	Description
Plants on site:	Outputs:
Ammonia Plant	2,300 tpd nominal capacity, using Krupp-Uhde technology
Urea Plant	3,500 tpd nominal capacity, granulated product
Desalination Plant	2.4 ML/d from desalination of seawater
Plant Area	Approx 12 hectares
Total Area disturbed	12-15 hectares
Storage: Ammonia	40,000 tonnes capacity on plant site in double skinned refrigerated tank
Urea (port site)	160,000 tonnes capacity, fully enclosed shed. Two options for the location of the shed given, of which Option 1 is preferred.
Urea (plant site)	4,000 tonnes capacity fully enclosed surge bin
Inputs: Natural Gas	Max. 93 TJ/day from LNG Plant
Urea formaldehyde	11 000tpa approximately. To be trucked.
Sea Water for Cooling: - Process Plant	2,300-3,000 kL/h from the Water Corporation (to be drawn from Mermaid Sound) [3]
- Desalination plant	500 kL/h from the Water Corporation
Cooling Tower	to incorporate measures to reduce mist to 0.01% of flow
Power Supply	Internal generation, with some export. Supplied by two combined cycle 15MW gas turbines, steam boiler and emergency generators (to be specified)
Energy efficiency	Approximately 30GJ/t ammonia 5.5 – 6.0GJ/t urea
Materials Transport: Natural Gas Pipeline	3 km length, 200mm diameter,4.2-4.8 MPag pressure, buried
Ammonia Pipeline	2.5 km length, 400 mm diameter, above ground, insulated for refrigerated ammonia transfer. To be emptied of liquid when not in use for ammonia transfer and fitted with automatic isolation valves at each end.
Ammonia Vapour Return Line	2.5 km length, 200 mm diameter, above ground fitted with automatic isolation valves at each end.
Urea Conveyor	3.0 km length, mainly above ground. To be covered and fully enclosed over roadways and water. To be fitted with baghouses at appropriate points.

Urea Shiploading System	Travelling, conveyor-fed, cantilever arm loader with direct discharge to ship hold via chute
Shipping	Export of ammonia 7 times per year; urea 30-35 times per year.
Gaseous Emissions:	
Oxides of nitrogen (NO_x) (as NO_2)	717 tpa approximately To be achieved with low NO_X burners on reformer, gas turbines and steam boiler.
Carbon dioxide (CO_2) vented to atmosphere[1]	824,600 tpa approximately. Total CO_2 generated approximately 1,710,000 tpa of which approximately 886,000 tpa used in urea manufacture.
Sulphur dioxide (SO_2)	8.4 tpa approximately. All process gas to be desulphurised.
Hydrogen (H_2)	750 tpa approximately, to be flared
Methane (CH_4) [2]	Traces, to be flared
Ammonia (NH_3)	800 tpa maximum, to be minimised as practicable during detailed engineering design
Urea Dust	300 tpa maximum, to be minimised as practicable during detailed engineering design. To include double demisters
Methanol	5 –20 tpa[3] approximately
Liquid Effluent Discharges:	
Flow:	
– Process Plant	1,700-2,200 kL/h [3] approximately
– Desalination Plant	420 kL/h approximately
– Demineralisation Unit	< 20 kL/h approximately
-.Stormwater	Uncontaminated stormwater to be diverted around plant and discharged to natural watercourses at appropriate velocity. First flush potentially contaminated stormwater to be retained on site for treatment and reuse and/or discharge to ocean outfall.
Characteristics:	
Temperature	2 to 5 degrees above ambient temperature
Salinity	53,000 mg/L
Nitrogen	43 kg/d, with target to reduce to 20 kg/d during detailed engineering design.
Toxicants	≤ANZECC 99% species protection guidelines for marine waters, exiting the site, except for ammonia and metals that already occur at concentrations above the ANZECC trigger levels in the intake water and recognising the concentrating effect of evaporative seawater cooling. For ammonia the 99% species protection trigger level to be met at edge of toxicant mixing zone.

Noise	< 35 dB(A) at nearest noise sensitive premises ≤65 dB(A) at plant boundary estimated 40-44 dB(A) at Hearson Cove, to be minimised as practicable during detailed engineering design.
Risk	< 1 death/million/year at nearest residence < 50 deaths/million/year at plant boundary
Roads	Access roads to and on site, to be decided in consultation with relevant authorities.

Notes: 1. CO_2 'total generated' defines the total amount of CO_2 generated in the ammonia-urea plant, while CO_2 'vented from process' describes the amount of excess CO_2 to be vented to atmosphere. The remainder of the CO_2 generated is used in the manufacture of urea. Dampier Nitrogen cannot mitigate or influence the emissions from the product once sold.
2. CH_4 to be flared Earlier (1998) figure was incorrect.
3. range to be confirmed during detailed engineering.

Abbreviations:

tpd – tonnes per day
Tj – terajoules
LNG – Liquefied Natural Gas
ML/d – Megalitres per day
KL/h – Kilolitres per hour
Mpag – Megapascals (gauge)
tpa – tonnes per annum
mg/L – milligrams per litre
kg/d – kilograms per day
dB (A) – decibels 'A' weighted
ANZECC – Australia and New Zealand Environment and Conservation Council

Since release of the original 1998 CER, a number of modifications to the proposal have been made by the proponent. These include:

- Increase in Plant Output. The proposed Project will produce a nominal 2,300 tonnes per day (tpd) of ammonia product, and a nominal 3,500 tpd of urea. This is compared to the original proposed plant output of nominally 1,800 tpd of ammonia and 2,000 tpd of urea product. The new 2,300/3,500 tpd plant capacity has the significant benefit of being a virtually balanced plant, i.e. the majority of CO_2 generated from ammonia production will be used for urea production. As a result of the changes in production, emissions of oxides of nitrogen and sulphur, hydrogen, ammonia, urea dust and wastewater will increase from estimates in the original CER. Modelling of significant emissions has been redone for the revised proposal.
- Plant Siting. The proposed plant site has been moved approximately 500 metres south of the original proposed site, because of the high civil engineering cut and fill requirement and corresponding cost to level the rocky terrain of the former site as well as for flora and fauna and heritage protection considerations. As a result of the change in siting, risk and noise modelling have been redone in the CER supplement.
- Urea Storage. A surge bin with a capacity of nominally 4,000 tonnes for urea leaving the granulation plant will now be installed to provide a storage buffer in case of interruptions to the production and transport of urea via the conveyor system. The main urea storage shed will be located near the Dampier Port Authority (DPA) wharf as originally proposed in the CER, however two options are now available regarding the specific location of the shed (Figure 3). The first alternative, which represents Dampier Nitrogen's preference, is to locate the storage facility to the west of the DPA building to

utilise an area to be cleared adjacent to the wharf. The second alternative location is similar to that proposed in the original CER, located to the east of the DPA office and south of MOF road which leads to the wharf. However, this proposed location has been moved further east on the site. The storage shed will hold 160,000 tonnes of urea (compared to 100,000 t originally) and will be totally enclosed to protect the product from weather and prevent loss to the environment. All urea conveyors will be covered and will be fully enclosed where they cross roads and the over-water section of the load-out facility.

- Seawater Supply and Return. The original proposal included self-supply of seawater from Mermaid Sound and discharge of brines via diffuser onto the King Bay tidal flats. The Water Corporation has now undertaken to supply the Project with seawater for cooling purposes. Desalinated and potable water will be provided by means of a desalination plant built and operated on site by Dampier Nitrogen. The Water Corporation will also handle the return streams from both desalination and cooling to the sea after on-site treatment. The treatment and disposal of wastewater has been re-evaluated in the Supplement to the CER.
- Shipping Movements. Using ammonia tankers of 15,000 - 20,000 dead weight tonnes (dwt) capacity, approximately seven tanker movements will be required each year for the export of ammonia. This is reduced from 15 tanker movements as originally proposed. The anticipated shipping movements for granulated urea export is 30 to 35 per year (average 35,000 dwt), compared with approximately 50 movements originally envisaged.
- Urea Formaldehyde. Urea Formaldehyde used in the granulation of urea, will be initially sourced from a manufacturer in Dardanup, WA. This will be transported in stainless steel road tankers from Dardanup to the Burrup plant rather than imported by ship as indicated in the original CER. (Provision has been made for a 200 mm diameter pipeline within the services corridor to allow potential future importation of methanol or urea formaldehyde from the DPA wharf to the plant site. These options have not been assessed as part of this proposal). The annual usage of urea formaldehyde will be 11,000 tonnes, which will be delivered by road tanker directly to site (estimated 4 trucks per week).

Since the publication of the Supplementary CER the following additional changes to the proposal have been made in response to environmental concerns raised:

- the ammonia storage tank has been moved to the south towards the plant site in order to minimize impacts on a possible threatened vegetation community; and
- the access road via Village Road has been re-aligned to avoid sensitive vegetation communities.

As a result of the repositioning of the ammonia tank the risk contours for the site have been revised. AUSPLUME modelling of nitrogen dioxide emissions has also been revised since the Supplementary CER was printed and another flora study report on the Option 2 storage shed site has been provided. It has also been advised that ammonia in the wastewater discharge will not meet the ANZECC 99% species protection criterion at the plant boundary but will meet this criterion at the edge of the toxicant mixing zone allowed for the Water Corporation's outfall.

3. Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage 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 relevant 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 site selection, 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 environmental factors relevant to the proposal require detailed evaluation in this report:

(a) Flora and Vegetation communities;

(b) Fauna

(c) Atmospheric emissions;

(d) Greenhouse gas emissions;

(e) Wastewater;

(f) Noise;

(g) Risk;

(h) Aboriginal Heritage; and

(i) Amenity.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors generated from the Supplementary CER document and the consultation done by the proponent, in conjunction with the proposal characteristics.

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 - 3.9. 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.

3.1 Flora and Vegetation Communities[1]

Description

The plant site is located in the King Bay-Hearson Cove area which was identified for industrial development along with a number of other areas on the Burrup Peninsula by the Burrup Peninsula Land Use Plan and Management Strategy (O'Brien Planning Consultants, 1996). This plan was endorsed by cabinet in 1996. The balance of the Burrup Peninsula has been identified as a Conservation, Heritage and Recreation Area

The plant site has been relocated from the north of the site as shown in the original CER to the south of the site (Figure 2). The footprint of the plant covers approximately 12 ha of the 67 ha site and includes laydown areas, stormwater ponds, ammonia storage tank, roads, and conveyor and pipeline routes. An area to the south of the plant site has been foreshadowed for further expansion, however this is not included in this proposal and has not been assessed by the EPA.

Due to the relocation of the plant site to the south of the lease area and the fact that the flora survey conducted for the 1998 CER was done during the dry season, Dampier Nitrogen committed to conducting a further survey of the lease area during the wet season when ephemeral flora would be identifiable. However, at the time of preparation of the CER Supplement (May 2002), insufficient rainfall had fallen on the Burrup Peninsula to enable a detailed wet season flora survey. Therefore an updated review of the status of the vegetation and flora on the Dampier Nitrogen lease site and urea storage shed locations based on the findings of the recently available Trudgen (2001, 2002) and Welker (2002) reports, supported by further dry season field work aimed at determining the presence of a possible rare species of *Stackhousia* on the plant site, was commissioned. The report on this review (Astron 2002) can be found in Section 3.2.11 of the CER Supplement and Appendix H of the Technical Appendices.

The report (Astron 2002) found that on the plant site:

(a) no individual flora species is threatened by this development;

(b) no *Stackhousia* sp were found on the plant site;

(c) the Priority 1 species *Terminalia supranitifolia* does occur on the site in association with rock piles;

(d) two other Priority species, *Abutilon trudgenii ms* and *Eriachne tenuiculmis* may occur on the site, but their presence or absence cannot be confirmed without a further survey at a suitable time after rain;

(e) of another 37 species of conservation significance identified by Trudgen, 75% would not be identifiable during a dry season survey and therefore their presence or absence cannot be confirmed without a further survey at a suitable time after rain;

(f) there were eight vegetation communities that might be defined as threatened or critically endangered communities, being poorly reserved in the Conservation Areas on the Burrup Peninsula. These communities were endangered through cumulative impacts of

[1] There is some debate on the scale of delineation of the floristic communities described in the Trudgen survey (Trudgen 2001, 2002). The term vegetation community is used generically to describe the vegetation unit at the level of delineation of the site survey.

development in the King Bay/Hearson Cove area. In the case of two of these communities the process plant area, as then proposed, would remove more than 40% of the total community. These were community AbImTe/TeRm (*Acacia bivenosa, Indigofera monophylla, Trioda epactia, Rhynchosia minima* lianes) of which 42% was impacted and community ChAbSg (*Corymbia hamersleyana, Acacia bivenosa, Stemodia grossa)* of which 49% was impacted.

(g) the samphire vegetation has been inadequately mapped to date and contains a range of communities that are extremely restricted.

For the urea storage shed site the report found that:

(a) for Option 1 (preferred option), the site was likely to have been cleared for the Western Stevedores loadout facility and in this case all vegetation will have been removed;

(b) for Option 2, previous reports on this site identified two vegetation communities that would be impacted by the proposed storage shed that were of high conservation value. It has also been previously identified that the storage shed and nearby areas include a concentration of *Terminalia supranitifolia* that is not replicated elsewhere in the Burrup or in the Eremaean district;

(c) for Option 2, comparison with the Trudgen assessment of conservation significance identified another two vegetation communities that would be impacted by the storage shed of very high and high significance respectively;

(d) Option 2, besides containing the Priority 1 species *Terminalia supranitifolia*, also is likely to contain another eleven species assigned a high conservation value by Trudgen.

Weeds

The introduction of weeds to the site from imported fill or machinery should be avoided. The proponent's has committed to prepare a Weed Management Plan which will include obtaining fill from a weed-free source and identifying best practice weed management procedures in consultation with Department of Conservation and Land Management (CALM).

Submissions

A submission from CALM requested that a condition be imposed requiring that developments may only proceed after a thorough investigation of the conservation status of vegetation associations present on the site and where rare or threatened ecological communities can be protected to the satisfaction of CALM.

CALM also requested that the access to Village Road be rejected and alternatives with less environmental impact pursued. CALM raised issues concerning the infrastructure corridors and requested that approval for a methanol pipeline be conditional such that if a methanol plant is built on the Burrup this pipeline should not be built. CALM agreed that the preferred option for the urea storage shed is Option 1.

DEP (Karratha) requested the proponent examine the possibility of re-establishing vegetation communities to be disturbed at another suitable location.

The Terrestrial Section of the EPA Service Unit (EPASU)was concerned that:

i) the combined effect by industry on vegetation of King Bay – Hearson Cove was very high because there is limited vegetated area there and much of it is impacted. The combined area of vegetation communities to be removed is also significant compared to the amount of these vegetation communities in the Conservation area;
ii) 10 of 11 vegetation types in the proposal area are threatened by combined industry, 2 to a major extent by the proposal alone;
iii) that while some component taxa are widespread the vegetation units in which they occur are not;
iv) combined industry has yet to address the local and regional context of the salt flats of Hearson Cove, and more work is needed.

Assessment

The area considered for assessment of this factor is the Dampier Nitrogen site at the corner of Burrup and Village Roads and the urea storage shed site on Dampier Port Authority land.

The EPA's environmental objective for this factor is to protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act 1950*, and to maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.

As a result of the concerns raised about the impact of the plant site on potential threatened ecological communities the proponent has altered the plant layout to reduce the impact on the two most affected communities on the site and to reduce the size of the plant footprint. Figure 7 in this Bulletin shows the revised layout of the plant over the vegetation community occurrence. Community AbImTe/TeRm is now not impacted at all and the impact on community ChAbSg is reduced from 49% to 0.6% of the community. The impact on the remaining potentially endangered communities on the site is largely due to the combined impacts of proposed development on other industrial land in the King Bay-Hearson Cove area and the proponent is unable to influence this clearing. The proponent has made a further commitment to prepare a Terrestrial Flora Management Plan that will address the locations of vegetation communities and identify areas not to be disturbed through optimisation of plant layout in consultation with CALM. Noting that the area has been endorsed by Cabinet for industrial development, the EPA considers that the proponent has therefore fulfilled the EPA's requirement to take reasonable measures to minimize the impact on the vegetation communities of highest importance as defined at a local and regional level and is satisfied that CALM will have the opportunity for continuing input into the protection of vegetation communities.

The EPA notes that a few Priority 1 *Terminalia supranitifolia* may be impacted in the small rock area at the south of the site and that the wet season survey will need to identify if any are present and if the road re-alignment will impact other individuals of this species.

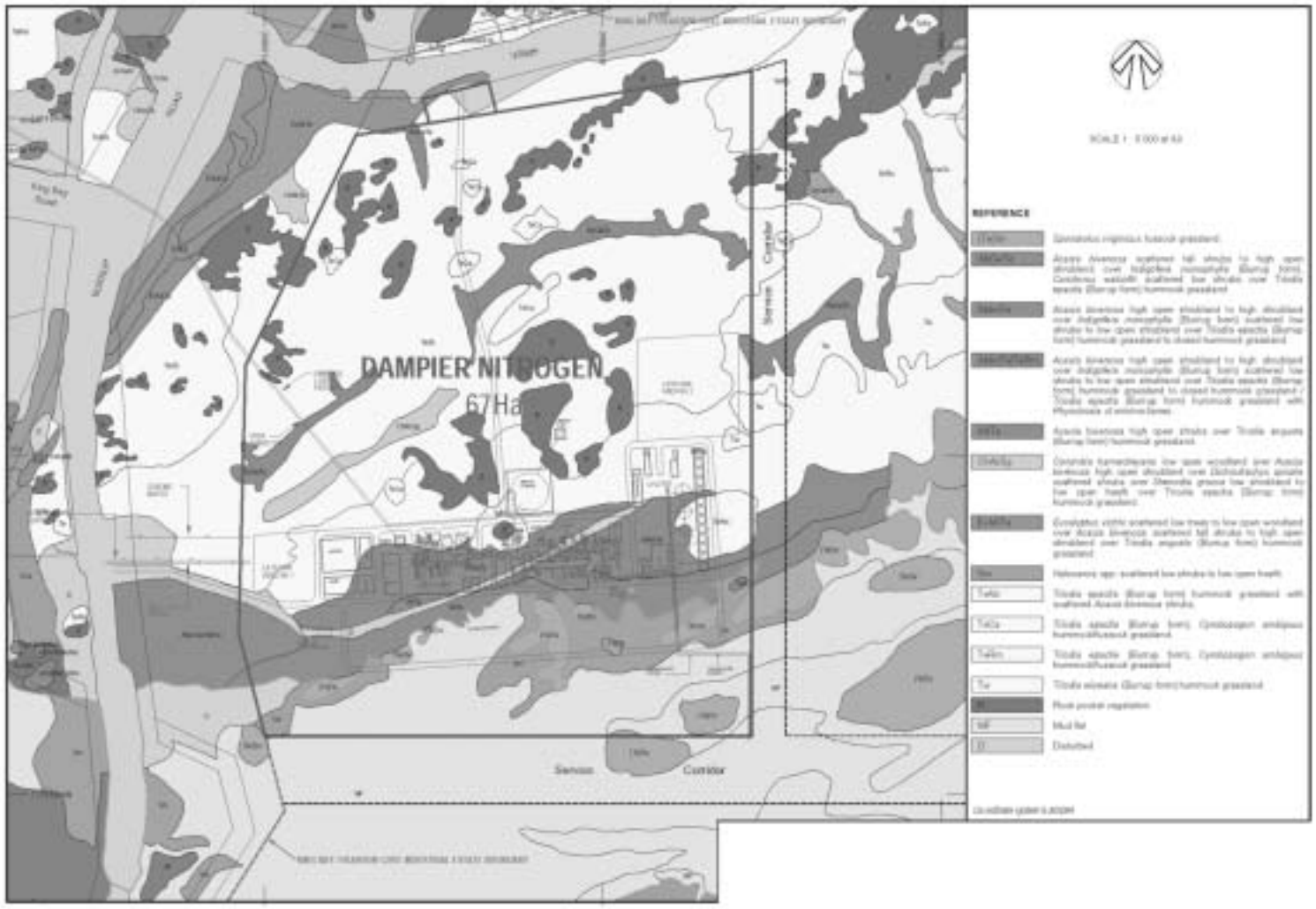

Figure 7: Site vegetation

The EPA notes that the proponent has committed to carrying out a flora and vegetation survey at an optimal time following wet season rains to establish the presence or absence of ephemeral species of conservation interest. Other commitments made by the proponent include seed collection of any prominent flora species present, including Priority Flora species, to assist the availability of species for rehabilitation, and germination trials prior to and following construction, with a particular focus on the Priority 1 species *Terminalia supranitifolia*. During the rehabilitation process, attempts will be made to restore any Priority Flora species disturbed by the project. The proponent has committed to support a regional survey of samphire vegetation communities within the King Bay-Hearson Cove valley with other prospective industries.

Option 1 for the urea shed is the preferred option of the proponent, the EPA and CALM. The EPA strongly recommends that this site be used for the shed. It is understood that negotiations are proceeding to secure the option 1 site. The EPA believes all reasonable endeavours should be made to secure this site or a suitable alternative. Option 2 for the shed should only be used as a last resort if all other feasible sites are unattainable. Accordingly, the EPA recommends that condition 11 (Appendix 4) apply. Option 2 is part of a site previously found to be of conservation significance by the EPA (EPA 2002) and every effort should be made to retain the significant vegetation on this site. The Option 1 site has already undergone assessment by the EPA (EPA 2002) and been found acceptable for clearing. Further assessment of this option therefore is unnecessary.

For emergency access and egress, the plant site is required to have two road accesses perpendicular to each other. Three access options are available, from Burrup Road, Hearson Cove Road and Village Road. These are being considered by Main Roads and Office of Major Projects (OMP). Dampier Nitrogen proposes to have the main access from Burrup Road with the emergency access to Village Road. Another proposal is for the main access to be from Village Road. The proponent has altered the proposed alignment of the access road from Village Road, from that shown in Figure 1.2 in the CER Supplement, in order to further minimize impacts on regionally significant vegetation (see Figure 7 in this report). The EPA notes that the proponent will liase with Main Roads, OMP and CALM in order to promote the option with the best environmental outcome.

The EPA notes the proponent's commitment to a weed management plan and further advises that introduced plants should not be used for landscaping on the site.

Summary

Having particular regard to the:

(a) changes made to the plant layout to avoid impact on vegetation;

(b) prior cabinet endorsement of industrial development in this area;

(c) proponent's commitment to prepare a Terrestrial Flora Management Plan that will address the locations of vegetation communities and identify areas not to be disturbed through optimisation of plant layout in consultation with CALM;

(d) commitment to undertaking a further wet season flora survey and prepare a Weed Management Plan; and

(e) EPA's recommended condition,

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

3.2 Fauna

Description

The change in the position of the plant on the site will benefit the protection of fauna as it now does not impact on the rocky areas of the site which are likely to be home to the Pilbara Olive Python and likely to be the habitat of land snails. The new location also avoids the central drainage gully in the plant site which may provide habitat and feeding location for fauna species.

Section 3.2.12 of the CER Supplement and Appendix H of the Technical Appendices provides information on the species found on the Burrup Peninsular. Fauna of conservation interest that may occur on the Dampier Nitrogen site are:

(a) the Western Pebble Mound Mouse, *Pseudomys chapmani*, which is listed as a Priority 4 species under the CALM Priority Fauna List;
(b) the Pilbara Olive Python, *Liasis olivacea barroni*, which is listed on CALM's Declared Threatened Fauna list and listed as Vulnerable under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999;*
(c) Camaenid Land Snails, *Rhagada sp* and *Quistrachia legendrei*, which occur within a limited area around Dampier and the Burrup Peninsula and have not been intensively surveyed;
(d) birds and migratory birds which are protected by Australian legislation or covered by CAMBA and JAMBA (China-Australia and Japan-Australia Migratory Bird Agreement).

The proponent has carried out a Camaenid Land Snail survey (Enzer Marine, 2002). The report draws attention to the fact that while invertebrate fauna constitute 95% or more of total faunal diversity, they are rarely surveyed due to a lack of knowledge of species and their distributions. Land snails are one group that can be studied due to the work of Dr Alan Solem of the Field Museum of Chicago, USA over the years 1974-1991.

The report found four species of snail (*Rhagada sp, Quistrachia legendrei, Pupoides beltianus* and *Pupoides contraries*) on the Dampier Nitrogen site. None of the species was common. Snails were more commonly found at sampling sites in the hills north of the plant footprint than at the plant area itself.

At the Option 2 urea storage shed site three species were found (*Rhagada sp, Quistrachia legendrei*, and *Pupoides beltianus*). All three species were wide spread in the study area. The Option 1 site has already been approved for development and is likely to be cleared prior to the construction of the urea shed.

The impact of light overspill on fauna was also considered. As the plant is 500m east of the Causeway, it was estimated that the light intensity will be very low at King Bay and unlikely to impact on marine species.

The proponent's commitments regarding lighting are listed under the factor "Amenity".

Submissions

The EPA Service Unit commented that removal of habitat is likely to have long term impact on fauna, particularly cumulatively with other industry. The proponent should review recent literature and relate the information to likely fauna impacts on their site and cumulative impacts from industrial developments particularly in the King Bay-Hearson Cove area as well as the Burrup Peninsula as a whole to demonstrate that there will be no significant losses to regional biodiversity.

The EPA Service Unit commented that as the fauna survey has not been completed, it should be demonstrated prior to the finalization of the assessment that fauna impacts will not represent a "fatal flaw" for the development of the site. The EPA Service Unit also sought information on the impact of light overspill on turtles.

The Nickol Bay Nats were generally satisfied with environmental measures proposed by the proponent, especially protection of Pilbara olive python habitat through relocation of plant from the rocky ridge area.

CALM sought commitment that light overspill would be kept to the minimum.

Assessment

The area considered for assessment of this factor is the Dampier Nitrogen site at the corner of Burrup and Village Roads and the urea storage shed site on Dampier Port Authority land.

The EPA's environmental objective for this factor is to protect Specially Protected (Threatened) Fauna consistent with the provisions of the *Wildlife Conservation Act 1950*, and to maintain the abundance, species diversity and geographic distribution of terrestrial fauna.

The EPA notes that in repositioning the site the significant rocky outcrop areas of habitat have been largely avoided and the central drainage gully has been avoided.

The snail survey concluded that there would be no major disruption to land snail populations from the development of the proposal. This conclusion was supported by the fact that in the five recent surveys carried out on the snails no previously uncollected species have been recorded, most species have been found to be wide spread on the Burrup and none is considered to be rare or endangered. It is also concluded that given the extent of development proposed for the Burrup, a broader scale study of the habitats and species present on the Peninsula should be conducted so that individual development proposals can be considered in a broader context. The EPA supports this suggestion.

The EPA notes that Dampier Nitrogen has committed to carrying out further site-specific surveys to investigate the occurrence of Priority Fauna species to be conducted prior to construction in consultation with CALM, scheduled to occur concurrently with the wet-season flora survey. It is now considered unlikely by CALM that the Western Pebble Mound Mouse still occurs on the Burrup. Nevertheless the Dampier Nitrogen site should still be surveyed for active mounds.

It is likely that the Pilbara Olive Python will occur on site and this should be investigated and the population of the species determined. The EPA notes the proponent's commitment to support collaborative research programs investigating the presence of this species. In addition employees and contractors should be trained on how to respond to the species. The relocation of the plant away from the rockpiles has significantly mitigated against potential impacts on the Pilbara Olive Python.

The EPA considers it unlikely that the proposal will impact directly on any protected birds. Consideration should be given in the detailed design stage for the plant to ensuring that elevated portions of the plant do not encourage the nesting of raptors.

The proponent has established that there are no turtle nesting beaches on the Burrup and therefore light overspill should not impact on turtles.

The EPA notes the proponent's commitment to prepare and implement a Fauna Management Plan which will identify procedures, monitoring requirements, workforce training and responsibilities to minimise disturbance of significant terrestrial fauna and address progressive rehabilitation of disturbed sites to maximise fauna habitat.

The EPA considers it unlikely that fauna impacts will represent a fatal flaw for the proposal. However it would have been preferable if all fauna surveys could have been completed for the assessment.

Summary

Having particular regard to the:

(a) relocation of the plant away from most rockpiles, which are important fauna habitat;

(b) proponent's commitment to an additional survey to further investigate the occurrence of Priority Fauna species prior to construction (which, if required, will be updated on a regular basis);

(c) proponent's support for collaborative research programmes investigating the presence of the Pilbara Olive Python on the Burrup Peninsula; and

(d) proponent's other commitments for fauna management,

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

3.3 Air emissions

Description

Construction

Construction of the proposed plant will have the potential to generate dust due to blasting, cut and filling, vehicle movements and site works. Management of dust will be addressed in the Environmental Management Program (EMP) for the construction phase with the preparation of a Dust Management Plan.

Operation

With the change in capacity of the plant since the original CER, anticipated emissions have changed. The table below shows emissions from the original proposal and the amended proposal:

Table 2: Calculated atmospheric emission estimates for original and revised proposal

Characteristic	Original Project	Revised Project	Change
Gaseous Emissions:			
Oxides of nitrogen (as NO_2)	684 tpa	717 tpa	↑ 33 tpa
Sulphur dioxide	6.3 tpa	8.4 tpa (maximum)	↑ 2.1 tpa
Hydrogen	577 tpa	750 tpa [1]	↑ 173 tpa
Methane [2]	100 tpa	Traces	↓ 100 tpa [2]
Ammonia	368-436 tpa	800 tpa	↑ 364 tpa
Urea Dust	158 tpa	300 tpa	↑ 142 tpa
Methanol	-	5 – 20 tpa	↑ 5 –20 tpa

1. to be flared.
2. CH_4 to be flared. Earlier (1998) figure was incorrect.

Emission data for normal operations is given in Table 3:

Table 3: Atmospheric Emission data for normal operations

Source	Stack Height (m)	Stack Diam. (m)	Exit Temp. (°C)	Exit Velocity (m/s)	Moisture Content (vol%)	Gas Flow rate Nm^3/s dry)	NO_X (g/s)	Ammonia (g/s)	Urea dust (g/s)
Reformer	35	3.0	177	17.0	19.3	59	11.0	-	
Low Pressure Absorber	56	0.3	48	27.6	71.5	0.62	-	0.2	
Atm. Pressure Absorber	56	0.2	46	1.1	9.5	0.026	-	1.0	
Granulation Plant	51	4.0	42	26.6	7.5	268	-	23.6	9.4
Gas Turbine 1	30	3.0	190	17.9	10.0	67	5.6	-	

Source	Stack Height (m)	Stack Diam. (m)	Exit Temp. (°C)	Exit Velocity (m/s)	Moisture Content (vol%)	Gas Flow rate Nm^3/s dry)	NO_X (g/s)	Ammonia (g/s)	Urea dust (g/s)
Gas Turbine 2	30	3.0	190	17.9	10.0	67	5.6	-	
Auxiliary Boiler	30	2.0	190	14.0	22	20	1.5	-	

Emission data for start-up operations is currently unavailable and will be provided after the detailed design for the plant has been completed and before works approval is issued.

Oxides of Sulphur (SO_x)

All process gas is required to be desulphurised for use in the process. However SO_X will be emitted from gas used as fuel for the gas turbines, boiler and reformer. This was estimated in the CER Supplement as being 8.4 t/a. However this amount was calculated on a sulphur content for the gas of 10 mg/Nm^3 (7ppm), which is a typical sulphur content for gas. North West Shelf typically contains around 2-3mg/Nm^3 (2ppm) of sulphur (K Stoney, *pers com*) currently. It is anticipated therefore that the emissions of SO_X will be less than 8.4 t/a initially and should not exceed 8.4t/a in future. Due to the low emission levels, emissions of SO_X were not modelled for ground level concentrations as, even at 8.4t/a, they will be insignificant.

Oxides of Nitrogen (NO_X)

NO_X will be generated from the reformer, the boiler and the gas turbines. All burners in this equipment will be of low NO_X design. The gas turbines will meet an emission standard of 75mg/Nm^3 of NO_X at 15% oxygen level, dry at STP.

AUSPLUME modelling and expected conversion of NO_x to nitrogen dioxide (NO_2) using the CSIRO assumption that the formation of NO_2 is limited by the background concentration of ozone, was used to predict groundlevel concentrations of NO_2. AUSPLUME modelling was selected in preference to DISPMOD

The above modelling shows maximum predicted one hour averages as shown in Table 4 and Figures 8 & 9 (Memorandum URS, 15 July 2002):

Table 4 : Maximum Predicted NO_2 Concentrations

Emission scenario	Maximum Predictions ($\mu g/m^3$, 1-hour average)		
	Off-site	Dampier	Karratha
Current Burrup Emissions*	149	60	55
Current Emissions + Dampier Nitrogen	149	60	55
Dampier Nitrogen only	95	15	10
NEPM Standard+	**246**	**246**	**246**

* Current emissions includes emissions from Woodside, Hamersley Iron Power Station, Syntroleum, Burrup Fertilisers and GTL plants

\+ National Environmental Protection Measure Standard

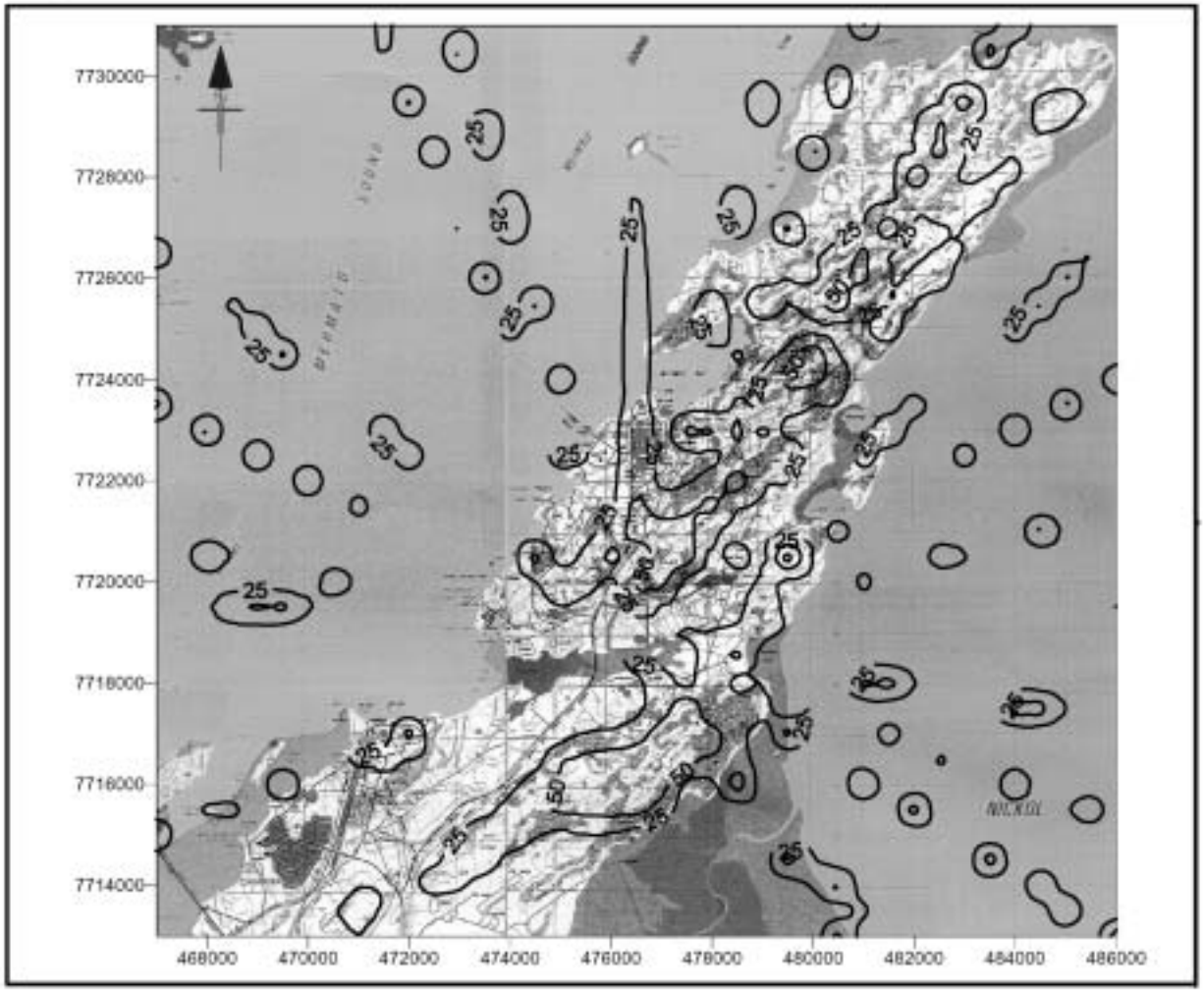

Figure 8: ***NO_2 modelling – 1 hour average maximum predicted concentrations ($\mu g/m^3$) from the plant in isolation***

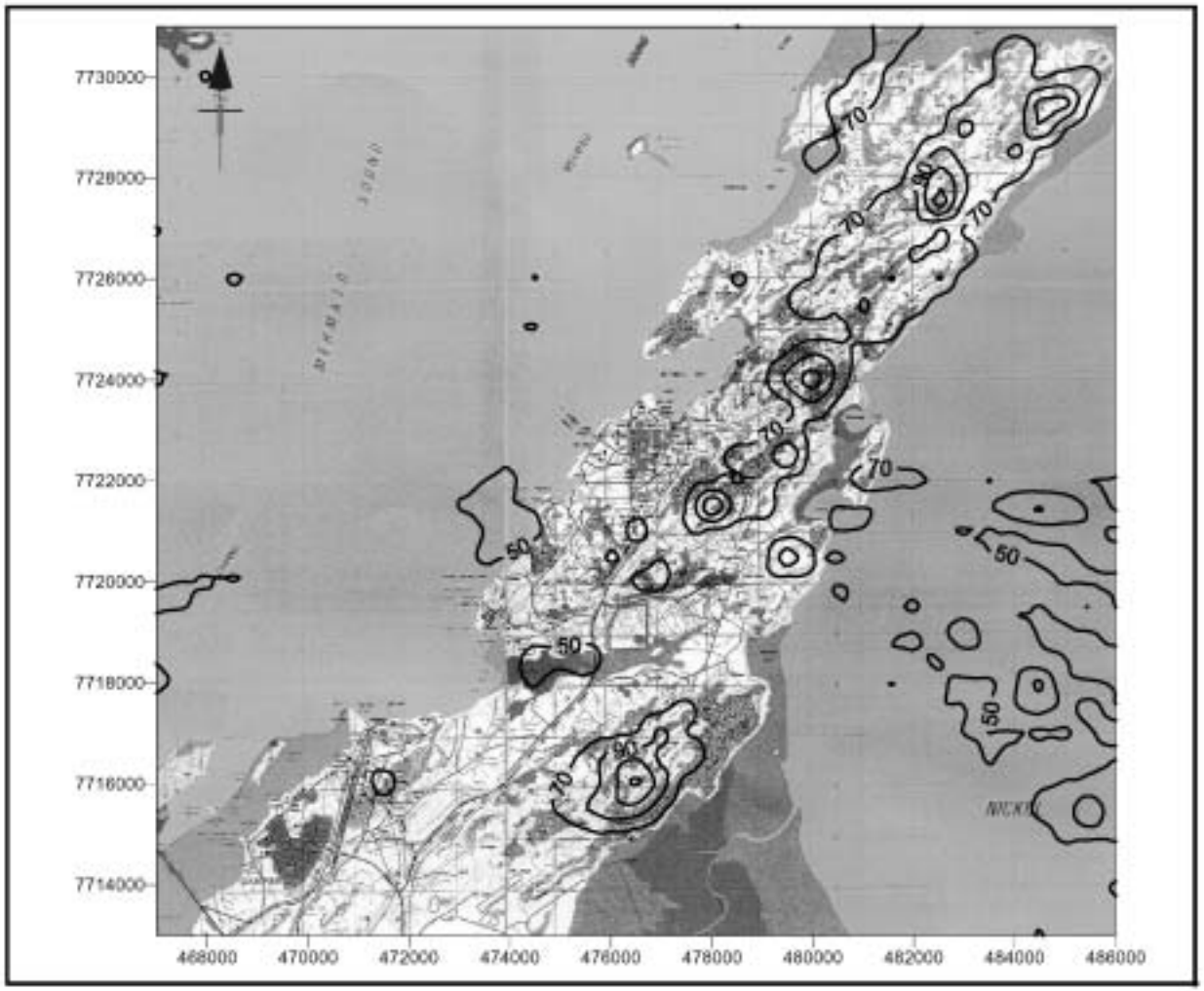

Figure 9: ***NO_2 modelling – 1 hour average maximum predicted concentrations ($\mu g/m^3$) from existing and proposed industry and the plant***

The maximum predicted 1-hour average for NO_2 does not change with or without the additional Dampier Nitrogen contribution as where and when predicted maximum concentrations occur depends on how plumes from different sources interact and meteorological conditions. Conditions and interaction of plumes may be such that no change in maximum concentration predicted results.

A smog modelling study was undertaken by the CSIRO Division of Atmospheric Research (CSIRO, 2002) to determine the impact of the proposal on regional concentrations of nitrogen dioxide and ozone. The study used the model TAPM and took into account existing air emission sources in the area (Woodside LNG plant, Hamersley power station and vehicle, town and shipping sources) and some proposed sources (Woodside LNG extension, Syntroleum plant, Burrup Fertilisers, GTL methanol plant). The results of the study are shown in Table 5.

Table 5: Maximum predicted regional nitrogen dioxide and ozone concentrations

Emission scenario	**Maximum Predictions for Region (ppb)**		
	NO_2 (hourly average)	**Ozone (hourly average)**	**Ozone (4-hourly average)**
Current Burrup Emissions*	58	90	70
Current Emissions + Dampier Nitrogen	65	89	70
NEPM Standard	**120***	**100***	**80***

*Goal includes maximum number of allowable exceedances of 1 day per year

The study concluded:

- Regional maximum ground-level concentration (glc) values of NO_2 and O_3 do not exceed the NEPM (National Environment Protection Measure) standards. At Dampier, maximum cumulative glc's were shown to be 20% of the NEPM standard for NO_2, and 58% to 67% of the NEPM standard for ozone (hourly and four-hourly average respectively). Similarly low levels were modelled to occur at Karratha (Appendix D of the Supplement to the CER).

- Emissions from the proposal were shown to contribute 7 ppb to the regional maximum hourly-averaged NO_2 glc, 3 ppb to the maximum hourly-averaged NO_2 glc at Dampier and 1 ppb at Karratha.

- Emissions from the proposal do not enhance the regional maximum hourly- or four-hourly-averaged O_3 glc. In fact when the plant emissions are included the maximum hourly-averaged O_3 glc decreases by 1 ppb.

- Emissions from the proposal do not enhance the maximum hourly- or four-hourly-averaged O_3 glcs at Dampier or Karratha. In fact the maximum hourly-averaged O_3 glc at Dampier decreases by 1 ppb with the addition of the Dampier Nitrogen ammonia urea plant, as does the maximum four-hourly-averaged O_3 glc at Karratha (due to the reaction of the increased NO with O_3).

NO_X emissions may have a number of impacts on surrounding areas through wet or dry deposition. The following potential impacts and conclusions are made in the Supplement to the CER:

1. NO_X in air may impact vegetation by uptake through plant stomata. Exposure to nitric oxide and nitrogen dioxide, existing in the atmosphere, as dry deposition, or nitrate existing as wet deposition, can have direct effects on some species(World Health Organisation, 2000). Studies on Australian vegetation have shown that NO_X can result in depression in growth and yield of the species studied (Murray et al, 1991). Studies have also shown that although arid zone vegetation demonstrates adaptations to reduce gaseous exchange and moisture loss, it is still vulnerable to NO_X exposure (Calquhoun et al. 1984, El Kiey & Ormerod 1987). Little information is available for species found on the Burrup.
2. NO_X in air may affect snail shells. It is concluded that since there are viable snail populations in three separate areas of the Burrup, this is not occurring.
3. NO_X may affect petroglyphs through wet and dry deposition. The Supplementary CER suggests a range of factors that may lead to the deterioration of petroglyphs besides acidic atmospheric deposition. Whether and how much deterioration is caused by NO_X has not been determined as yet.
4. NO_X may also contribute to acidification or increased nitrogen content of the soil through wet or dry deposition. Increased nitrogen availability in the soil may lead to changes in plant and fungal communities and encourage weed growth (Campbell 2002). Information on the impact of daily deposition of nitrogen over the long term on Burrup species is not available.
5. NO_X may also add to nutrient contributions in the marine environment (URS 2002).

Dampier Nitrogen will contribute 717t/a of NO_X to the Burrup airshed. Estimated current emissions are 7600t/a from existing industrial sources (SKM 2002). While Dampier Nitrogen will not be a large emitter of NO_X on the Burrup based on current emissions, the proposal will add to any cumulative impacts of NO_X.

Ammonia emissions

At present this proposal will be the only emitter of ammonia during normal operations in the area. The proposed Burrup Fertilizers Ammonia Plant may emit ammonia under emergency conditions, but will not emit ammonia under normal operating conditions. The emissions of ammonia originate from the Granulation Plant in the proposal.

The predicted emissions of ammonia of 800t/a have been modelled and give a predicted maximum groundlevel concentration of 142$\mu g/m^3$ (3-minute average). This is below the Victorian EPA design standard of 600$\mu g/m^3$ and well below the odour threshold of 11 700$\mu g/m^3$.

Urea dust emissions

The predicted urea dust emission from the plant is 300t/a at 35mg/Nm^3. Modelling gives a maximum groundlevel concentration of 6.6µg/m^3. This is well below the NEPM standard of 50µg/m^3 for particulate matter of 10µm or less.

The European Fertilizer Manufacturers' Association "best practice" standard for urea dust emissions is 50mg/Nm^3 in concentration or approximately 320t/a on a per tonne of product basis (EFMA 2000b). The proposed emission for this proposal is 35mg/Nm^3 or about 300t/a. The proposal therefore meets the EFMA standard. However the proponent has recognised that recent technological advances indicate that these dust levels may be able to be reduced in the future and will keep these under review (Supplement to CER, 2002).

The urea conveyor is to be covered and enclosed where it crosses roads and over water. Urea dust should not be emitted in any quantity during ship loading as best available ship loading technology will be used, incorporating telescopic chutes with baffles. Dust will be collected and filtered through reverse pulse baghouses at the ship loading conveyor transfer points.

Urea dust may be deposited on the surrounding areas by wet or dry deposition. The dispersion of urea has been modelled for particles of less than 3µm in diameter. This particle size can be obtained by the use of two demisters. The predicted deposition rate is a maximum of 200mg urea/m^2/a or 2kg urea/ha/a. A study was undertaken by the proponent (Campbell 2002) which found that this is considerably less than the nitrogen pollution from sites such as large cities or industrial zones where adverse effects on native vegetation have been recorded. However no data exists regarding the effects on vegetation of the Burrup of nitrogen deposition at this level. Natural nitrogen deposition measured near Darwin is 140mg/m^2/a (R Gillett, CSIRO, Atmospheric Research, *pers com*) and may fluctuate within a 30% range. The maximum deposition rate of urea (approximately 100mg nitrogen/m^2/a) adds to natural levels.

Urea deposition may have the following impacts, which are identified in the Supplement to the CER:

1. impact on vegetation due to leaf scalding. However, any detectable impact is considered extremely unlikely at the levels emitted;
2. addition of nitrogen to low nutrient soils causing changes in plant and fungal community composition and favouring weed growth;
3. accumulation in freshwater pools causing impact on freshwater systems.

Submissions

The EPASU raised concerns regarding impact on vegetation from urea emissions and requested effective monitoring of urea deposition effects, including identification of early warning indicators and contingency measures.

Environment Australia requested monitoring for secondary impacts from urea deposition.

The EPASU raised concerns about nutrient enrichment of soil from urea, NO_x, and ammonia emissions from this proposal and the cumulative impacts from other nitrogen sources. Potential impacts include change of community composition and conditions favouring weed growth.

The EPASU raised concerns about acid emission impacts on vegetation, rock pools, fauna and petroglyphs and acid deposition in dew. Nickol Bay Nats raised concerns about impacts of urea and ammonia on rock pools.

The EPASU commented that there has been no reference to impacts of air pollutants on mangroves in 'Potential Effects on Biophysical Attributes' section.

The EPASU stated that the environmental implications of the substantial estimates of airborne deposition of N as urea particulates and airborne gases (NO_x and NH_3) to Nickol Bay which may be relatively enclosed system had not been discussed in detail.

Dampier Nitrogen has committed to undertake vegetation monitoring for 'secondary impacts'. The EPASU advised that the issue of establishing early warning indicators, triggers for management and mitigation measures had not been addressed.

Assessment

The area considered for assessment of this factor is the Dampier Nitrogen site at the corner of Burrup and Village Roads and the urea storage shed site on Dampier Port Authority land, surrounding Conservation Areas and marine areas.

The EPA's environmental objective for this factor is to:

(i) Ensure that gaseous emissions, from this proposal in isolation and in combination with emissions from neighbouring sources and background concentrations, do not cause ambient ground level concentrations to exceed appropriate criteria, (including the NEPM for Ambient Air Quality), or cause an environmental or human health/ amenity problem; and

(ii) Use all reasonable and practicable measures to minimize the discharge of significant atmospheric wastes such as NOx, SOx, greenhouse gases, toxic gases, particulates and smoke.

Oxides of Sulphur (SO_X)

The EPA notes that the emissions of oxides of sulphur are likely to be less than 8t/a. At this level no impact on human health is expected. Synergistic acid impact of SO_X and NO_X on the environment is possible. However, the main concern is the cumulative impact with other existing and proposed industries in the area rather than the impact of this proposal in isolation. The EPA expects the proponent to take all reasonable and practicable measures to minimize the discharge of SO_X in accordance with waste minimisation principles to reduce cumulative impacts.

Oxides of Nitrogen (NO_x)

The EPA notes that low NO_x design burners will be installed on all gas burning plant (boiler, reformer and gas turbines). The gas turbine specification falls short of the EPA guideline of 70mg/m^3 by 5mg/m^3 (EPA, 2000b). Although this is not a substantial amount, the EPA considers it appropriate that the proponent should demonstrate that oxides of nitrogen emissions from gas turbines will meet the Environmental Protection Authority's guideline value of 0.07 grams per cubic metre as stated in its Guidance Statement No. 15 "Emissions of Oxides of Nitrogen from Gas Turbines," May 2000; or if a higher NO_x concentration than the Environmental Protection Authority's guideline value for gas turbines (0.07grams per cubic metre) is proposed, provide a comprehensive report (by or audited by an independent expert, approved by the Environmental Protection Authority) to demonstrate that:

- all feasible options (process/technology improvement and NOx control measures) to minimise NOx emissions have been considered (including an evaluation of the expected reduction in emissions of NOx and efficiencies for each option); and
- the proposed options to minimise NOx is consistent with the best practicable technology and current industry standards for similar operations with other combined cycle gas turbine systems in developed countries. (Condition8-1.subsection3. Appendix 4)

The EPA notes that the AUSPLUME modelling has shown that the predicted groundlevel concentration of NO_2, in isolation and cumulatively with other industries, easily meets the NEPM standard and should not impact human health. It is noted that the cumulative modelling did not include emissions from the proposed Methanex plant. However modelling done by Methanex and the Office of Major Projects indicates that cumulative NO_x impacts from existing and proposed projects will not exceed NEPM standards. Advice from the DEP is that while some proponents have used DISPMOD for modelling on the Burrup Peninsula, AUSPLUME is also acceptable for modelling. Both models have shortcomings for use on the Burrup Peninsula as AUSPLUME takes into account the effects of surrounding terrain but not coastal fumigation while DISPMOD takes into account coastal fumigation but not terrain effects. Neither model will be entirely accurate.

Modelling carried out by the CSIRO using the TAPM smog model also indicates that regional groundlevel concentrations of NO_2 and ozone are not expected to exceed the NEPM standards.

Cumulative impacts of NO_x emissions are a potential area of concern, especially on vegetation and rock art, however there is insufficient information available to determine whether and to what extent these impacts may occur. Air quality guidelines for Europe for impacts on vegetation (World Health Organisation, 2000) suggest 75μg/m^3 for NO_x as a 24 hour mean as a critical level for short term exposures and for long term effects 30μg/m^3 of NO_x as an annual mean may be appropriate. It should be noted that these guidelines are for NO_x ie NO plus NO_2. Air modelling has been carried out for NO_2 for comparison with the NEPM standard for

human health, assuming the conversion of up to approximately 30% of NO_X to NO_2, ie NO_X levels are up to (depending on distance from stack) approximately three times higher than the modelled NO_2 levels.

Cumulative loads of nitrogen deposition are not known although Methanex (Methanex 2002) has estimated an average annual deposition rate of 4.8g NO_X/m^2 (48kg/ha) from existing and proposed industry. This level is at the upper limits of the guidelines for many vegetation types in Europe for total nitrogen deposition recommended in World Health Organisation 2000. The estimation made by Methanex does not include the additional nitrogen sources of ammonia and urea from this proposal.

There are no guidelines for Australian vegetation and freshwater systems and the impacts on vegetation types on the Burrup Peninsula are not currently known. Therefore the EPA requires proponents to minimise emissions to as low as reasonably practicable and to continue to investigate this issue.

The EPA notes that the proposal by itself it not the largest contributor, existing or proposed, of NO_X in the region. The annual average of the predicted NO_X emission of the proposal on it own is well below the World Health Organisation guidelines. NO_X concentrations have not been predicted as 24 hour averages, therefore no comparison can be drawn with the 24 hour guideline. It would also be difficult to separate any monitored impacts of NO_X (should there be found to be impacts) from impacts due to other industries in the area.

The EPA notes the proponent's commitment to encourage specific investigations of the cumulative NO_X effects on Pilbara flora and vegetation in their natural habitat, through the prospective King Bay-Hearson Cove Industry Group in consultation with CALM and other relevant experts. The proponent also has endorsed the proposed establishment of a King Bay-Hearson Cove Industry Group to enable a coordinated approach to identifying the potential cumulative impacts from acidic air pollution.

The EPA also understands that the Government has commission a study of petroglyphs on the Burrup in order to determine if acid emissions from industry are damaging the petroglyphs. The results of this study are needed to determine if further action is required to reduce regional acid emissions or to protect rock art.

The EPA recommends that the potential for cumulative emissions of NO_X and other nitrogen sources to cause nutrient enrichment of the soil should also be addressed on a whole of industry basis (see Other Advice section of this report).

The EPA notes that the proponent has predicted that wet and dry deposition of NO_X from existing industries, Burrup Fertilisers, Syntroleum, Methanex and this proposal in the marine environment will add a load of 30tpa of nitrogen to Mermaid Sound, distributed over 270 square kilometres. The Pilbara coast is the only arid sub-tropical coastal zone and there are no marine ecosystems with which comparisons can be drawn. Therefore the impact of NO_X deposition is difficult to assess. The Water

Corporation will be required to monitor for marine impacts from wastewater discharge through their outfall in the vicinity of the outfall. The monitoring programme will include monitoring for impacts of nutrient enrichment.

Ammonia

The EPA acknowledges that the emission of ammonia at the levels predicted under normal operational conditions is unlikely to cause an odour impact outside of the plant boundary.

The EPA notes that the emission of 800t/a of ammonia does not conform with the "best practice" standard given by the European Fertiliser Manufactures' Association (EFMA), which would be approximately 400t/a for this plant capacity (EFMA 2000b). This level of emission can be achieved by the installation of acid scrubbing on the granulation stack. An acid scrubber would require the importation of large quantities of concentrated acid and the subsequent disposal of a large amount of ammonium nitrate or sulphate effluent. There is no readily available method of disposing of the effluent at the plant location. At other plants effluent is often directed to nearby plants which can make use of the effluent. Other urea formaldehyde based ammonia abatement systems have not been proposed. It is the EPA's recommendation that if subsequently a plant is established in the local area that could process the by-product of an acid scrubber, the proponent should investigate the practicability of installing acid scrubbers and having the effluent processed. If this option in reasonable and practicable, it should be implemented.

The EPA notes that ammonia deposition may:

1. impact freshwater pools as ammonia is soluble and is a physical and chemical stressor to freshwater systems; and
2. add to the nitrogen content of soil.

Air quality guidelines for Europe for impacts on vegetation (World Health Organisation, 2000) suggest 270$\mu g/m^3$ for ammonia as a 24 hour mean as a critical level for short term exposures and for long term effects 48$\mu g/m^3$ of ammonia as an annual mean may be appropriate. The predicted maximum groundlevel concentration of 142$\mu g/m^3$ as a 3-minute average is therefore unlikely to exceed the guideline for ammonia alone. However ammonia deposition will add to impacts of NO_X and urea on freshwater systems and vegetation.

The EPA notes that the proponent has made a commitment to review predicted ammonia emissions prior to works approval. The proponent has also committed to continue close monitoring of evolving technologies and potential effects upon rock pools. Based on the above monitoring, Dampier Nitrogen states that it will be able to respond through retrofit of appropriate technologies if they are economically viable.

It is the EPA's opinion that as the currently proposed technology does not meet best practice standards the proponent should be required to provide a report to the Environmental Protection Authority demonstrating that ammonia emissions meet current industry standards for similar operations, or justifying why these standards cannot be met in these circumstances; reviewing ammonia emission reduction technologies and pollution control devices, and the results achievable on application of these; and outlining the reasons for the final selection of an emissions control

system and demonstrating that this is the best practicable and reasonable system (Condition 8-2, Appendix 4).

The proponent should also identify preliminary warning indicators and "trigger levels" to indicate impacts of ammonia and urea on natural systems, including soil condition, rockpools, vegetation and mangal communities, design and implement a monitoring programme to establish baseline conditions prior to commissioning of the plant and identify practicable management or contingency measures, as it relates to the Dampier Nitrogen project, to be implemented should the "trigger levels" be exceeded (Condition 8-3, Appendix 4).

Urea

The EPA notes the proponent's commitment to meet current best practice standards as described in EFMA 2000b and to endeavour to reduce emissions further during design work. As technology is evolving that may provide better reduction of urea dust, the EPA has recommended a condition that the proponent provide a report to the Environmental Protection Authority demonstrating that urea emissions meet current industry standards for similar operations, or justifying why these standards cannot be met in these circumstances; reviewing urea emission reduction technologies and pollution control devices, and the results achievable on application of these; and outlining the reasons for the final selection of an emissions control system and demonstrating that this is the best practicable and reasonable system (Condition 8-2, Appendix 4).

The proponent has committed to monitoring for secondary impacts of urea deposition on surrounding regions. In order to implement this monitoring it is the EPA's recommendation that the proponent identify preliminary warning indicators and "trigger levels" to indicate impacts of ammonia and urea on natural systems, including soil condition, rockpools, vegetation and mangal communities; design and implement a monitoring programme to establish baseline conditions prior to commissioning of the plant; and identify practicable management or contingency measures, as it relates to the Dampier Nitrogen project, to be implemented should the "trigger levels" be exceeded (Condition 8-3, Appendix 4).

The proponent does not anticipate adverse impacts of urea deposition on mangrove leaves and cites in support of this conclusion the fact that the plant at Gibson Island, Queensland has operated for over 30 years and has traditionally emitted much larger volumes of urea dust than the BAT levels anticipated from their project, scalding effects on mangroves have never been raised as an issue for concern for fringing mangrove habitats nearby the Gibson Island plant. It is acknowledged that dust may cause scalding of mangrove leaves if present in sufficient quantity. The EPA considers that it is unlikely that there will be any detectable impact on mangrove leaves due to deposition of urea, however this should be confirmed through the monitoring programme required in recommended condition 8-3.

The urea conveyor is covered but not totally enclosed. Transfer points occurring in the open environment should be enclosed to collect and contain any spillage.

The EPA also notes the proponent's commitment to best available weed control measures as urea deposition may promote weed growth.

Methanol and other minor emissions

The predicted emission of methanol is very low and should not have an impact on the environment. However the EPA recommends that the presence and concentration of any minor emissions should also be established to confirm that no impact, particularly of odour, will occur. This should be addressed under Part V of the *Environmental Protection Act 1986*.

Summary

Having particular regard to the:

(a) measures taken to reduce NO_X emissions and further recommended requirements;

(b) the small relative contribution of the proposal to NO_X emissions in the area;

(c) all emissions being well below appropriate human health reference levels;

(d) the opportunity to further manage ammonia and urea emissions prior to the Works Approval process;

(e) proponent's commitment to manage dust from construction;

(f) proponent's other commitments;

(g) recommended conditions; and

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

3.4 Greenhouse Gas Emissions

Description

Carbon dioxide (CO_2) is the primary greenhouse gas emitted in significant quantity from the plant, comprising 98% of the total GHG profile for the project with methane (CH_4) and nitrous oxide (N_2O) emissions determined to be negligible in comparison. Dampier Nitrogen estimates that a total of 1,710,000 tpa of CO_2 will be generated by the process and fuel combustion. Of this approximately 886,000 tpa will be used in the reaction of ammonia with CO_2 to form urea (NH_2CONH_2). The net emission of greenhouse gases, on a CO_2 equivalent basis, from the plant is 841,055 tpa (of which 824,670 tpa is CO_2).

The main sources of CO_2 released from the manufacturing process are from the primary reformer (403,000 tpa) and the carbon dioxide removal unit (86,600 tpa) in the ammonia plant. CO_2 is also released during combustion from the gas turbines (236,000 tpa) and auxiliary boiler (99,000). Methane released during upset conditions

will also be combusted to form CO_2 in the plant flare stack; fugitive methane emissions from leaks of natural gas will be negligible due to stringent leak control measures incorporated into the plant design. Only very small quantities of CO_2 are estimated to be released from the vent and absorber stacks in the urea plant, representing less than 0.008% of the total Project emissions (Supplement to CER).

As a result of changes to the capacity of the plant, greenhouse gas emission have been revised from the original CER. Table 6 shows the revised quantity of greenhouse gas that will be emitted (Supplement to CER):

Table 6: Expected Greenhouse Gas Emissions from Original (1998) Project and Current Revised Project

Source	Annual Emissions (tpa) CO_2 eq	
	Original 1998 Project (1,800/2,000 tpd design)	**Current Revised Project (2,300/3,500 tpd design)**
Ammonia Plant:		
Primary Reformer	311,138	411,212
CO_2 Removal Unit	242,000	86,600
Urea Plant:		
Urea Granulation Vent Stack	16	28
Low Pressure Absorber Stack	24	42
Utilities:		
Gas Turbines	215,166	243,161
Auxiliary Boiler	78,449	100,012
Total	**846,793**	**841,055**

Note: Emission estimates have been corrected to incorporate N_2O contribution (CO_2 eq) for both 1998 and current plant designs.

Some of the CO_2 contained in the urea may be released when the product is used. Some of it will be exported. However, due to the current greenhouse gas accounting procedures the emissions from ammonia and urea accrue to the country of production.

The European Fertiliser Manufacturers Association (EFMA 2000a) provide a benchmark for Best Available Technology (BAT) for new ammonia plants of 29.3 GJ per tonne ammonia produced on a Lower Heating Value (LHV) basis.

When comparing the efficiency of the proposed plant on the Burrup with the EFMA benchmark, it is necessary to consider that:

- the EFMA benchmark only considers an ammonia plant in isolation;
- the EFMA benchmark does not factor in the energy consumption of plant utilities such as desalination and cooling water pumping and circulation; and
- EFMA energy efficiencies are calculated using European operating conditions, such as cooling water available at an ambient temperature of 20 degrees C.

Other local and design factors where the plant proposed by Dampier Nitrogen differs from the EFMA model and which will affect the efficiency figure include:

- type of reformer (top-fired vs side-fired);
- feedstock gas composition and impurities;
- gas supply pressure; and
- type of CO_2 removal process used (Supplement to CER).

The proponent advises that their ammonia plant design is expected to have an actual energy efficiency of 30.35 GJ/tonne NH_3. When corrected for local conditions the ammonia plant efficiency will be 29.3 GJ/tonne NH_3 (which accords with the EFMA benchmark).

The energy needs of urea plants are small compared to those of ammonia plants and no efficiency benchmark is available from EFMA (EFMA 2000b).

Specific 'no regrets' measures that will be included in the plant design and pursued by Dampier Nitrogen include (Supplement to CER):

- adoption of state-of-the-art steam reforming using proven technology design, which has proven efficiency benefits over conventional reforming processes;

- proposed use of a top-fired steam reformer burner, which has demonstrated higher efficiency compared with side-fired reformers. This will ensure an improved greenhouse efficiency, and simultaneously lower potential NO_X emissions in combination with the use of low NO_x combustors for the Project;

- adoption of waste heat recovery and cogeneration wherever possible. The Project design has optimised the use of heat generated during various stages of the process in both the ammonia and urea plants, to be used elsewhere in the process. Additionally, some steam from the reformer will be exported for operation of the thermal desalination plant;

- a shift towards a more balanced plant configuration, so as to ensure that more CO_2 produced in the ammonia plant is utilised for downstream urea production. Dampier Nitrogen is currently seeking opportunities to make the proposed ammonia/urea plant even more balanced, with the potential to optimise urea manufacture to the point where CO_2 vented to atmosphere from ammonia production will be negligible;

- use of low CO_2 content North West Shelf gas as feedstock for the Project. The location of the Project on the Burrup Peninsula enables the utilisation of high quality feedstock gas, which will deliver greenhouse improvements compared to other potential natural gas sources in Australia which characteristically have a higher natural CO_2 content; and

- self-contained utilities. Dampier Nitrogen will be self-sufficient with on-site power co-generation during plant operation. There is the capacity to feed surplus electricity generated back to the grid, to potentially make the Project a net exporter of electrical energy.

Submissions

The Australian Greenhouse Office (AGO) sought details on the greenhouse gas and fuel savings from "no regrets" and "beyond no regrets" measures and those measures considered but not implemented, as well as information on equipment efficiencies and other technical details

AGO also sought details on the greenhouse gas management plan, and how this plan will be prepared and implemented.

Assessment

The area considered for assessment of this factor is global, Australia and the local region.

The EPA's environmental objective for this factor is to minimise greenhouse gas emissions in absolute terms and reduce emissions per unit product to as low as reasonably practicable and to mitigate greenhouse gas emissions in accordance with the Framework Convention on Climate Change 1992, and in accordance with established Commonwealth and State policies.

The EPA notes that the proponent has benchmarked the energy efficiency of the ammonia plant and the greenhouse gas intensity per tonne of ammonia against the EFMA guideline and other ammonia plants. In this regard the plant compares favourably or very closely with available information from other plants.

It is difficult to compare the overall ammonia-urea plant energy efficiency and greenhouse gas intensity with other plants as there is only one other plant in Australia producing ammonia and urea. This plant sources power from a coal fired power station, also produces ammonium sulphate and phosphate enriched fertiliser and exports ammonia It is thirty years old with sections that have been updated and retrofitted. Therefore comparison of greenhouse gas emissions with this plant is not realistic. Information from other overseas competitors is not easily obtainable.

Information from the proponent indicates that a typical energy efficiency for the production of urea is 5.5 –6.0GJ/tonne urea. The efficiency of the proposed plant will be approximately 5.88GJ/tonne urea which falls in the range of energy efficient plants (J Rich, *pers com*).

It is estimated that less than one quarter of the total energy usage of the plant is attributable to the urea plant, based on total energy predictions. The ammonia plant is therefore the largest consumer of energy. For the ammonia plant, satisfactory energy efficiency and greenhouse gas intensity has been demonstrated.

The EPA notes that specific 'beyond no regrets' measures that will be further investigated by Dampier Nitrogen include (Supplement to CER):

- Potential use of CO_2 by downstream industries.
- Vegetation-based carbon sequestration opportunities. During detailed design and operational phases, Dampier Nitrogen will consider the economic feasibility of forestry offset measures to minimise total emissions. Plantation offset of CO_2 will be considered on a cost per % CO_2 sequestered basis, building on previous research undertaken recently (e.g. CSIRO in Woodside 1998).
- Potential CO_2 re-injection opportunities. The 'beyond no regrets' measure of re-injecting CO_2 into North-West Shelf gas or oil fields has been discounted as a viable short-term option by Woodside (1998) and Burrup Fertilisers (SKM 2001), due to the extremely high cost involved, limited injection life of the fields and unavailability of those fields until after 2010. However, this option may emerge as a feasible offset measure in the longer term over the life of the Dampier Nitrogen Project.
- Potential NH_3 synthesis using hydrogen from upstream industries. Dampier Nitrogen has identified the opportunity to utilise excess H_2 from other proposed industries in the Burrup region. This would provide a more efficient supply of H_2 required for ammonia manufacture, and reduce the demand for natural gas feedstock with the concomitant production of CO_2. Dampier Nitrogen will investigate the feasibility of this option through consultation with prospective industries in the region.

The EPA notes the proponent's commitments that:

- DN will conduct further investigations of possible 'beyond no regrets' measures and their respective greenhouse and efficiency gains in consultation with the AGO; and
- the proponent will participate in the Commonwealth Government's Greenhouse Challenge and as part of the *Greenhouse Challenge*, a Greenhouse Gas Emissions Management Plan will be prepared with the AGO and DEP as part of finalizing the EMP during detailed engineering design. This will involve DN optimising the Project's GHG efficiency and confirming the inventory as part of detailed engineering phase, and then working with the AGO and DEP to develop a set of agreed objectives, targets and performance measures to ensure greenhouse emissions are minimized as far as practicable over the life of the project.

The EPA recommends that the proponent be required to comply with the standard condition applied to all proposals with large greenhouse gas inventories, requiring a greenhouse gas emissions management plan. The EPA further notes that the AGO has requested specific information on greenhouse gas and fuel savings from "no regrets" and "beyond no regrets" measures, as well as information on equipment efficiencies and other technical details, and of other mitigation measures which the proponent considered but did not implement in the plant design, along with an accompanying explanation supported by sufficient technical details and an estimation of greenhouse gas emissions savings foregone. Clause 7-1 of condition 7 (Appendix 4) requires that the proponent "ensure that "greenhouse gas" emissions from the

project are adequately addressed and best available efficient technologies are used to minimise total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product; and mitigate "greenhouse gas" emissions in accordance with the Framework Convention on Climate Change 1992, and consistent with the National Greenhouse Strategy."

Summary

Having particular regard to the:

(a) the energy efficiency predicted for the ammonia plant;

(b) proponent's commitments; and

(c) EPA's recommended condition,

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

3.5 Wastewater

Description

Water will be supplied to the Dampier Nitrogen plant via a common-user seawater supply line operated by the Water Corporation. This seawater will be used for cooling water and feed water to the desalinated water plant. Sources of liquid effluent from the plant will include cooling water return (including tower blowdown) from process plant, brine return from the desalination plant, wastewater from the demineralisation plant, domestic wastewater and stormwater runoff from process areas.

Cooling return seawater will be concentrated due to evaporation to a maximum total dissolved solids content of 53 000ppm and maximum temperature of 2C above ambient seawater temperature for 80% of the time and never more than 5C above ambient temperature. It will contain biocides and anti-scalant chemicals. Significant quantities of corrosion inhibitor will not be required due to the use of fibreglass reinforced plastic for the seawater cooling system. Some corrosion inhibitor will be required for the protection of heat exchangers, which are made of metal. The use of fibreglass reinforced plastic will also limit the amount of metals corroded into the cooling water. Concentrated brine will be discharged from the desalination plant.

Discharge from the demineralisation plant will contain nitrogen from turbine condensate, process condensates from the ammonia and urea plants, steam condensate from the urea plant and blow down from the steam generator. This nitrogen is anticipated to total 43kg/day or approximately 15.7t/a. Any metal or toxicant content is predicted to be less than the ANZECC 99% species protection trigger levels at the plant boundary for marine waters when mixed with the outgoing seawater stream, except for ammonia which will exceed the trigger level at the plant boundary. (Figure 10).

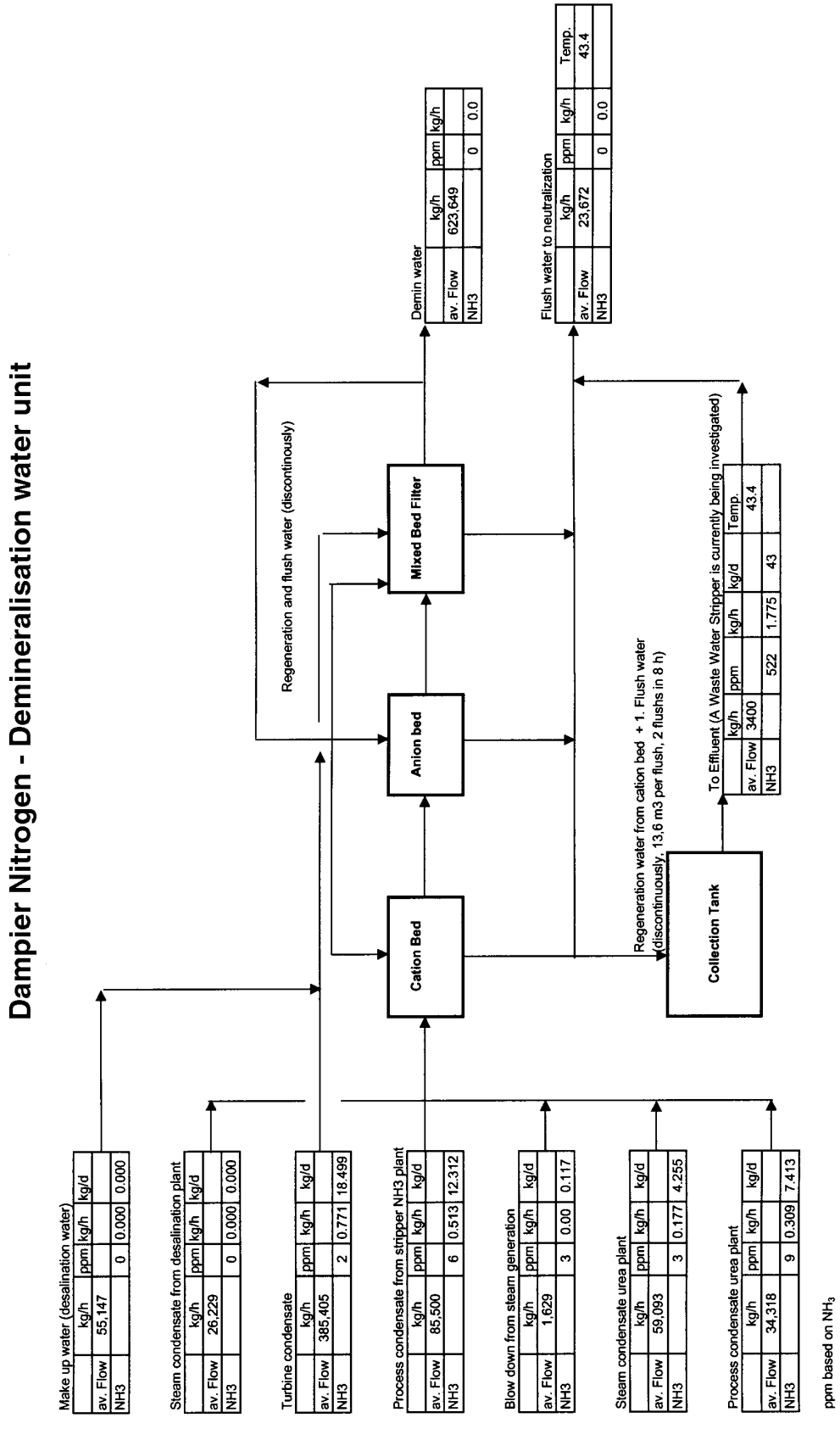

Figure 10: Demineralisation water unit

Domestic wastewater will contain 20-40ppm of total nitrogen, 10-20ppm of total phosphorus and 2.5million cfu/100ml of e-coli. The estimated load of nitrogen from this source is 44-88kg/a and phosphorus 22-44kg/a. It is proposed to discharge this to the Water Corporation outfall with other wastewater or use it for irrigation.

It is proposed to collect the first 15mm of run-off from potentially contaminated areas. This water will be treated as required, such as skimming off hydrocarbons, and be recycled to the process if quality permits. Otherwise it will be discharged to the outfall. Subsequent stormwater runoff will be discharged to the environment.

It is anticipated that wastewater discharged to the Water Corporation outfall will have the following characteristics:

Table 7: Characteristics of Potential Contaminants in Dampier Nitrogen Liquid Waste Flows

Water Quality Parameter	Waste Stream Source	Wastewater Stream Flow Rate	Concentration of Parameter in Wastestream	Contribution at DN Plant Boundary
Cadmium Chromium Cobalt Copper Lead Mercury Nickel Silver Tributyltin Vanadium Zinc	Cooling Tower Blowdown	2,700 m^3/hr	Negligible	Background
Ammonia Methanol	Demin plant	3.4 m^3/hr	522 ppm NH_3 0.07 – 0.17 ppm	43kg/d 15700 kg/yr 2 - 5 kg/year
Phosphorous (total)	Domestic Wastewater	100-200 L/day per person	10-20 ppm	21.9-43.8 kg/yr
Total Nitrogen	Domestic Wastewater	100-200 L/day per person	20-40 ppm	43.8-87.6 kg/yr
E-coli	Domestic Wastewater	100-200 L/day per person	2.5 million cfu/100 mL	

Salinity and temperature

The Water Corporation has conditions for the acceptance of wastewater for discharge to the outfall that relate to temperature, biocide and anti-scalant. In addition the salinity level needs to meet ANZECC guidelines within the designated mixing zone. Dampier Nitrogen's wastewater will comply with Water Corporation requirements and Department of Environmental Protection license conditions for salinity and temperature to be accepted for discharge.

Toxicants

Dampier Nitrogen has predicted that wastewater discharged from the plant will meet the ANZECC trigger levels for protection of 99% of species in marine waters, with the exception of ammonia and of metals that already occur at concentrations above the ANZECC trigger levels in the intake water and recognising the concentrating effect of evaporative seawater cooling. The concentration of ammonia after dilution with return cooling water is estimated at 750 micrograms per litre (μg/L). Allowing for dilution in the mixing zone for toxicants (EPA Bulletin 1044) ammonia will easily meet the ANZECC 99% protection trigger levels for marine waters of 500μg/L at the edge of the mixing zone. A small amount of methanol is also predicted to be present in the wastewater. After dilution with return cooling water the concentration of methanol will be very low. There are no ANZECC trigger levels available for methanol.

The following additives will be used in cooling water (Supplement to CER):

Table 8: Characteristics of Cooling Water Additives

Process Stream	Product Name	Active Ingredient	Dosing Rate	Concentration in Effluent	Ecotoxicology Toxicity to fish: LC50/Brachydanio rerio:
Desalination Plant	Altreat 400 (Antiscalant)	Maleic Acid (Polycarboxylic Acid)	1-10 ppm	0.2 – 2 ppm (0.2 – 2 mg/L)	>1000 mg/L/ 96 h
Seawater Cooling Circuit	Drewsperse 747A (Antiscalant)	Maleic Acid	2 ppm	1.5 ppm (1.5 mg/L)	>1000 mg/L/ 96 h
Seawater Cooling Circuit	WPD 11-166 (Corrosion Inhibitor)	Sodium Tolyltriazole	8 ppm	6.5 ppm (6.5 mg/L)	~ 122 mg/L
Seawater Cooling Circuit	Sodium Hypochlorite	Chlorine	0.3-0.5 ppm	Nil - Chlorine will be chemically reduced prior to discharge from DN site via the addition of sodium sulphite	Not Applicable

If the proposed treatment of chemicals are judged by the EPA at a later date to pose an unacceptable impact or risk to the aquatic environment, then Dampier Nitrogen has committed to develop a plan with the DEP to mitigate or more completely research this impact. This plan may include a consideration of alternative treatment chemicals and/or a toxicological study on local marine fauna or other alternative assessment.

Nutrients

Nutrient sources in wastewater to be discharged to the marine environment through the Water Corporation's outfall will be from turbine condensate and steam condensate and blow down, as well as process condensate. This is estimated to be 43kg/day or approximately 15.7t/a. Domestic wastewater will also add to the nutrient discharge if this is discharged through the outfall, to a maximum of approximately 44-88kg/a. of nitrogen and 22-44kg/a of phosphorus.

It is possible to reduce the nitrogen discharge by either replacing ammonia as the boiler feed water conditioner with a phosphate compound or further treating the wastewater by the installation of a steam stripper. The proponent has committed to investigating these options during detailed design work prior to works approval. The proponent will also look at the option of local uses of nitrogen loaded blowdown water during detailed design.

The proponent also carried out a cumulative nitrogen load assessment, from wastewater discharge and atmospheric deposition of urea and gaseous emissions to the marine environment (CER Supplement, Appendix F, URS 2002). As there is no comparable marine ecosystems to the Pilbara coast, the results of the study were compared with loads received on the Great Barrier Reef, Cockburn Sound and Warnbro Sound.

The study concluded that the effect of the increased concentration of available nitrogen that will occur in the immediate vicinity of the outfall is likely to be restricted to the stimulation of phytoplankton growth. It also concluded that "the increase in nitrogen concentration to which algae, mangroves or corals at the adjacent shorelines are directly exposed will be extremely small and not measurable within the normal range of variability experienced in the marine environment. Any minor increase in the availability of nitrogen at the shoreline of King Bay will be readily assimilated by the fringing mangroves and the algae occurring on the rocky shores to the north of the outlet. These effects are expected to be minor and localised, and no detectable increase in macroalgal growth is anticipated."

Stormwater

It is proposed that the first 15mm of rainfall will be collected from potentially contaminated areas of the plant site. The lined stormwater ponds for contaminated water collection will be 45 m x 15 m x 2 m depth and will be located to the south west of the plant, south of the administration buildings and west of the future expansion areas. Dampier Nitrogen has committed to place these on the already disturbed areas. The proponent has also committed to manage stormwater runoff so it will not result in water quality degradation off site. Treatment will be dependent upon the type of contamination (if any) encountered. For example, solids will be settled out of the stormwater and removed periodically from the stormwater pond. Stormwater containing ammonia will be reprocessed if concentration permits and oil will be skimmed. Further detail on the management of stormwater will be provided in the EMP.

Submissions

The Dampier Archipelago Preservation Association was particularly happy with alternative wastewater discharge measures compared to the 1998 proposal.

DEP (Karratha) requested Dampier Nitrogen to use 'environmentally friendly' anti-scalants, not just the cheapest. Also, information on the chronic toxicity of these products to a range of locally occurring species at different trophic levels was requested. Information was also requested on the loading or fate of these products (or their derivatives after use) in the environment.

EPA Service Unit asked about the risks of residual chlorine being discharged and what control/monitoring/contingency measures would be taken to ensure that there was no residual chlorine discharged from the Dampier Nitrogen plant.

EPA Service Unit stated that the effluent quality should meet the 99 % species protection levels for toxicants or twice the filtered value of unpolluted seawater (ie regional background level), whichever is the greater

DEP (Karratha) asked if 'adverse' tidal conditions could be avoided when discharging nitrogen laden wastewater.

EPA Service Unit questioned the use of ammonia for conditioning and whether it was preferable over phosphates.

EPA Service Unit questioned the potential nutrient effect on coral communities which inhabit rocky shores near the outfall.

EPA Service Unit stated that Dampier Nitrogen constitutes the greatest direct, point source discharge of N to the marine environment (via the Water Corporation outfall). Based on estimates presented in the supplementary CER, Dampier Nitrogen direct nitrogen inputs to Mermaid Sound are far in excess of the other proposed industries. DN should review and amend its effluent and emissions treatment processes to substantially reduce its nitrogen loads to the marine environment.

EPA Service Unit suggested that a review of cumulative nitrogen and phosphorus inputs should be carried out for Mermaid Sound and Nickol Bay.

EPA Service Unit noted that the proponent needs to be able to characterize more fully the quality of site runoff, and needs to commit to manage this runoff so that it will not result in water quality degradation. The stormwater management plan (and site plan) needed to be more carefully designed, with a view to minimizing stormwater contamination, promoting recycling and reuse, and addressing the testing of stormwater for contaminants.

Water Corporation expressed the opinion that information shows King Bay, even though an embayment, has considerable tidal flushing and discharges of nitrogen will have no detrimental impact. Thus, discharge of 43kg/day (or 16 tonnes/year) by Dampier Nitrogen is within acceptable maximum discharge limits of King Bay. Even at a maximum emission of 800 tonnes/year (nitrogen) from the Water Corporation infrastructure operating at full capacity there is expected to be no measurable change or influence on the marine ecology of the receiving waters.

Assessment

The area considered for assessment of this factor is the marine environment of Mermaid Sound, Nickol Bay and surface and groundwater discharge from the plant site.

The EPA's environmental objective for this factor is to maintain marine ecological integrity and biodiversity and ensure that any impacts on locally significant marine communities are avoided and to maintain or improve the quality of surface and groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

General

The EPA considers that the proponent should show prior to the Works Approval application for the plant, that the brine and wastewater discharge will meet best practicable technology and waste minimisation principles for contaminants and nutrients and has recommended condition 9-2 (Appendix 4) for this purpose.

The EPA considers that the characteristics of the wastewater to be discharged from the site are not adequately known and therefore has recommended condition 9-1 (Appendix 4) to characterise the physico-chemical composition and flowrate of all process wastewater streams from the ammonia plant; to determine, for all non-negligible contaminants and nutrients, the total annual loads of contaminants and nutrients in the combined brine and wastewater discharge exiting the plant; and to determine (for normal and worst case conditions) the concentrations of contaminants and nutrients (for agreed averaging periods) in the combined brine and wastewater discharge exiting the plant.

At this stage of the plant design the characteristics of the effluent under upset conditions and estimated frequency and duration of upset conditions are not known. The EPA recommends that performance criteria for wastewater discharge be developed in licence conditions.

Toxicants

The EPA notes that the proponent has committed to meet the ANZECC 99% species protection trigger values for toxicants in wastewater to be discharged from the site except for ammonia and for metals that already occur at concentrations above the ANZECC trigger levels in the intake water. For ammonia, the EPA notes that concentrations will be below the 99% species protection trigger level at the edge of the toxicant mixing zone, which meets the EPA's second requirement as outlined in condition 9-4 (Appendix 4). Nevertheless the EPA expects the proponent to make every endeavour to ensure that wastewater discharge will meet best practicable technology and waste minimisation principles, as outlined in the assessment of the Water Corporation's outfall (EPA Bulletin 1044).

Some toxicants do not have recommended trigger values in the ANZECC guidelines. The EPA therefore recommends condition 9-5 (Appendix 4) for the proponent to undertake whole-of-effluent toxicological studies on a simulated effluent, or provide acceptable alternative information such as risk assessment, prior to commissioning of the plant. Subsequently, an analysis demonstrating effluent properties are substantially consistent with predictions should be performed. If the effluent is not as predicted toxicological studies or acceptable alternative information such as risk assessment should be provided, on the actual effluent following stabilisation of plant operation.

The EPA further recommends that the proponent maintain mass balances and inventories of toxicants to ensure that their fate can be traced (Condition 9-4,2, Appendix 4). The proponent should include in their Operational EMP control, monitoring and contingency measures to be taken to ensure that no residual chlorine is discharged from the site.

Nutrients

The EPA notes the proponent's commitment to further evaluate both ammonia- and phosphate-based dosing systems for boiler feed water during detailed engineering design, and consult with DEP Marine Branch prior to works approval. This requirement has also been recommended as condition 9-3 (Appendix 4).

The load of nitrogen from this proposal going to the marine environment through the Water Corporation's outfall is the largest proposed for proposals so far assessed. The EPA notes the view of the Water Corporation about the quantity of nitrogen that King Bay could accept, The EPA notes the proponent's further commitment to investigate alternatives to reduce nutrient discharge in the design phase of the project and the view of the EPASU that it needs to be carefully managed. The commitment together with the recommended condition to show waste minimisation and best practicable technology for nutrient reduction should meet the EPA's environmental objective.

Stormwater

The EPA notes the proponent's commitment to managing stormwater runoff so it will not result in water quality degradation off site and to locating the stormwater ponds in already disturbed areas which avoid the *AbImTe/TeRm* vegetation community.

Summary

Having particular regard to the:

(a) meeting of ANZECC 99% species protection trigger levels for toxicants in marine waters at the plant boundary, except for ammonia and for metals where the concentration in the intake water already exceeds the criteria for which the ANZECC 99% species protection trigger levels will be met at the edge of the mixing zone;

(b) commitment and conditions requiring the further investigation and minimisation of nitrogen (and ammonia) in the discharge water;

(c) further characterisation and studies required on the discharge water;

(d) proponent's other commitments; and

(e) EPA's recommended conditions;

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

3.6 Noise

Description

An updated noise assessment for the proposal was undertaken, taking into consideration the potential effects of the larger capacity plant now proposed and the revised location.

The modelling showed that the predicted maximum noise level at Dampier was 33dB(A). Noise levels for Karratha were not predicted but should be lower, given the increased distance to Karratha. It is predicted that noise from the conveyor should not increase modelled noise levels at Dampier. Noise from shiploading is also predicted not to be significant at Dampier.

However the modelling carried out showed that the boundary noise level requirement of 65dB(A) as stipulated by the *Environmental Protection (Noise) Regulations, 1997* would not be met under all meteorological conditions using the design assumptions known at the time. The proponent has committed to meeting the requirement not to exceed the 65db(A) limit. The following achievable noise reduction measures are proposed:

- site layout optimisation
- lagging pipeline;
- acoustic enclosures; and,
- silencers.

The proponent has also committed to further investigate reasonable and practicable noise reduction measures during the detailed engineering design phase when more definitive plant noise power levels are available to ensure noise is minimised, utilising the advice of an acoustic engineer.

The maximum noise level predicted by the modelling at Hearson Cove was 49 dB(A). Under the condition that noise requirements at the site boundary are met, the noise level at Hearson Cove is predicted to be 40 -44dB(A).

Submissions

DEP expressed concern at predicted noise levels, especially at Hearson Cove. Although there is no assigned level for a recreational area, the predicted level was high, especially compared to neighbouring industry predictions. DEP sought a commitment to the implementation of noise reduction measures

Assessment

The area considered for assessment of this factor is the neighbouring industries, Hearson Cove and residential areas of Dampier and Karratha.

The EPA's environmental objective for this factor is to ensure that noise impacts emanating from the proposed plant comply with statutory requirements specified in the Environmental Protection (Noise) Regulations 1997 and to minimise the impact on the amenity of Hearson Cove as far as practicable.

The EPA notes the proponent's commitment to comply with the 65dB(A) sound level requirement at the boundary of the site and to further investigate practicable noise reduction measures during the detailed engineering design to minimise noise, utilising the advice of a mutually acceptable, independent acoustic engineer. The maximum predicted noise levels under this condition will not exceed the regulatory limit at any residential area and will give a maximum 40-44 dB(A) level at Hearson Cove.

The Office of Major Projects (OMP) undertook a Noise study and workshop (SKM 2002) to determine at what level of noise the local community would consider the amenity of Hearson Cove to be affected. The study found that for combined industries complying with the regulatory requirement of 65d(B)A at their boundary and not allowing for adjustments for annoying characteristics such as tonality, resultant noise level is predicted to range from 46dB(A) at the southern end of the beach to 52dB(A) at the northern end. It also predicted that the maximum 48dB(A) noise level at the northern sun shelter under certain meteorological conditions, would be representative of worst case in the high usage area. Noise levels at the water's edge would be 2-5dB(A) lower due to the slope of the beach. At 48dB(A) the worst case noise level would be below the New South Wales acceptable amenity criterion of 50dB(A) but above the EPA's aspirational criterion of 45dB(A) (see Section 5 of this report).

The survey results indicated that at 40dB(A) 85% of people would believe that the amenity of the beach is just starting to be affected. OMP further recommended that individual industries should implement all practicable measures to minimise noise emissions so as to minimise the impact on public amenity at Hearson Cove Beach. The predicted 40-44dB(A) at the Cove from this proposal will add to the cumulative noise level from other industries, therefore the EPA considers that the proponent should show that all practicable noise reduction measures have been implemented for the proposal. To this end a condition is recommended that the proponent employ a

mutually agreed independent acoustical engineer approved by the EPA and for that engineer to review the design of the plant and their Noise Management Plan to demonstrate that the design and plan incorporate best practicable and reasonable measures to minimise noise at Hearson Cove.

Summary

Having particular regard to the:

(a) proponent's commitments;

(b) the acceptable noise levels predicted at residential areas;

(c) EPA's recommended condition (condition 10, Appendix 4);

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

3.7 Risk

Description

Individual Fatality Risk

The EPA considers individual fatality risk as it relates to off-site impacts to people. The ammonia-urea plant will be classified as a Major Hazards Facility by the Department of Mineral and Petroleum Resources (MPR).

As a result of the changes in capacity and siting of the plant, the preliminary risk assessment (PRA) undertaken in the CER has been revised and the revised study is contained in the CER Supplement (Qest 2002). A further revision of risk contours was undertaken (Qest Ammonia Tank Relocation Addendum July, 2002) as a result of the ammonia storage relocation and unbunding of the tank to reduce vegetation impacts on the site(Figure 11).

The scope of the PRA is hazard identification, hazard and risk assessment and evaluation and selection of hazard and risk control measures. The hazards considered in the PRA are those associated with the operation of the Dampier Nitrogen plant that have the potential to extend beyond the boundaries of the plant.

Hazards are generated in the following areas:

- Chemical usage, generation, storage and transport, particularly ammonia, methane and hydrogen;
- operating conditions, particularly in the synthesis reactor, secondary reformer and with liquid ammonia;
- pressure system components, such as furnaces and compressors; and
- product export in transport, ship loading facilities and shipping.

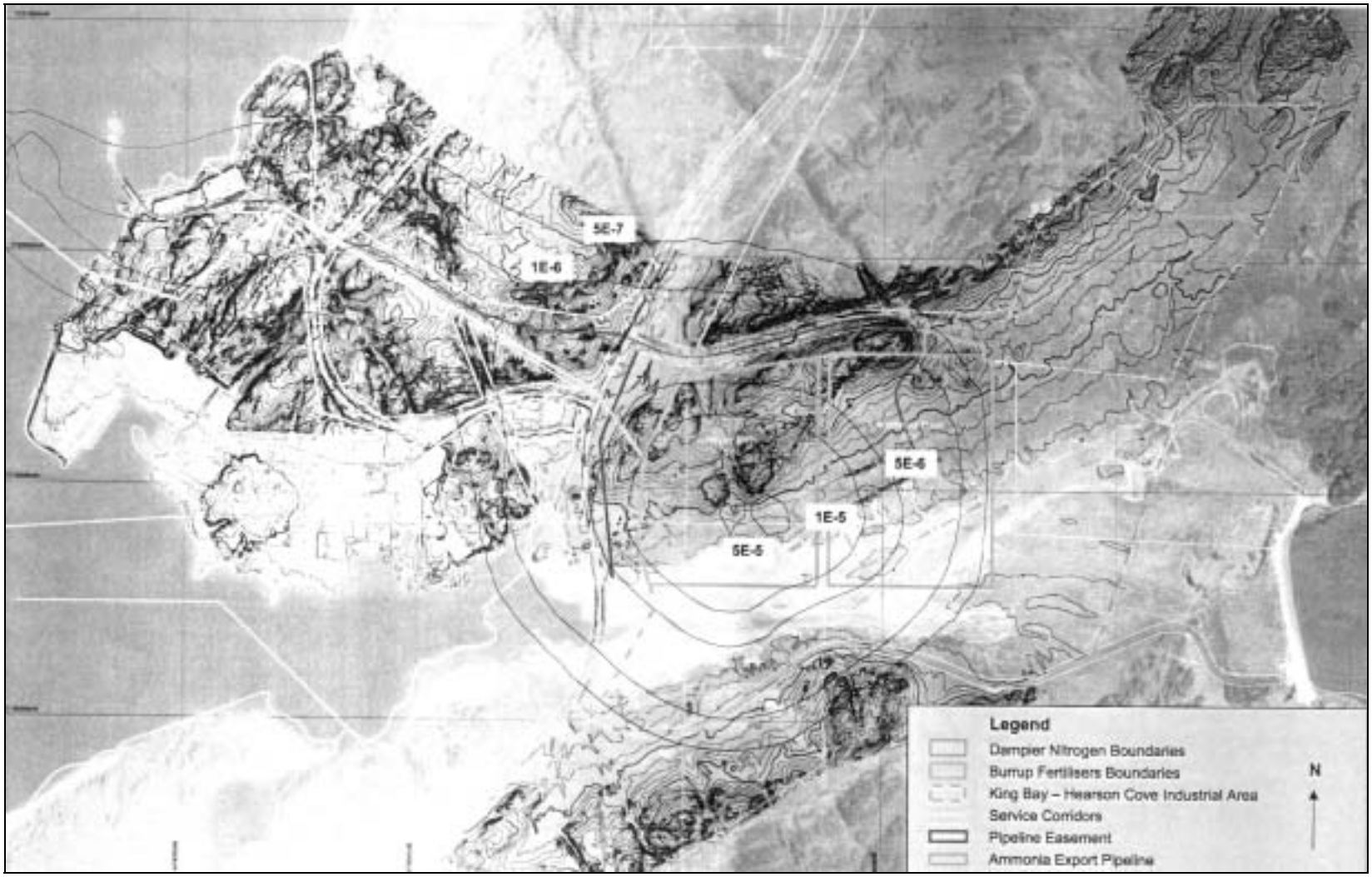

Figure 11: Individual fatality risk contours for the ammonia-urea plant

The identified hazards that have the potential to impact off-site are:

Table 9: Potential Hazardous Events Examined in Risk Analysis

Location	Event	Release
Natural Gas Feed	Major leak or rupture	Natural Gas
Ammonia Plant	Major leak or rupture	Natural Gas/SynGas Ammonia (l)
Urea Plant	Major leak or rupture – urea reactor system	Ammonia (l)
Refrigerated Ammonia Storage Tank	Major leak	Ammonia (l)
Ammonia Export Pump	Major release from pump while operating	Ammonia (l)
Ammonia Pipeline – Plant to Wharf	Major leak or rupture in pipeline	Ammonia (l)
Ammonia Marine Loading Arm	Major leak or rupture	Ammonia (l)
Shipping Channel	- Ship to ship collision - Grounding - Collision with fixed structure - Fire/explosion onboard - Tank material failure	Ammonia (l)

The PRA concluded that the individual fatality risk met the EPA criteria (EPA 2000a).

The PRA also considered societal risk ie. a measure of the risk to a defined number of persons, and concluded that the societal risk from this plant lies within the tolerable section of societal risk criteria for new plants, previously applied in Western Australia (Figure 3.3, CER Supplement 2002).

Pipeline management

When the export pipeline is not in use it will be emptied of liquid ammonia until only atmospheric vapours remain. Therefore for approximately 95% of the time, the pipeline will be a minimal risk as vapour ammonia has a smaller consequence distance than liquid ammonia.

Pipeline safety features as required by regulations and MPR will be included in the design. Actual design and operations risk reduction and response procedures will be determined during detailed design stage and development of plant operating procedures.

Traffic risk

Traffic risk will be generated during the construction of the plant due to construction traffic and during operation due to increased truck movements. In relation to construction traffic the proponent has said that detailed planning for road moves will be contained in the project logistics plan. The largest module to be delivered to site will be in the order of 51 m and 450 t, with the next biggest module about half of that size. Planning for road moves will be cognizant of causing minimal disruption.

The potential risks of trucking urea formaldehyde (UFC-85) from Dardanup to the plant site were also evaluated by Qest. Upon reviewing the MSDS for UFC-85, it was confirmed that it is not classified as a dangerous good according to the Australian Dangerous Goods Code (ADGC). Therefore any spillage during the transport (trucking) of UFC-85 was considered to be a low risk event in the PRA and did not warrant further assessment.

Submissions

MPR examined the PRA and issues raised by MPR were addressed by the proponent.

EPA Service Unit required pipeline management risk issues to be addressed in the EMP.

The Shire of Roebourne expressed concern about timing of construction, especially delivery of modules and potential impact upon road users and infrastructure.

Assessment

The area considered for assessment of this factor is areas surrounding the plant site including the pipeline corridor and port area.

The EPA's environmental objective for this factor is to ensure that risk is managed to meet the EPA's criteria for off-site individual fatality risk (Interim Guidance Statement No.2), that ALARP is demonstrated, and the MPR/EPA requirements in respect of public safety are met. The EPA's objective for road safety is to ensure that road traffic is managed to meet an adequate standard of service and safety and Department of Planning and Infrastructure requirements.

The proponent will be required to develop a Safety Report in accordance with the National Standard for Control of Major Hazard Facilities.

The EPA notes that the PRA undertaken for the proposal shows that the EPA's criteria for individual risk are predicted to be met.

The EPA notes that the predicted individual fatality risk at Hearson's Cove is well below 1 in a million. However, presently there is only one two-wheel drive access road to the Cove and in the event of an emergency this would require people at the Cove to pass through the industrial area to exit the vicinity. This should be considered in the planning of roads and in emergency response planning.

The EPA notes the proponent's commitments to:

- Undertake a Quantitative Risk Assessment (QRA) and final HAZOP study during detailed design.
- Contribute to the development of a Burrup Industrial Integrated Emergency Response Plan (BIIERP) with other industries within the King Bay-Hearson Cove Industrial Estate.

The EPA notes that the ammonia storage tank is a double walled tank and that risk of both skins failing is low. Therefore risk of a major ammonia release is low. Small leaks of refrigerated ammonia are likely to evaporate at atmospheric temperature leaving small amounts of residue. Nevertheless in unbunding the tank the proponent needs to ensure that there is an adequate system for collection of spills and leakage from pipework and stormwater from hardstand surrounding the tank to the contaminated pond.

Summary

Having particular regard to the:

(a) fact that the EPA's criteria are met;

(b) proponent's commitments; and

(c) requirements under the National Standard for Control of Major Hazard Facilities,

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

3.8 Aboriginal Heritage

Description

An archaeological investigation of the plant site has been undertaken. The investigation included review of previous work in the area and the Department of Indigenous Affairs (DIA) files and a field inspection. The field survey revealed three sites located in the plant impact area which may be disturbed and one site located in the port corridor area that may be disturbed. The three plant sites consist of a hunting hide and two sparse midden scatters and the corridor site is a hunting hide. All of these sites are considered to be of low archaeological value. Clearance under the *Aboriginal Heritage Act* to disturb the sites will be sought.

One Aboriginal claimant group for the area, the Yaburara/Mardudhunera, have undertaken heritage surveys of the site and not objected to the disturbance of the sites. The other two groups have been requested to undertake heritage surveys but have not as yet done so.

No recorded ethnographical sites have been identified and Yaburara/Mardudhunera have not identified any sites of ethnographical significance.

Submissions

The DEP (Karratha) expressed concern over cumulative loss of Aboriginal sites on the Burrup Peninsula.

Assessment

The area considered for assessment of this factor is the Dampier Nitrogen site at the corner of Burrup and Village Roads and the urea storage shed site on Dampier Port Authority land.

The EPA's environmental objective for this factor is to ensure that the proposal complies with the requirements of the *Aboriginal Heritage Act* 1972 and to ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.

The EPA notes that no heritage sites of high value are likely to be impacted by the proposal and that the one Aboriginal group which has undertaken surveys so far, has not objected to the disturbance of those sites identified.

The EPA notes no ethnographic sites have been identified.

The proponent has committed to completing the surveys with other claimant groups and to preparing and implementing an Indigenous Heritage Management Plan addressing details of ongoing management to minimise disturbance to areas of cultural significance and promote employee awareness.

The Option 1 urea shed site has been considered previously by the EPA and approved for clearing. The new position of the urea shed on the Option 2 site has been surveyed for archaeological sites by Western Stevedores and one site in this area has been identified. Further consultation with claimant groups will be required regarding this Option and the siting of the shed.

Summary

Having particular regard to the:

(a) results of the surveys so far completed; and

(b) proponents commitments

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

3.9 Amenity

Description

Besides noise impacts to Hearson Cove, the amenity of the Cove will also be impacted visually and through light overspill. The amenity of the Burrup as a tourist attraction will also be affected by the visual aspect of the plant and light from the plant at night.

The Supplement to the CER provides anticipated views of the plant from various points (CER Supp, Figures 3.22 –3.25). To a certain extent visual impact is unavoidable, consistent with the area's development to an industrial estate. The plant will be entirely visible from Burrup Road. From the lower points of Hearson Cove only the stacks will be visible.

To a certain extent light overspill and sky glow are also unavoidable. However, the plant site is 1km east of King Bay and 2.5km from Hearson Cove and the distance will mitigate the light impacts. Sky glow is likely to be seen and any flaring at night will be visible.

The proponent has made the following commitments with respect to visual amenity and light overspill:

- Adopt appropriate paint colour schemes (colour-matching) for the plant infrastructure and urea conveyor system so as to blend into surrounding terrain subject to process requirements. Preserve elevated rocky terrain which will maintain a natural backdrop and minimise visual intrusion on the skyline.

- Maintain an excellent standard of general housekeeping of the plant and associated infrastructure over the life of the Project.

- Light overspill will be kept to a minimum, using AS 4282 as a guide, consistent with site safety and security requirements.

- Light sources will be oriented to minimise overspill, whilst providing the required degree of illumination within the plant boundary. Overspill reduction measures such as directional beams and shrouding of the sides and rears of light sources will be employed where practicable.

Submissions

Pilbara Development Commission was concerned for protection of recreation amenity at Hearson Cove, noting that the local community is confident that any impacts upon Hearson Cove from Dampier Nitrogen will be kept to a minimum by virtue of commitments, although long-term it is preferred that an alternative beach be provided by State government.

Dampier Archipelago Preservation Association was concerned with cumulative impacts but satisfied that these have been addressed by Dampier Nitrogen and do not anticipate any significant reduction in the amenity value of Hearson Cove.

EPA Service Unit sought information on light impacts of the flare on Hearson Cove at night.

Assessment

The area considered for assessment of this factor is Hearson Cove and the general area surrounding the plant.

The EPA's environmental objective for this factor is that visual amenity of the plant and facilities from adjacent public areas should not be unduly adverse and the recreational uses of the Hearson Cove area, as developed by local authority and planning agencies, should not be compromised.

Visual amenity and light overspill were considered in a study of the impacts of proposed industrial development in the King Bay-Hearson Cove Industrial Estate carried out by OMP. Three options for reducing impact were considered: a) colour choice for buildings, b) vegetation screening and c) bunds. These options may have limitations as in the case of vegetation screening the natural vegetation is not of a suitable height and importation of species is not recommended. In the case of bunds, it may be important to ensure that they do not have unacceptable environmental effects. The proponent has already committed to appropriate colour schemes.

Provision of adequate lighting for night-time operation is mandatory and therefore some overspill and sky glow is expected. However, proponents are expected to minimise impacts as far as possible, which has been committed to by this proponent.

Summary

Having particular regard to the:

(a) proponent's commitments;

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

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage 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.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The proponent's commitments as set in the Supplement to the 1998 CER and subsequently modified, as shown in Appendix 4, should be made enforceable.

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Dampier Nitrogen Pty Ltd to construct and operate an ammonia-urea plant on the Burrup Peninsula, is approved for implementation.

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

(b) that the proponent be required to fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(c) that the proponent be required to fulfil the condition relating to gaseous emissions in order to minimise and identify any impacts from these emissions;

(d) that the proponent be required to fulfil the condition relating to wastewater discharge in order to characterise, minimise and predict any impacts from these emissions;

(e) that the proponent be required to fulfil the condition relating to noise emissions in order to minimise any impacts from these emissions; and

(f) that the proponent be required to fulfil the condition relating to the siting of the urea shed in order to minimise impacts on vegetation in the region.

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

- Major Hazard Facility (MPR)
- Works approval (DEP)
- Licensing (DEP)
- Aboriginal Heritage Act (DIA)

5. Other Advice

While the Woodside LNG facility is still the only major industrial plant on the Burrup Peninsula, there has been considerable activity in the last two years on the assessment of proposals for the area and the following new projects are proposed for the Burrup:
Methanol Plant – GTL Pty Ltd
Export Ammonia Plant – Burrup Fertilizers Pty Ltd
Dimethyl Ether Project – Japan DME
Ammonia Urea Plant - Dampier Nitrogen Pty Ltd
Methanol Complex – Methanex Australia Pty Ltd
Pilbara Ammonium Nitrate Project
Gas to Synthetic Hydrocarbons Plant – Syntroleum Ltd
Extension to Nickol Bay Quarry
Multi-user Seawater Supply System and Wastewater Outfall - Water Corporation
Dampier Public Wharf Expansion.

The above group of projects represents a significant planned addition to the level of industrial development on the Burrup. When combined with the existing and planned expansions to Woodside LNG this group of projects would take up much of the available land zoned for industry on the Burrup.

The EPA recognizes the attractions of the Burrup Peninsula to industrial development focused around the supply of natural gas. However, the EPA encourages Government to commit to a long term plan for the establishment of infrastructure so as to have available the Maitland Industrial Estate for future development projects.

The Burrup is a special place, and on-going planning is required to ensure the orderly use of the areas available for industry, taking into account the community's increasing understanding of the environmental and social values of the Burrup Peninsula.

Clearly the level of potential cumulative impacts on the Burrup would increase significantly if all these projects are built. A discussion of the range of issues raised follows. This discussion applies to the Burrup as a whole and not all items necessarily apply to every industry.

Vegetation

The combined effect of industrial development on the vegetation of King Bay – Hearson Cove area is very high, due to the high incidence of bare areas (rock, mudflat or pre-disturbed) in the area. That is, there is limited vegetated area, much of which will be impacted. The combined area of vegetation is also significant compared to the amount of vegetated area in the Conservation area. Further work is need on cumulative effects and what action may be taken to ensure the survival of a representative proportion of vegetation communities. Although some individual assessments have been completed, most proposals have plans for future expansion of the plant site.

Most vegetation is limited in extent because of the large number of vegetation types forming the mosaic on the peninsula. At present what seems the most significant vegetation is less impacted by avoiding rockpiles. However, the cumulative impacts of industry on vegetation of midslope soils is an issue.

More survey work is required on the samphire vegetation communities of the salt flats as this vegetation has not been adequately surveyed.

Fauna

Various studies have identified the need for further snail surveys for cumulative impacts and for co-ordinated action to protect the Olive python and feeding areas for this species. These matters need to be addressed in a co-operative manner by industries on the Burrup with advice from CALM.

Marine

The limited background data on seawater quality around the Burrup is currently an issue. A program to acquire this data should be instigated to assist in the assessment of proposals and the setting of appropriate conditions on works approvals issued for developments on the Burrup.

Work is also urgently required to develop a better understanding of what constitutes an environmentally safe load of nutrients to Mermaid Sound and Nickol Bay. That understanding presently does not exist. A similar review of cumulative phosphorus inputs should be carried out for Mermaid Sound and Nickol Bay.

Due to lack of information about nitrogen impact on corals it is recommended that the Water Corporation be requested to include a coral monitoring program in their management program, with agreed indicators and management response by the participating industries if these indicators are exceeded. The Water Corporation could require management action from the companies, if the coral impact indicators were exceeded.

Air Quality

Air emissions from individual projects and as cumulative impacts have been assessed, using available NEPM limits. These limits were largely developed for the protection of human health. Effects on other organisms or natural processes can occur at lower concentrations of pollutants but no data on these effects are known for the range of native plants, animals and heritage items, such as rock art, that exist on the Burrup.

Air emission studies generally concentrate on the so called "criteria pollutants" including NOx, SOx and particulates. In some circumstances, other pollutants such as VOCs, PAHs and heavy metals may require consideration.

Photochemical smog and ozone may be of concern as the number of industries increases. While acid rain is a more familiar concern in other places, dry deposition is the more likely mechanism of pollutant deposition most of the time on the Burrup. Ammonia and urea may have deleterious effects on native plant growth and ecosystem composition in a naturally nutrient poor environment.

Some systems that may plausibly be affected by air emissions are plants, fresh water rock pools, land snail species know to have very limited distributions and petroglyphs (rock art).

The EPA notes that OMP, on behalf of the WA Government, has recently commenced a four year study to establish a baseline for petroglyphs condition and investigate potential threats to them from air emissions on the Burrup. In addition to this, the EPA considers there is a need for government/industry to develop and implement a management plan to monitor, evaluate and manage impacts on other conservation values, including vegetation, fauna and ephemeral pools. The EPA considers there is a need to:

- determine the deposition rates of acidic gases and nutrients (especially nitrogen) from proposed and existing industry on the Burrup; and
- establish criteria that would be protective of the Burrup vegetation, fauna, ephemeral pools and rock art.

The EPA understands that additional information would be required to achieve the above including more accurate dispersion and deposition modelling for the Burrup and appropriate monitoring of the health and growth of vegetation and fauna.

As more developments are placed on the Burrup, cumulative impacts and co-ordinated management will need to be carefully considered. As little is known about specific impacts in this environment, research, monitoring and management of cumulative impacts is essential. This applies particularly to the issue of ensuring that all the available air-shed capacity is not taken up by one or two industries. In this regard, the EPA encourages new and existing industry on the Burrup to minimise all emissions to the environment by utilising best practice management and best practicable technology/measures.

Noise and other Amenity Issues at Hearson Cove

Hearson Cove is the only local swimming beach with two wheel drive access. Potential noise, odour, aesthetic and light overspill impacts therefore require careful control.

All industries are required to meet the *Environmental Protection (Noise) Regulations 1997* which stipulate a 65dBA limit at the plant boundary. They are also required to take all reasonable and practicable measures to further reduce impacts. Cumulative modelling using current design parameters for the proposals currently mooted for the Burrup indicates a noise level of about 48dBA could occur at the northern beach shelter on Hearson Cove. The principle of "all reasonable and practicable measures" under the *Environmental Protection Act 1986* requires proponents to get impacts down as low as reasonably practicable within the definition in the Act. A cumulative level of 45dBA at the beach is recommended by the EPA as an aspirational goal to help maintain the amenity at Hearson Cove. While this aspirational goal is not mandatory, it provides some guidance on a target for all proponents to strive to achieve.

With regard to the whole range of amenity issues listed above, industry and government should be encouraged to work with the community to increase mutual understanding and acceptance of what are desirable and tolerable levels of amenity. Such an approach has commenced with work commissioned by the Office of Major Projects to define what some members of the community regard as acceptable noise levels.

Control of potential impacts at source is obviously an important and usual means of managing effects on Hearson Cove. It would also be possible to significantly improve the control of noise, visual and light overspill effects by providing screening at the beach. It is understood that a dune existed at the back of the beach prior to its removal for construction sand some years ago. It would be possible to replicate this feature, perhaps by using sand recovered from regular dredging operations off the west side of the Burrup, and then vegetating it with hardy local plants. A properly designed, located and landscaped sand bund would materially improve the control of noise, light and visual impacts on the beach. The EPA considers that the potential impacts on visual amenity would be best addressed jointly by local industry through the development of a Landscape Management Plan for Hearson Cove. The plan should incorporate community consultation on a range of approaches to minimise visibility of the industrial plants, including light spill at night.

An additional approach would be to provided two wheel drive access to another beach. The site most often mentioned is Conzinc Bay, on the northwestern side of the Burrup. Conzinc Bay is an attractive, sandy beach with much to recommend it as a recreation site, although it is not entirely screened from existing industry.

Careful consideration would, however, need to be given to opening up this site because a readily accessible road there could significantly increase recreational pressure on a greater proportion of the northern end of the Burrup, which is difficult to access at present. It is understood that there are petroglyphs and other conservation features on the northern half of the Burrup which could come under increased pressure from increased visitation. If access to Conzinc Bay were to be improved, then it should be done on the basis of careful expert planning and with concomitant attention to an appropriate plan to manage the range of impacts that could be expected on a wider area of the northern Burrup.

Risk Management

There is a need for accurate cumulative risk contours for the Hearson Cove Industrial Area. Government should be encouraged to perform a cumulative risk analysis when detailed engineering designs are available for the existing and currently proposed industries for the Burrup.

At present there is no policy position on the acceptable risk levels that apply to a conservation and recreation zone such as that proposed for much of the Burrup. During the environmental impact assessment of projects to date, and interim risk level of 1 x 10-5 has been used as being acceptable for the non-industrial areas. There is a need to clarify the tenure and zoning of the balance of the non-industrial land on the Burrup to give certainty to the issue of safety management. Also, users of Hearson Cove traverse the area zoned for industry as they cross the Burrup. Attention needs to be given to an alternative egress route from Hearson Cove beach in the event of an emergency on the industrial land.

There is also a need to manage the cumulative risk associated with the multi-user service corridors, during the construction of individual pipelines, as well as during the operation of those pipelines. There is likely to be a number of pipelines carrying different substances including hazardous materials, and plans need to be in place to ensure events or knock-on effects which can lead to a release of hazardous materials are managed within acceptable limits.

An integrated emergency response management plan will also be required for the Burrup industrial area, as is the case now at Kwinana. The proposed Burrup Industrial Council may be the appropriate vehicle for such a plan. In this regard, attention also needs to be given to alternative egress arrangements from Hearson Cove in the event of an emergency. At present there is only one ingress and egress route to the beach and it is likely that the existing route will be paralleled, at least in part, by pipelines carrying hazardous materials like natural gas, methanol, synthetic diesel, ammonia etc.

Drainage and Flooding

Much of the land zoned for industry between King Bay and Hearson Cove is essentially a flood plain continuing inland from King Bay. Under storm surge conditions it is possible that much of the area would be flooded. New industrial plants will need to be built on fill to protect them from such flooding. Filling of the floodplain will reduce its natural capacity to store and handle flood waters which may lead to erosion and redirection of flood waters in ways which could have undesirable environmental impacts.

Attention needs to be given to a cumulative impact study of flood plain alteration and to the source and impacts of supplying fill material, which is in short supply on the Burrup. If dredge spoil is to be used as fill the impacts of salt draining from the fill on the terrestrial environment will need to be taken into account.

6. Conclusions

The EPA has considered the proposal by Dampier Nitrogen to construct and operate an ammonia-urea plant of nominal capacity of 2300tpd of ammonia and 3500tpd of urea, on the Burrup Peninsula including a storage site for urea at Dampier Port, export of ammonia and urea from the Port and associated infrastructure and utilities.

The EPA believes the proposal can be implemented and managed to meet its environmental objectives and that there are no "fatal flaws" associated with the proposal.

However, the EPA notes that as the proposal has not reached the final design stage yet, some information relating to the selection of plant is not available. The EPA expects the proponent to provide further information specified in commitments and conditions prior to the granting of a works approval, or as required.

The EPA further notes that a wet season flora survey, some aspects of the fauna survey and some ethnographical surveys are still to be completed and these should be done prior to works approval application. However, the EPA recognizes that the ability to undertake a wet season flora survey depends on there being adequate rainfall, thus such a survey may not be possible prior to construction.

Infrastructure corridors and the supply and return of seawater have not been considered in this proposal and are the responsibility of other proponents.

The EPA also understands that it is the proponent's intention to propose further changes to the proposal in terms of laydown areas, the location of the ammonia storage tank on site, expansion of the urea storage shed at the port and a possible duplication of the plant. These aspects of the proposal have not been considered by the EPA and the EPA will consider the need for an appropriate level of assessment when and if these proposals are made. This Bulletin relates only to the proposal as described in Schedule 1.

The EPA has concluded that the proposal is capable of being managed in an environmentally acceptable manner such that it is most unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Section 4, including the proponent's commitments.

7. Recommendations

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

1. That the Minister notes that the proposal being assessed is to construct and operate an ammonia-urea plant of nominal capacity of 2300tpd of ammonia and 3500tpd of urea, on the Burrup Peninsula, including a storage site for urea at Dampier Port, export of ammonia and urea from the Port and associated infrastructure and utilities.
2. That the Minister considers the report on the relevant environmental factors 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.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.
5. That the Minister notes the EPA's other advice on management of cumulative impacts from industrial development on the Burrup Peninsula.

Appendix 1

List of submitters

Stakeholders consulted by the proponent during preparation of the Supplement to the CER.

Organisations:

Aboriginal Claimant Groups, namely Ngarluna Injibarrndi, Wong-goo-tt-oo and Yaburara Madudhuners people
Australian Greenhouse Office
Coastcare
Dampier Archipelago Preservation Association
Dampier Port Authority
Dampier Salt
Department of Conservation and Land Management (Karratha)
Department of Environmental Protection (Perth and Karratha)
Department of Indigenous Affairs
Department of Mineral and Petroleum Resources
Department for Planning and Infrastructure
Environment Australia
Friends of the Burrup
Karratha Chamber of Industry and Commerce
Nickol Bay Naturalist Club
North West Shelf Gas Pty Ltd
Pilbara Development Commission
Robin Chapple MLC
Shire of Roebourne
Water and Rivers Commission (Karratha)
Water Corporation
Western Power
Western Stevedores Pty Ltd
Woodside Energy Ltd

Submitters on the 1998 CER

CSBP
Gorgon Development
Woodside Energy Ltd
Friends of the Burrup
Shire of Roebourne
Water and Rivers Commission
Department of Minerals and Energy
Aboriginal Affairs Department
Department of Conservation and Land Management
Department of Resource Development

Individual
Julie Ann McParland

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Appendix 3

Summary of identification of relevant environmental factors

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Flora/Vegetation communities	Clearing of approx 30 ha of site for plant infrastructure (new plant location) Clearing for urea storage shed??	▪ CALM expressed concern that some vegetation units that will be impacted by the proposed development may be classified as Threatened Ecological Communities as a result of the recent Trudgeon report. ▪ CALM advises that they cannot give definitive advice on the significance of projected impacts upon vegetation until they have had time to consider the Trudgeon and Welker reports. ▪ EPA Service Unit expressed concern that the cumulative impacts of industry on vegetation of midslope soils is an issue. Most vegetation is limited in extent because of the large number of vegetation types forming the mosaic on the peninsula. At present what seems the most significant vegetation is less impacted by avoiding rockpiles. However, the general difference of the vegetation of the Burrup from the adjacent hinterland, which also imparts significance, appears not to be given adequate emphasis. ▪ EPA Service Unit expressed concern that the combined effect on vegetation of King Bay – Hearson Cove industry is very high, due to the high incidence of bare areas (rock, mudflat or pre-disturbed). That is, there is limited vegetated area, much of which is impacted. The combined area is also significant compared to the amount in the Conservation area. ▪ 10 of 11 vegetation types in the proposal area are threatened by combined industry, and 2 to a major extent by the proposal alone ▪ Combined industry has yet to address the lack of local and regional context of the salt flats of Hearson Cove, and more work is needed. ▪ The proponent has to compensate for the original survey being in the dry season and concentrating on the northern part of the prospect. They still need to survey within a reasonable wet season, and a commitment to this effect is given. ▪ DEP (Karratha) Requested DN examine possibility of re-establishing vegetation communities to be disturbed at another suitable location on site.	Flora/Vegetation communities is considered to be a relevant environmental factor due to: ▪ Potential threatened ecological vegetation communities on site ▪ Cumulative impacts on vegetation communities of clearing for industry in the King Bay-Hearson Cove industrial area; ▪ Loss of priority species; ▪ Possible occurrence and loss of priority/unlisted ephemeral species of conservation significance is unknown.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Fauna	Clearing of 30 ha of plant site of vegetation resulting in loss of fauna habitat and food supply.	▪ EPA Service Unit commented that removal of habitat likely to have long term impact on fauna, particularly cumulatively with other industry. The proponent should review recent literature and relate the information to likely fauna impacts on their site and cumulative impacts from industrial developments particularly in the King Bay-Hearson Cove area as well as the Burrup Peninsula as a whole to demonstrate that there will be no significant losses to regional biodiversity. ▪ As the fauna survey has not been completed, it should be demonstrated prior to the finalization of the assessment that fauna impacts will not represent a "fatal flaw" for the development of the site. ▪ Nickol Bay Nats - Generally satisfied with environmental measures proposed by DN, especially protection of Pilbara olive python habitat through relocation of plant from rocky ridge area.	Fauna is considered to be a relevant environmental .factor due to probable occurrence of protected species (Olive Python) on site and loss of habitat for other species.
Marine ecology	Risk of introduction of marine species due to shipping movements and discharge of ballast water. Risk of spillage of urea during ship loading	▪ EA requires commitment to ballast water management to be reflected in WA conditions; ▪ EPA Service Unit asked what the environmental implications of a spill of ammonia or urea on marine life were; and ▪ If the increased risk of siting the proposed urea storage shed close to shore had been evaluated.	The marine environment is a relevant factor due to the potential for impacts from the proposal. This factor is considered with the marine impacts of wastewater discharge.
Landform, drainage and site hydrology	Cut and fill of plant site to raise level above flood height	▪ EPA Service Unit requested liaison with WRC regarding drainage	This factor while relevant can be addressed through commitments and under Works Approval conditions.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Air Emissions	Emissions to air of NO_x, SO_x, ammonia, urea particles and dust. Impacts on terrestrial vegetation, mangroves, soil quality, petroglyphs, surface water and marine environment.	▪ EPA Service Unit raised concerns regarding impact on vegetation from urea emissions and requested effective monitoring of urea deposition effects, including identification of early warning indicators and contingency measures. ▪ EA requested monitoring for secondary impacts from urea deposition. ▪ EPA Service Unit raised concerns about nutrient enrichment of soil from urea, NO_x, and ammonia emissions from this proposal and the cumulative impacts from other nitrogen sources. Potential impacts include change of community composition and conditions favouring weed growth. ▪ EPA Service Unit raised concerns about acid emission impacts on vegetation, rock pools, fauna and petroglyphs. Acid deposition in dew is a concern. ▪ EPA Service Unit and Nickol Bay Nats raised concerns about impacts of urea and ammonia on rock pools. ▪ There has been no reference to impacts of air pollutants on mangroves in 'Potential Effects on Biophysical Attributes' section ▪ EPA Service Unit stated that the environmental implications of the substantial estimates of airborne deposition of N as urea particulates and airborne gases (NOx and NH3) to Nickol Bay which may be a may be a relatively enclosed system has not been discussed in detail. It is therefore appropriate that the company should provide a cumulative assessment of nutrient inputs to Nickol Bay, and their potential environmental effects. ▪ PRCL has committed to undertake vegetation monitoring for 'secondary impacts'. The issue of establishing early warning indicators and triggers for management has not been addressed. The issue of what management commitments will be given to mitigate effects if these trigger values are exceeded has not been addressed. The proponent needs to propose the triggers and commit to management actions, should these triggers be exceeded	This is considered a relevant factor due to the potential for impact of air emissions on human health, flora, fauna, freshwater systems, soil and petroglyphs. The discharge of minor emissions should also be established to ensure there will be no impact from these. This can be managed under Part V of the *Environmental Protection Act 1986* processes.
Greenhouse gases	Production of CO_2 from plant and discharge of CO_2 to atmosphere	▪ AGO sought details on the greenhouse gas and fuel savings from "no regrets" and "beyond no regrets" measures and those measures considered but not implemented, as well as information on equipment efficiencies and other technical details ▪ AGO sought details on the greenhouse gas management plan, and how this plan will be prepared and implemented.	This factor is relevant due to the impact of the proposal in increasing Australia's greenhouse gas emissions and the impact of global warming.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Wastewater	Liquid waste discharge to the marine environment via the Water Corporation outfall	▪ Dampier Archipelago Preservation Association is particularly happy with alternative wastewater discharge measures compared to 1998 proposal. ▪ DEP (Karratha) Requested DN opt for use of 'environmentally friendly' anti-scalants, not just the cheapest. Also information on the chronic toxicity of these products to a range of locally occurring species at different trophic levels was requested (Marine). ▪ DEP (Karratha) asked if 'adverse' tidal conditions be avoided when discharging N laden wastewater? ▪ EPA Service Unit questioned the use of ammonia for conditioning and whether it is preferable over phosphates ▪ EPA Service Unit questioned the potential nutrient effect on coral communities which inhabit rocky shores near the outfall ▪ EPA Service Unit stated that the effluent quality should meet the 99 % species protection levels or twice the filtered value of unpolluted seawater (ie regional background level), whichever is the greater ▪ EPA Service Unit stated that PRCL constitutes the greatest direct, point source discharge of N to the marine environment (via the WC outfall). Based on estimates presented in the supplementary PER, the PRCL direct N input to Mermaid Sound are far in excess of the other proposed industries. PRCL should review and amend its effluent and emissions treatment processes to substantially reduce its N loads to the marine environment. ▪ EPA Service Unit suggested that a review of cumulative nitrogen and phosphorus inputs should be carried out for Mermaid Sound and Nickol Bay ▪ The Table on page 16 does nothing to suggest that the nitrogen loads to Mermaid Sound are insignificant. On a per squ km basis they are comparable to the Cairns and Tully tropical systems; on a per cub km basis they are in excess of Cairns and Tully. The Table of N inputs to Perth's coastal waters is not transferable, because it is a temperate, not a tropical marine system	This factor is considered relevant due to the potential impact of wastewater discharge on the marine environment.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Surface and groundwater quality	Discharge of plant site run-off and potential leakage/spills on plant site and from pipelines	.• EPA Service Unit noted that the proponent needs to be able to characterize more fully the quality of site runoff, and needs to commit to manage this runoff so that it will not result in water quality degradation. The stormwater management plan (and site plan) needs to be more carefully designed, with a view to minimizing stormwater contamination, promoting recycling and reuse, addressing the testing of stormwater for contaminants	This is considered a relevant factor due to potential impacts to surface and groundwater quality. Downstream ecological systems may also be impacted by change in surface water flows.
Waste	Solid waste disposal	▪ DEP (Karratha): Requested DN commit to 'reduction' of waste, not just re-use/recycling (as stated in the CER Supplement), and that there be no on-site burning of waste during construction. ▪ Asked will DN consider working in a cooperative approach with other prospective Burrup industrial developers and the Shire of Roebourne to address waste disposal issues? ▪ Asked will DN practice 'waste stewardship' to confirm that waste consigned to contractors for disposal is properly disposed of in accordance with extant regulations.	While this is a relevant factor, solid waste disposal can be addressed under licence conditions and in agreement with the Shire of Roebourne.
Noise	Emissions from plant and conveyor. Impact on amenity values of Hearson Cove and Conservation area	▪ DEP expressed concern at predicted noise levels, especially at Hearson Cove. Although there is no assigned level for recreational area, predicted level was high, especially compared to neighbouring industry predictions. ▪ DEP sought commitment to implementation of noise reduction measures	This is considered a relevant factor due to the potential for noise to impact on the recreational amenity of Hearson Cove.
Light	Overspill from plant. Impact on amenity values and marine fauna	▪ EPA Service Unit sought information on light impacts of flare at Hearson Cove at night. ▪ EPA Service Unit sought information on impact of light overspill on turtles. ▪ CALM sought commitment that light overspill would be kept to the minimum.	This is considered a relevant factor due to the potential for light overspill to impact on the recreational amenity of Hearson Cove.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Risk	Risk to public safety from plant, ammonia storage and product and raw material pipelines	▪ MPR examined PRA and issues raised by MPR were addressed by the proponent. ▪ EPA Service Unit required pipeline management risk issues to be addressed in EMP	This is considered a relevant factor due to the potential for accidents to impact on people beyond the site boundary and on the environment.
	Road safety	▪ Shire of Roebourne expressed concern about timing of construction, especially delivery of modules and potential impact upon road users and infrastructure	This factor can be addressed by the proponent in consultation with the Shire of Roebourne.
	Risk to plant from bushfires	▪ CALM sought commitment that DN would permit bushfires on site to burn without intervention, consistent with protection of life and property. Suggested that the FESA and WA Planning Commission (December 2001) bulletin *Planning for Bushfire Protection* be reviewed during detailed plant design	This factor can be addressed by the proponent in consultation with CALM and FESA and through proponent commitments.
Culture and Heritage	Loss of Aboriginal sites	▪ DEP (Karratha)Expressed concern over cumulative loss of Aboriginal sites on the Burrup Peninsula, although expressed satisfaction with Aboriginal heritage protection measures employed by DN	The EPA considers this a relevant factor.
Amenity	Visual impact (noise, light air emission impacts in respective sections)	▪ PDC concern for protection of recreation amenity of Hearson Cove, noting that local community is confident that any impacts upon Hearson Cove from DN will be kept to a minimum by virtue of DN commitments, although long-term it is preferred that an alternative beach be provided by State government. ▪ DAPA Concerned with cumulative impacts but satisfied that these have been addressed by DN and do not anticipate any significant reduction in the amenity value of Hearson Cove	The EPA considers this a relevant factor, but sees limited scope for the reduction of impact on visual amenity. Consideration should be given to colour of construction to facilitate blending into environment. This can be addressed in construction EMP and works approval.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
OTHER 1998 CER submissions			
Plant siting	Sited on the Burrup Peninsular in sensitive environment.	▪ The Consultative Environmental Review (CER) states a number of times that the proposed plant location is in an area which was designated for industrial development in the 'Burrup Land Use Plan and Management Strategy'. These areas [including Zone D] were identified for strategic industry. Can Plenty River Corporation Limited (PRCL) demonstrate the strategic importance of this facility? ▪ The points raised for not locating this project on the Maitland Estate (3rd paragraph on pg 1-7) are relevant to any major industry that is interested in setting up to access the downstream benefits of the offshore oil and gas reserves. Is it essential that this proposal be located on the Burrup?	While the choice of site is a relevant environmental factor, the site has been designated as industrial land and previously been assessed by the EPA under the Burrup Land Use Plan.
Odour	Potential for the emission of ammonia, VOC's and formaldehyde odours	▪ Odorous discharges may have a significant impact on workers at the two industrial areas located two kilometres to the west of the proposed plant, which is in the direction of one of the prevailing winds for this area.	While this is a relevant factor, odorous emissions are not predicted under normal operation. This factor may be addressed under Licence conditions.

Appendix 4

Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No.

Recommended Environmental Conditions

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

AMMONIA-UREA PLANT, BURRUP PENINSULA

Proposal: The construction and operation of an ammonia plant of 2300 tonnes per day capacity and an urea plant of 3500 tonnes per day capacity on the Burrup Peninsula, utilising Krupp-Udhe technology, as documented in schedule 1 of this statement. The plants will utilise North-West Shelf Gas for energy and as feedstock for the process. The proposal includes an on-site desalination plant.

Proponent: Dampier Nitrogen Pty Ltd

Proponent Address: Level 13, St George's Square,
225 St George's Terrace, PERTH WA 6000

Assessment Number: 1178

Report of the Environmental Protection Authority: Bulletin 1065

The proposal referred to above may be implemented subject to the following conditions and procedures:

Procedural conditions

1 Implementation and Changes

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

Published on

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is not substantial, the proponent may implement those changes upon receipt of written advice.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of the conditions in this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall provide evidence to the Minister for the Environment and Heritage within five years of the date of this statement that the proposal has been substantially commenced or the approval granted in this statement shall lapse and be void.

Note:The Minister for the Environment and Heritage will determine any dispute as to whether the proposal has been substantially commenced.

4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment and Heritage, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

- the environmental factors of the proposal have not changed significantly;
- new, significant, environmental issues have not arisen; and
- all relevant government authorities have been consulted.

Note: The Minister for the Environment and Heritage may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

Environmental conditions

5 Compliance Audit and Performance Review

5-1 The proponent shall prepare an audit program in consultation with and submit compliance reports to the Department of Environmental Protection which address:

- the implementation of the proposal as defined in schedule 1 of this statement;
- evidence of compliance with the conditions and commitments; and
- the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environmental Protection is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

Usually, the Department of Environmental Protection prepares an audit table which can be utilised by the proponent, if required, to prepare an audit program to ensure that the proposal is implemented as required. The Chief Executive Officer is responsible for the preparation of written advice to the proponent, which is signed off by either the Minister or, under an endorsed condition clearance process, a delegate within the Environmental Protection Authority or the Department of Environmental Protection that the requirements have been met.

5-2 The proponent shall submit a performance review report every five years after the start of the operations phase, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, which addresses:

- the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;
- the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;

- significant improvements gained in environmental management, including the use of external peer reviews;
- stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and
- the proposed environmental targets over the next five years, including improvements in technology and management processes.

6 Decommissioning and Closure Plans

6-1 Prior to construction, the proponent shall prepare, and subsequently implement, a Preliminary Decommissioning and Closure Plan, which provides the framework to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The Preliminary Decommissioning and Closure Plan shall address:

1) rationale for the siting and design of plant and infrastructure as relevant to environmental protection, and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;

2) a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;

3) a conceptual plan for a care and maintenance phase; and

4) management of noxious materials to avoid the creation of contaminated areas.

6-2 At least six months prior to the anticipated date of closure, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Decommissioning and Closure Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The Final Decommissioning and Closure Plan shall address:

1) removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;

2) rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); and

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

6-3 The proponent shall implement the Final Decommissioning and Closure Plan required by condition 6-2 until such time as the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, that the proponent's closure responsibilities are complete.

6-4 The proponent shall make the Final Decommissioning and Closure Plan required by condition 6-2 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

7 Greenhouse Gas Emissions

7-1 Prior to commencement of construction of the plant, the proponent shall prepare a Greenhouse Gas Emissions Management Plan to:

- ensure that "greenhouse gas" emissions from the project are adequately addressed and best available efficient technologies are used to minimise total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product; and

- mitigate "greenhouse gas" emissions in accordance with the Framework Convention on Climate Change 1992, and consistent with the National Greenhouse Strategy;

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

This Plan shall include:

1) calculation of the "greenhouse gas" emissions associated with the proposal, as indicated in "Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No. 12" published by the Environmental Protection Authority. The following are to be included as part of annual reporting on environmental performance:
    - an estimate of "greenhouse gas" emissions (broken down by species and in carbon dioxide equivalents) from the production of ammonia and urea;
    - an estimate of the downstream (ie post-production) "greenhouse gas" emissions (broken down by species and in carbon dioxide equivalents) from the ammonia and urea, noting that this is a source of emissions which the proponent does not and cannot control; and
    - an account of the methodology used in making the estimates.
2) specific measures to minimise the total net "greenhouse gas" emissions and/or the "greenhouse gas" emissions per unit of product associated with the proposal;

3) monitoring of "greenhouse gas" emissions;

4) estimation of the "greenhouse gas" efficiency of the project (per unit of product and/or other agreed performance indicators) and comparison with the efficiencies of other comparable projects producing a similar product;

5) analysis of the extent to which the proposal meets the requirements of the National Greenhouse Strategy using a combination of:

    a. "no regrets" measures;
    b. "beyond no regrets" measures;
    c. land use change or forestry offsets; and
    d. international flexibility mechanisms.

6) a target set by the proponent for the reduction of total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product over time, and annual reporting of progress made in achieving this target.

Note: In part 5 above, the following definitions apply:

1) "no regrets" measures are those that can be implemented by a proponent which are effectively cost-neutral and provide the proponent with returns in savings which offset the initial capital expenditure that may be incurred; and

2) "beyond no regrets" measures are those that can be implemented by a proponent which involve some additional cost that is not expected to be recovered.

7-2 The proponent shall implement the Greenhouse Gas Emissions Management Plan required by condition 7-1 to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

7-3 The proponent shall make the Greenhouse Gas Emissions Management Plan required by condition 7-1 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

8 Gaseous Emissions

8-1 Prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall:

1. confirm the engineering design details for the emission of gaseous pollutants, including stack heights, stack diameters, exit temperatures and exit velocities;
2. estimate the concentration of oxides of nitrogen, and other major gaseous pollutants, under normal and worst case conditions, including start-up and upset emissions;
3. demonstrate that oxides of nitrogen emissions from gas turbines will meet the Environmental Protection Authority's guideline value of 0.07 grams per cubic metre as stated in its Guidance Statement No. 15 "Emissions of Oxides of Nitrogen from Gas Turbines," May 2000; or

   if a higher NO_X concentration than the Environmental Protection Authority's guideline value for gas turbines (0.07grams per cubic metre) is proposed, provide a comprehensive report (by or audited by a mutually agreed independent expert) to demonstrate that:
   - all feasible options (process/technology improvement and NOx control measures) to minimise NOx emissions have been considered (including an evaluation of the expected reduction in emissions of NOx and efficiencies for each option); and
   - the proposed options to minimise NOx is consistent with the best practicable technology and current industry standards for similar operations with other combined cycle gas turbine systems in developed countries; and

4. remodel the oxides of nitrogen emissions to determine building wake effects,

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Note: The Environmental Protection Authority requires stack heights to be such that the downwash of emissions in the lee of buildings or other structures is minimised or preferably avoided.

8-2 Prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall provide a report to the Environmental Protection Authority:

- demonstrating that ammonia and urea emissions meet current industry standards for similar operations, or justifying why these standards cannot be met in these circumstances;
- reviewing ammonia and urea emission reduction technologies and pollution control devices, and the results achievable on application of these; and
- outlining the reasons for the final selection of an emissions control system and demonstrating that this is the best practicable system,

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

8-3. At least three months prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall design, and subsequently implement, a monitoring program to identify the impacts of ammonia and urea emissions on the surrounding areas, to include:

- Identification of preliminary warning indicators and "trigger levels" to indicate impacts of ammonia and urea on natural systems, including soil condition, rockpools, vegetation and mangal communities;
- Design and implementation of a monitoring programme to establish baseline conditions prior to commissioning of the plant; and
- Identification of practicable management or contingency measures, as it relates to the Dampier Nitrogen project, to be implemented should the "trigger levels"(dot point one above) be exceeded,

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

9 Brine and Wastewater Discharge

9-1 Prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall:

1. characterise the physico-chemical composition and flow rate of all wastewater streams within the site, including the desalination plant;

2. determine, for all non-negligible contaminants and nutrients, the total annual loads of contaminants and nutrients in the combined brine and wastewater discharge exiting the site; and
3. determine, for normal and worst case conditions, the concentrations of contaminants and nutrients (for agreed averaging periods) in the combined brine and wastewater discharge exiting the site,

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

9-2 Prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall demonstrate that the brine and wastewater discharge will meet best practicable technology and waste minimisation principles for contaminants and nutrients, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

9-3 Following completion of design, and at least three months prior to submitting a Works Approval application, the proponent shall present to the Environmental Protection Authority its preferred option for Boiler Feedwater Conditioning, together with a detailed rationale for its selection and use including environmental protection, and shall demonstrate waste minimisation and best practicable technology, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

9-4 Prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall design, and subsequently operate plant and equipment on the site such that:

1. the contaminant concentrations in the combined brine and wastewater effluent from the site, just prior to entry to the multi-user brine and wastewater discharge system, meet (in order of preference):
   - the ANZECC/ARMCANZ (2000) 99% species protection level; or
   - the ANZECC/ARMCANZ (2000) 99% species protection level at the edge of the approved mixing zone (currently 0.01 square kilometre), without any subsidy or pre-dilution from the main brine return line; or
   - other acceptable limits, if the Environmental Protection Authority determines the regional background concentration of a given contaminant in seawater to be significant;
2. mass balances and inventories of toxicants (i.e. catalysts and process chemicals) can be maintained throughout the life of the plant so that their fate can be traced; and
3. the load of nutrients causes no resultant detectable change beyond natural variation in the diversity of the species and biological communities and abundance/biomass of marine life, beyond the designated mixing zone,

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

9-5 At the timing indicated in brackets, the proponent shall conduct the following:

1) whole-of-effluent toxicological studies on a simulated effluent, including treatment chemicals, or provide acceptable alternative information such as risk assessment. These studies are to be consistent with ANZECC requirements (prior to the Works Approval application for the ammonia-urea plant); and

2) an analysis demonstrating effluent properties are substantially consistent with predictions. In the event that effluent properties are not substantially consistent with predictions, toxicological studies or provide acceptable alternative information such as risk assessment, on the actual effluent, consistent with ANZECC requirements (following commissioning and stabilizing of the plant operations),

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

10 Noise

10-1 Prior to submitting a Works Approval application for the ammonia-urea plant, the proponent shall prepare a Noise Management Plan to minimise the impacts on the amenity of Hearson Cove from noise resulting from activities associated with the proposal, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

This Plan shall include:

- an acoustical model of the plant;
- best practicable measures to minimise noise levels at Hearson Cove;
- operating procedures to be adopted for particular routine activities to minimise noise impacts on amenity at Hearson Cove;
- noise monitoring; and
- complaint management procedure.

10-2 The proponent shall implement the Noise Management Plan required by condition 10-1 to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

10-3 The proponent shall make the Noise Management Plan required by condition 10-1 publicly availability to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

10-4 Prior to construction, the proponent shall employ a mutually agreed independent acoustical engineer to

- review the design of the plant;
- review the Noise Management Plan, required by condition 10-1,

- demonstrate that the design and plan incorporate best practicable measures to minimise noise at Hearson Cove,

to the requirements of the Minister for the Environment and Heritage on advice of Environmental Protection Authority.

11 Urea Storage Shed Site

11-1 If the Option 1 site is reasonably available to the proponent for the construction of the Urea Storage Shed, the proponent shall utilize the Option 1 site in preference to the Option 2 site.

11-2 In the event that the Option 1 site is not reasonably available to the proponent, prior to utilizing the Option 2 site, the proponent shall demonstrate in report form that:

- all other feasible site options have been investigated and there is no other reasonable and practicable site available;
- every practicable effort has been made to minimise the damage to significant vegetation on the site by the design and positioning of the Storage Shed;
- measures to conserve other areas of vegetation or replace significant vegetation that will be removed have been considered and adopted as far as practicable,

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

12 Work Practices

12-1 Prior to commencement of construction, the proponent shall submit a written prescription for contractor work practices covering plant and pipeline construction and operation, to ensure that work practices are carried out at the level of international best practice, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

12-2 The proponent shall ensure that the prescription of work practices required by condition 12-1 is implemented to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority", the Chief Executive Officer of the Department of Environmental Protection will obtain that advice for the preparation of written advice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies, as required, in order to provide its advice to the Chief Executive Officer of the Department of Environmental Protection.

Notes

1 The Minister for the Environment and Heritage will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environmental Protection 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*.

3 Following final technology decisions, the proponent will be in a position to meet the requirements of conditions 8 (gaseous emissions) and 9 (brine and wastewater discharge).

Schedule 1

The Proposal (Assessment No. 1178)

The proposal is to construct and operate an ammonia-urea plant on the Burrup Peninsula, approximately 1300 kilometres north of Perth. The location of the complex is in the King Bay-Hearson Cove Industrial Area, as shown in Figure 1 (attached). The project lease has an area of approximately 67 hectares of which approximately 12 hectares will be cleared for the plant, as shown in Figure 2 (attached).

The ammonia-urea plant will comprise of an ammonia plant producing 2300 (nominal) tonnes per day of ammonia and a urea plant producing 3500 (nominal) tonnes per day of urea. Krupp-Udhe technology will be utilized. The plant also includes a seawater desalination plant; seawater treatment and storage; internal power generation and distribution; product storage facilities for ammonia (on-site) and urea (on-site and near wharf); pipelines for ammonia export and potential future urea formaldehyde import from the site to the wharf; urea formaldehyde storage on site; transfer conveyor systems, and ship load-out facilities for bulk granular urea, ship-loading facilities for load-out of anhydrous (liquid) ammonia.

All pipelines and conveyors will be situated in multi-user corridors which have not been assessed in this proposal. Seawater supply and return will be undertaken by the Water Corporation and assessment of this is not part of this proposal.

The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Summary of key proposal characteristics

Characteristic	Description
Plants on site:	Outputs:
Ammonia Plant	2,300 tpd nominal capacity, using Krupp-Uhde technology
Urea Plant	3,500 tpd nominal capacity, granulated product
Desalination Plant	2.4 ML/d from desalination of seawater
Plant Area	Approx 12 hectares
Total Area disturbed	12-15 hectares
Storage: Ammonia	40,000 tonnes capacity on plant site in double skinned refrigerated tank
Urea (port site)	160,000 tonnes capacity, fully enclosed shed. Two options for the location of the shed given, of which Option 1 is preferred.
Urea (plant site)	4,000 tonnes capacity fully enclosed surge bin
Inputs: Natural Gas	Max. 93 TJ/day from LNG Plant
Urea formaldehyde	11 000tpa approximately. To be trucked.
Sea Water for Cooling: - Process Plant	2,300-3,000 kL/h from the Water Corporation (to be drawn from Mermaid Sound) [3]
- Desalination plant	500 kL/h from the Water Corporation
Cooling Tower	to incorporate measures to reduce mist to 0.01% of flow
Power Supply	Internal generation, with some export. Supplied by two combined cycle 15MW gas turbines, steam boiler and emergency generators (to be specified)
Energy efficiency	Approximately 30GJ/t ammonia 5.5 – 6.0GJ/t urea
Materials Transport: Natural Gas Pipeline	3 km length, 200mm diameter,4.2-4.8 MPag pressure, buried
Ammonia Pipeline	2.5 km length, 400 mm diameter, above ground, insulated for refrigerated ammonia transfer. To be emptied of liquid when not in use for ammonia transfer and fitted with automatic isolation valves at each end.
Ammonia Vapour Return Line	2.5 km length, 200 mm diameter, above ground fitted with automatic isolation valves at each end.
Urea Conveyor	3.0 km length, mainly above ground. To be covered and fully enclosed over roadways and water. To be fitted with baghouses at appropriate points.
Urea Shiploading System	Travelling, conveyor-fed, cantilever arm loader with direct discharge to ship hold via chute
Shipping	Export of ammonia 7 times per year; urea 30-35 times per year.
Gaseous Emissions:	

Oxides of nitrogen (NOx) (as NO2)	717 tpa approximately To be achieved with low NOx burners on reformer, gas turbines and steam boiler.
Carbon dioxide (CO2) vented to atmosphere[1]	824,600 tpa approximately. Total CO2 generated approximately 1,710,000 tpa of which approximately 886,000 tpa used in urea manufacture.
Sulphur dioxide (SO2)	8.4 tpa approximately. All process gas to be desulphurised.
Hydrogen (H2)	750 tpa approximately, to be flared
Methane (CH4) [2]	Traces, to be flared
Ammonia (NH3)	800 tpa maximum, to be minimised as practicable during detailed engineering design
Urea Dust	300 tpa maximum, to be minimised as practicable during detailed engineering design. To include double demisters
Methanol	5 –20 tpa[3] approximately
Liquid Effluent Discharges:	
Flow:	
– Process Plant	1,700-2,200 kL/h 3 approximately
– Desalination Plant	420 kL/h approximately
– Demineralisation Unit	< 20 kL/h approximately
-.Stormwater	Uncontaminated stormwater to be diverted around plant and discharged to natural watercourses at appropriate velocity. First flush potentially contaminated stormwater to be retained on site for treatment and reuse and/or discharge to ocean outfall.
Charcteristics:	
Temperature	2 to 5 degrees above ambient temperature
Salinity	53,000 mg/L
Nitrogen	43 kg/d, with target to reduce to 20 kg/d during detailed engineering design.
Toxicants	≤ANZECC 99% species protection guidelines for marine waters, exiting the site , except for ammonia and metals that already occur at concentrations above the ANZECC trigger levels in the intake water and recognising the concentrating effect of evaporative seawater cooling. For ammonia the 99% species protection trigger level to be met at edge of toxicant mixing zone.
Noise	< 35 dB(A) at nearest noise sensitive premises ≤65 dB(A) at plant boundary estimated 40-44 dB(A) at Hearson Cove, to be minimised as practicable during detailed engineering design.
Risk	< 1 death/million/year at nearest residence < 50 deaths/million/year at plant boundary
Roads	Access roads to and on site, to be decided in consultation with relevant authorities.

Notes: 1. CO_2 'total generated' defines the total amount of CO_2 generated in the ammonia-urea plant, while CO_2 'vented from process' describes the amount of excess CO_2 to be vented to atmosphere. The remainder of the CO_2 generated is used in the manufacture of urea. Dampier Nitrogen cannot mitigate or influence the emissions from the product once sold.
2. CH_4 to be flared Earlier (1998) figure was incorrect.
3. range to be confirmed during detailed engineering.

Abbreviations:

tpd – tonnes per day
Tj – terajoules
LNG – Liquefied Natural Gas
ML/d – Megalitres per day
KL/h – Kilolitres per hour
Mpag – Megapascals (gauge)
tpa – tonnes per annum
mg/L – milligrams per litre
kg/d – kilograms per day
dB (A) – decibels 'A' weighted
ANZECC – Australia and New Zealand Environment and Conservation Council

Figures attached

Figure 1 Site location
Figure 2 Site layout
Figure 3 Storage shed site options

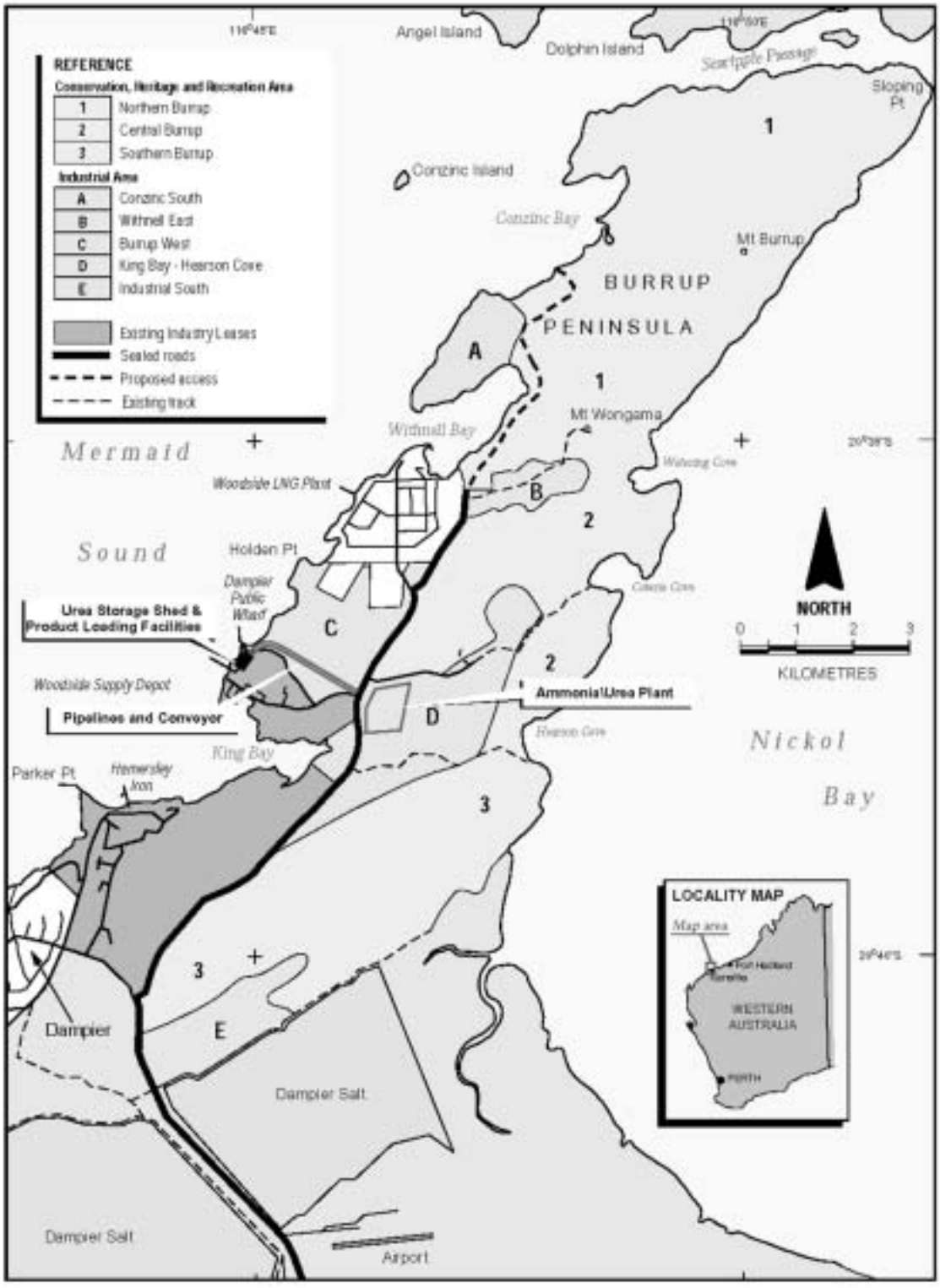

Figure 1: Site Location

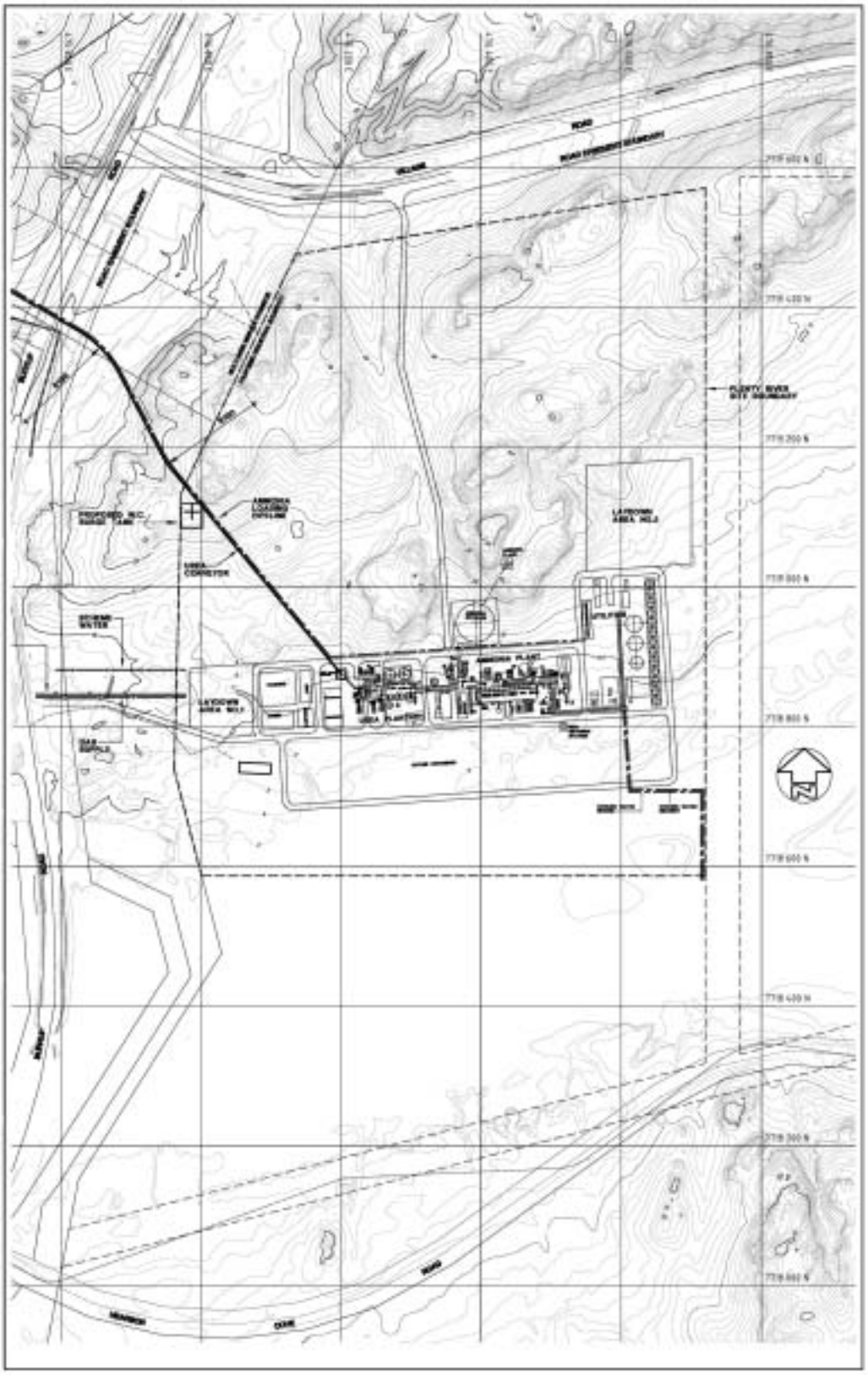

Figure 2: Site Layout

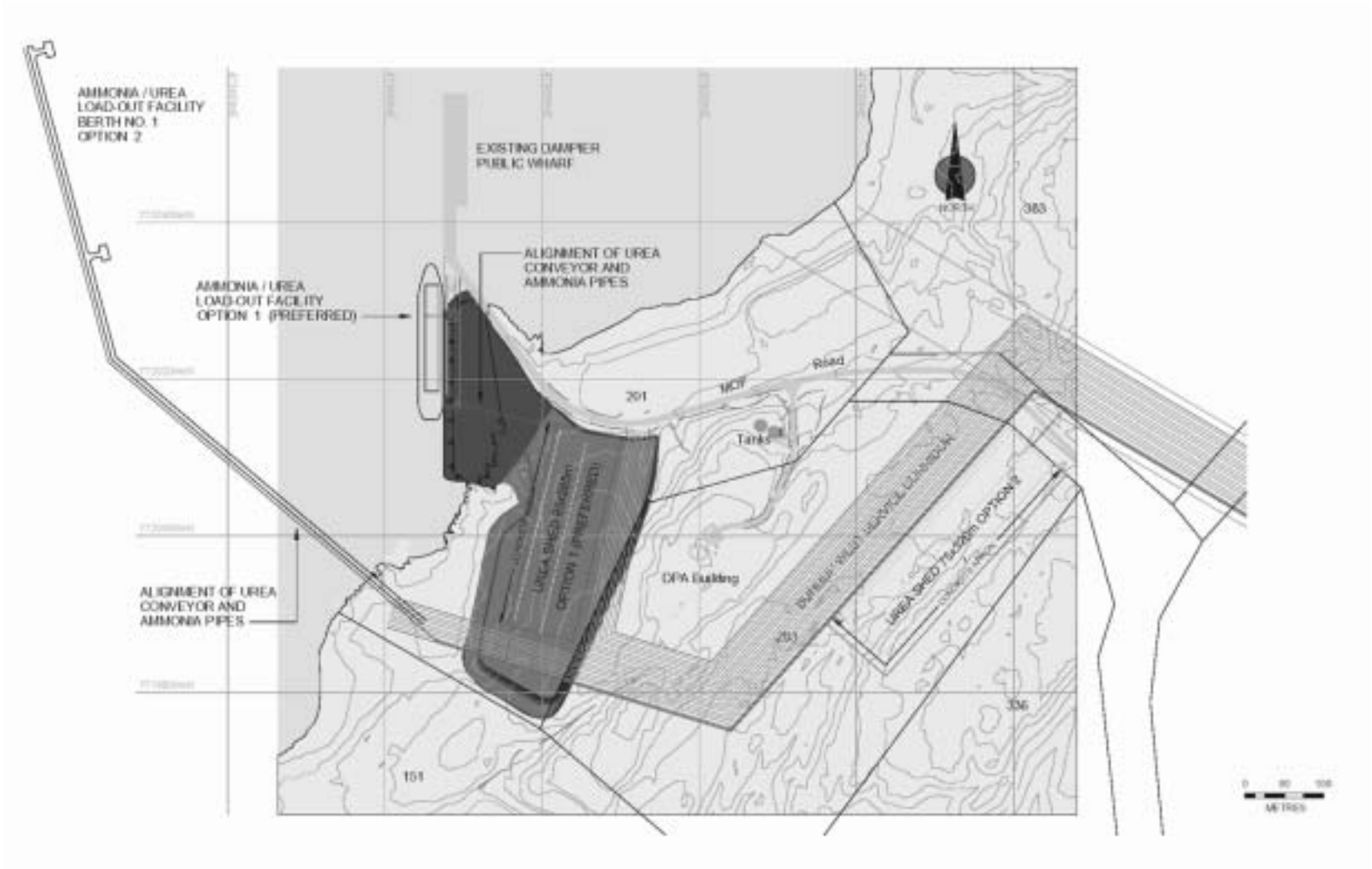

Figure 3: Storage Shed Site Options

Schedule 2

Proponent's Environmental Management Commitments

21 August 2002

AMMONIA-UREA PLANT, BURRUP PENINSULA
(Assessment No. 1178)

DAMPIER NITROGEN PTY LTD

Proponent's Consolidated Environmental Management Commitments – Ammonia/Urea Project, Burrup Peninsula (No. 1178) August 2002

No.	Topic	Action	Objective	Timing	Advice
Construction Environmental Management					
1	Environmental Management	1) Prepare a Construction Environmental Management Programme (EMP) for the construction of the Plant and infrastructure. The EMP will outline responsibilities and obligations, and will incorporate the following plans: • Terrestrial flora and vegetation (see commitment 2); • Weeds (see commitment 3); • Fauna Management (see commitment 4); • Culture and Heritage (see commitment 5); • Hydrology and Surface Water (see commitment 6); • Traffic Management (see commitment 7); • Dust Management (see commitment 8); • Noise Management (see commitment 9); • Liquid and Solid Waste Management (see commitment 10); • Hazardous Materials Management (see commitment 11); • Fire Management (see commitment 12). 2) Implement the Construction EMP.	To manage all relevant environmental factors associated with the construction phase of the Project.	Prior to commencement of construction.	
2	Terrestrial flora management	1) Prepare a Terrestrial Flora Management Plan addressing: • locations of vegetation communities and identify areas not to be disturbed through optimisation of plant layout; • site clearance procedures; • procedures for rehabilitating areas of temporary disturbance; • results of an additional vegetation/flora survey at an optimal time following wet season rains; • support for a regional survey of samphire vegetation communities within the King Bay-Hearson Cove valley with other prospective industries. • seed collection of any prominent flora species present, including Priority Flora species, to ensure the availability of species for rehabilitation; • germination trials prior to and following construction, with a particular focus on the Priority 1 species *Terminalia supranitifolia*; • during the rehabilitation process, attempts will be made to restore any Priority Flora species disturbed by the project. 2) Implement the Terrestrial Flora Management Plan.	Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities. Minimise disturbance to vegetation communities during construction . Manage construction impacts on flora, in particular Priority flora.	Pre- construction. During Construction	CALM

No.	Topic	Action	Objective	Timing	Advice
3	Weed Management	1) Prepare a Weed Management Plan which will include obtaining fill from a weed-free source and identifying best practice weed management procedures in consultation with CALM. 2) Implement the Weed Management Plan.	To prevent the spread of weeds and the introduction of new weed species.	Prior to commencement of construction.	CALM, Dept of Ag
4	Terrestrial Fauna	1) Prepare a Terrestrial Fauna Management Plan that includes: • ensuring physical disturbance is kept within designated areas; • progressive rehabilitation of disturbed sites to maximise fauna habitat; • results of an additional survey to further investigate the occurrence of Priority Fauna species prior to construction (which, if required, will be updated on a regular basis); • establishment of procedures, monitoring requirements, workforce training and responsibilities to minimise disturbance of significant terrestrial fauna; • support for collaborative research programmes investigating the presence of the Pilbara Olive Python (*Liasis olivacea barron*i)on the Burrup Peninsula. 2) Implement the Terrestrial Fauna Management Plan.	Maintain the abundance, species diversity and geographical distribution of terrestrial fauna. Protect Specially Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act 1950*. Protect fauna listed on the Schedules of the *Environment Protection Biodiversity Conservation Act*.	Pre-construction and ongoing. Pre-construction.	CALM
5	Culture and Heritage	1) Prepare an Aboriginal Heritage Management Plan which will encompass: • provision of cultural awareness training for construction and operations workforces; • results of outstanding ethnographic and archaeological surveys and ongoing consultation; • a heritage monitoring programme during initial site preparation; • procedures for handling any newly discovered sites which may be uncovered; • ensuring that archaeological sites in the vicinity of the Project are marked and protected from potential disturbance during construction; • contribution towards preserving the Burrup's cultural heritage values, as well as indigenous training, employment and contracting opportunities. 2) Implement the Aboriginal Heritage Management Plan.	To preserve Aboriginal heritage sites located within the Project area, and ensure that the proposal does not adversely affect cultural associations of the Project lease.	Pre-construction.	DIA

No.	Topic	Action	Objective	Timing	Advice
6	Surface Water Management and Hydrology	1) Prepare a Surface Water Management Plan which will manage water discharge from the site. This will address: • avoidance of disturbance to natural drainage lines, where possible; • interception of stormwater from the plant site by a drainage system, and use of sediment retention basin; • erosion control practices to be employed; • minimal disturbance to surface soils through restricted clearing and progressive rehabilitation of temporary disturbance areas; • monitoring and reporting requirements; • minimise disturbance to Ab/Im/Te/Rm vegetation communities. 2) Implement the Surface Water Management Plan.	Maintain the integrity, functions and environmental values of natural surface water drainage. Maintain the integrity, function and environmental values of watercourses and sheet flow.	Pre-construction and ongoing.	CSLC
7	Construction Traffic Management	1) Prepare a Traffic Management Plan so as to minimise disruption of traffic from heavy vehicle movements during construction, maintain public safety and restrict vehicle access to designated routes. 2) Implement the Traffic Management Plan.	To ensure minimum disruption of traffic and maintain safety of public during construction.	Pre-construction Construction	SoR, MRWA, FESA
8	Dust Management	1) Prepare a Dust Management Plan for the construction phase of the project, which will address: • the use of water sprays to wet the site during dry windy conditions; • speed limits to minimise dust generated by vehicle movements; • the use of minimum drop heights when loading and unloading soils and other excavated material; and • minimising areas of disturbed, exposed soils. 2) Implement the Dust Management Plan.	To ensure that dust generated during construction does not cause any environmental or human health problem or significantly impact on amenity.	Pre-construction Construction	
9	Noise Management	1) Prepare a Noise Management Plan for construction activities to ensure suitable work practices are adopted to minimise noise generation, including: • the use of low noise equipment where practicable; • use of silencers where necessary; • use of exhaust mufflers; • noise monitoring and reporting. 2) Implement the Noise Management Plan	Ensure that construction noise emissions comply with Noise Regulations and meet EPA objectives to protect amenity at Hearson Cove.	Pre-construction Construction	

No.	Topic	Action	Objective	Timing	Advice
10	Liquid and Solid Waste Management	1) Prepare a Waste Management Plan based on a waste management hierarchy. This will include established procedures for monitoring, recording, disposing and reporting of waste quantities during construction. 2) Implement the Waste Management Plan.	To minimise waste and potential for groundwater and surface water contamination or risk to public health.	Pre-construction Construction	SoR
11	Hazardous Materials Management	1) Prepare a Hazardous Materials Management Plan to ensure that hazardous materials are properly handled, segregated, transported, treated and disposed. 2) Implement the Hazardous Materials Management Plan.	To minimise waste and potential for groundwater and surface water contamination or risk to public health.	Pre-construction Construction	
12	Fire Management	1) A commitment is given by the proponent that there will be no demands made on managers of adjacent lands to extinguish any wildfires, in circumstances other than when they pose a significant direct threat to the plant; 2) In designing the plant layout, the document 'Planning for Bushfire Protection' Dec 2001, FESA & WA Planning Commission be consulted and incorporated.	Manage bushfires in accordance with CALM requirements commensurate with the protection of life and property.	Pre-construction	
Operations Environmental Management					
13	Environmental Management	1) Prepare an Operations Environmental Management Programme (EMP) for the operation of the Plant and infrastructure. The EMP will outline responsibilities and obligations, and will incorporate the following plans: • Terrestrial flora and vegetation (see commitment 14 & 15); • Fauna Management (see commitment 16); • Culture and Heritage (see commitment 17); • Hydrology and Surface Water (see commitment 18); • Marine Environment (see commitment 19); • Public Health and Safety ((see commitment 20) • Risk(see commitment 21); • Liquid and Solid Waste Management (see commitment 22 & 23); • Hazardous Materials Management (see commitment 24); • Atmospheric Emissions Management (see commitment 25); • Greenhouse Gas Management (see commitment 26); • Noise Management (see commitment 27) • Lighting (see commitment 28); • Visual Amenity (see commitment 29); • Regional Environmental Management (see commitment 30); • Strategic Planning (see commitment 31).. 2) Implement the Operations EMP.	To manage all relevant environmental factors associated with the operation phase of the Project.	Prior to commissioning	

No.	Topic	Action	Objective	Timing	Advice
14	Terrestrial flora management	1) Prepare a Terrestrial Flora Management Plan addressing details of ongoing management of terrestrial flora, vegetation and weeds. 2) Implement the Terrestrial Flora Management Plan.	Maintain species abundance and minimise operation impacts on vegetation and flora.	Pre-commissioning Commissioning	CALM
15	Terrestrial flora management	1) Prepare a Landscaping Plan addressing details of ongoing management of landscaped areas within the Project area. 2) Implement the Landscaping Plan.	Maintain species abundance and minimise operation impacts on vegetation and flora.	Pre-commissioning Commissioning	CALM
16	Terrestrial fauna	1) Prepare a Terrestrial Fauna Management Plan addressing details of ongoing management of terrestrial fauna, including fauna observation, handling and translocating procedures. 2) Implement the Terrestrial Fauna Management Plan.	Maintain species abundance and minimise operation impacts on terrestrial fauna.	Pre-commissioning Commissioning	CALM
17	Culture and Heritage	1) Prepare an Indigenous Heritage Management Plan addressing details of ongoing management to minimise disturbance to areas of cultural significance and promote employee awareness. 2) Implement the Indigenous Heritage Management Plan.	To preserve Aboriginal heritage sites located within the Project area, and ensure that the proposal does not adversely affect cultural associations of the Project lease.	Pre-commissioning Commissioning	DIA
18	Hydrology and Surface Water	1) Prepare a Surface Water Management Plan to ensure ongoing management of non-contaminated stormwater and potentially contaminated site run off. Establish procedures for testing, monitoring and reporting the quality of site run off, and treatment prior to discharge if required. 2) Implement the Plan.	Maintain the integrity, functions and environmental values of natural surface water drainage.	Pre-commissioning Commissioning	WRC

No.	Topic	Action	Objective	Timing	Advice
19	Marine Environment	1) Prepare a Marine Water Quality Management Plan that includes: • Procedures for managing and monitoring return water to the WAWC to ensure that acceptance criteria are met, as set in licence conditions; • • Adoption of AQIS guidelines, and environmental management requirements of the DPA; • Contribute to a coordinated management response with the WAWC and other system users to reduce inputs if ambient monitoring shows an elevated risk of environmental quality objectives not being met for King Bay; • Monitoring protocols in the event of ammonia spill. 2) Implement the Plan. 3) Investigate the feasibility of further reducing anticipated Nitrogen load during the detailed design phase. 4) Evaluate alternative technologies for use of ammonia or phosphorus for boiler feedwater conditioning in consultation with DEP (Marine Branch). 5) If proposed treatment chemicals pose an unacceptable impact or risk to the environment, develop a plan with the DEP (Marine Branch) to mitigate or more completely research this impact. This may include consideration of alternative treatment chemicals and/or a toxicological study on local marine fauna.	Maintain marine ecological integrity and biodiversity and minimise impact of shipping on the marine environment.	Pre-commissioning During commissioning. Prior to Works Approval Prior to Works Approval Prior to Works Approval	WAWC, DPA, AQIS WAWC, DPA, AQIS WAWC, DPA
20	Public health and safety	1) Prepare a Safety Management Plan, together with an Emergency Response Plan to enable a rapid response at the plant and product export facilities. The Project will incorporate a range of safety features to minimise risk, including: • nitrogen purge facilities; • blow down systems; • firefighting facilities; • a safety trip and interlock system; • Emergency Shutdown System to initiate automatic shutdown of the plant; • development of a safety policy and comprehensive training of all operations personnel in all aspects of plant operation including emergency procedures. 2) Implement the Plan.	To ensure that the risk to the public is as low as reasonably practicable (ALARP) and complies with acceptable standards.	Pre-commissioning	MPR, FESA

No.	Topic	Action	Objective	Timing	Advice
21	Risk	1) Undertake a Quantitative Risk Assessment (QRA) and final HAZOP study during detailed design. 2) Prepare an Emergency Response Plan. 3) Contribute to the development of a Burrup Industrial Integrated Emergency Response Plan (BIIERP) with other industries within the King Bay-Hearson Cove Industrial Estate. 4) For the ammonia and methanol pipelines, design and operations risk reduction and response procedures will be developed during the design stage, including the development of plant operating procedures.	To ensure that the risk to the public is as low as reasonably practicable (ALARP) and complies with acceptable standards. To ensure cooperative measures are in place to integrate emergency response procedures with neighbouring industries to minimise public risk, especially at Hearson Cove.	Prior to Works Approval Pre-commissioning Pre-commissioning	MPR, FESA
22	Liquid Waste Management	1) Prepare a Liquid Waste Management Plan that details the ongoing management of liquid waste disposal streams, including treatment, monitoring and reporting of wastewater to be returned to the WAWC brine return system. 2) Implement the Liquid Waste Management Plan.	To minimise waste and potential for groundwater and surface water contamination or risk to public health.	Pre-commissioning During Commissioning	WAWC
23	Solid Waste Management	1) Prepare a Solid Waste Management Plan based on a waste management hierarchy. This will include established procedures for monitoring, recording, disposing and reporting of solid waste quantities during operation. 2) Implement the Waste Management Plan.	To minimise waste and potential for groundwater and surface water contamination or risk to public health.	Pre-commissioning During Commissioning	SoR
24	Hazardous Materials Management	1) Prepare a Hazardous Materials Management Plan to ensure that hazardous materials are properly handled, segregated, transported, treated and disposed, and appropriate response strategies are in place. 2) Implement the Hazardous Materials Management Plan.	To minimise waste and potential for groundwater and surface water contamination or risk to public health.	Pre-commissioning During Commissioning	

No.	Topic	Action	Objective	Timing	Advice
25	Atmospheric Emissions Management	1) Undertake a program of stack emission monitoring to verify current emission estimates, and determine compliance monitoring and reporting requirements in consultation with the DEP (Air Quality Branch). 2) Develop a programme for monitoring potential effects of urea deposition in the vicinity of the project lease with the DEP, focusing on secondary effects on native vegetation and rock pools. Urea emissions will be no more than 35 mg/m^3, and the proponent will investigate further opportunities to minimise particulate urea loss from the Project during detailed design. 3) Review building wake effects and anticipated upset/start-up emissions during detailed design in consultation with the DEP Air Quality Branch. 4) Review predicted ammonia emissions prior to works approval, and continue close monitoring of evolving technologies and potential effects upon rock pools. Based on the above reviews and monitoring, DN will be able to respond through retrofit of appropriate technologies if economically viable.	To minimise the discharge of atmospheric emissions where practicable and maintain compliance with regulatory guidelines.	Operation . Pre-commissioning Prior to Works Approval Prior to Works Approval	MPR CALM
26	Greenhouse Gas Management	1) Join the *Greenhouse Challenge* Program. 2) Develop a Greenhouse Gas Emissions Management Plan to identify further 'No Regrets' and 'Beyond No Regrets' opportunities to reduce and offset GHG emissions over the life of the Project, in accordance with the *Greenhouse Challenge* Programme. 3) Implement the Plan. 4) Conduct further investigations of possible 'beyond no regrets' measures and their respective greenhouse and efficiency gains in consultation with the AGO.	To promote continuous improvement in greenhouse emissions management over the life of the Project.	Pre-commissioning Commissioning Pre-commissioning	AGO AGO

No.	Topic	Action	Objective	Timing	Advice
27	Noise Management	1) Prepare a Noise Management Plan that includes details of noise attenuation measures adopted and demonstration of conformity with statutory criteria, requirements for noise monitoring upon commissioning, and reporting requirements. 2) Implement the Noise Management Plan. 3) Further investigate practicable noise reduction measures during the detailed engineering design phase when more definitive plant noise power levels are available, utilising the advice of a mutually acceptable acoustic engineer.	Ensure that operational noise emissions comply with Noise Regulations and minimise the noise impacts on the amenity at Hearson Cove.	Pre-commissioning Commissioning Prior to Works Approval	
28	Lighting	1) Light overspill will be kept to a minimum, using AS 4282 as a guide, consistent with site safety and security requirements. 2) Light sources will be oriented to minimise overspill, whilst providing the required degree of illumination within the plant boundary. Overspill reduction measures such as directional beams and shrouding of the sides and rears of light sources will be employed where practicable.	Manage potential impacts from plant light overspill to visitors at Hearson Cove, and offshore fauna if applicable.	Pre-commissioning	CALM
29	Visual amenity	Adopt appropriate paint colour schemes (colour-matching) for the plant infrastructure and urea conveyor system so as to blend into surrounding terrain subject to process requirements. Preserve elevated rocky terrain which will maintain a natural backdrop and minimise visual intrusion on the skyline. Maintain an excellent standard of general housekeeping of the plant and associated infrastructure over the life of the Project.	To minimise potential impacts on visual amenity.	Pre-commissioning Ongoing.	OMP
30	Regional environmental management	Participate in a future King Bay-Hearson Cove industry group to develop a long-term monitoring/management plan for the King Bay-Hearson Cove industrial area including a cooperative ambient air monitoring programme which may be established with the WA Government. Contribute to cooperative research or baseline monitoring programmes on investigating potential cumulative impacts on molluscan fauna, aboriginal petroglyphs or vegetation.	Minimise the impacts of strategic industrial development on the environmental attributes of the King Bay-Hearson Cove valley.	Pre-commissioning	OMP, CALM

No.	Topic	Action	Objective	Timing	Advice
31	Strategic Planning	Consider cooperative arrangements with other prospective industries and OMP where practicable to ensure efficient use of infrastructure corridor space. Consider using locally manufactured methanol if available. Liaise with OMP and MRWA to promote the option for alternative road access alignments within the Project lease with the best overall environmental outcome.	To ensure strategic planning and infrastructure development is undertaken in a coordinated manner.	Pre-construction Pre-construction	OMP OMP, MRWA

Abbreviations

AGO	Australian Greenhouse Office
AgWA	Department of Agriculture Western Australia
AQIS	Australian Quarantine & Inspection Service
CALM	Department of Conservation and Land Management
CSLC	Commissioner for Soil and Land Conservation
DEP	Department of Environmental Protection
DIA	Department of Indigenous Affairs
DPA	Dampier Port Authority
EPA	Environmental Protection Authority
FESA	Fire and Emergency Services Authority
MPR	Department of Mineral and Petroleum Resources
MRWA	Main Roads Western Australia
OMP	Office of Major Projects
PDC	Pilbara Development Commission
SoR	Shire of Roebourne
WAWC	Water Corporation
WRC	Water and Rivers Commission

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions

Summary of Issues Arising From Stakeholder Consultations in Karatha/Dampier – 5 and 6 June 2002

Stakeholder	Issue	Dampier Nitrogen Response
CALM, Karratha	▪ CALM expressed concern that some vegetation communities that will be impacted by the proposed development may be classified as Threatened Ecological Communities as a result of the recent Trudgeon report. ▪ CALM advises that they cannot give definitive advice on the significance of projected impacts upon vegetation until they have had time to consider the Trudgeon and Welker reports.	Consideration is being given to relocating the ammonia storage tank and realigning the northern access roadway in order to reduce or totally avoid impact to the ChAbSg community. There is limited latitude to move the plant footprint to avoid the AbTa/AbImTe community, although detailed site planning will aim to minimize impact. DN notes that no impacts at a species level will result from the proposed ammonia/urea plant construction, and that inaccuracies in the Trudgeon mapping (identified by Astron site surveys) indicate that these communities may have a slightly wider distribution than that noted in the mapping. Impacts upon *Terminalia supranatifolia* at the Option 2 urea storage shed site are noted, and form the basis for Option 1 being the preferred site. URS has consulted with OMP to ensure the transfer of vegetation data obtained by OMP to the CALM endangered species and communities unit at Woodvale.
	▪ Questioned size, pressure and future expansion plans for the gas supply pipeline, while acknowledging that these were not issues under the control of DN. Requested DN demonstrate commitment to work with government to minimize infrastructure requirements on the Burrup.	DN is a customer of the pipeline service provider and has no role in planning, construction or operation of the pipeline. To the extent available, DN supports government in any endeavour to minimize infrastructure requirements, noting the capital and maintenance cost savings to be achieved.
	▪ If it is possible to connect to the existing DBNGP for emergency supply, why can't this be the normal condition, i.e. why is a separate gas supply pipeline required for industry?	The gas supplier has determined that a separate pipeline is required DN has no part in determining this requirement.
	▪ What will be the external skin temperature of ammonia export pipeline.	The pipeline (incorporating export and vapour return systems) will be double-skinned with 100 mm of insulation between the inner and outer skins. External skin temperature will therefore be dependent upon ambient air temperature and solar insolation.
	▪ CALM sought commitment that light overspill would be kept to the minimum.	DN has already committed to this, consistent with site safety and security requirements.
	▪ Where will the methanol pipeline go?	Between the wharf and plant, along the service corridor. DN will examine potential for use of locally produced methanol should a methanol plant be developed in the King bay/Hearson Cove area.
	▪ CALM sought commitment that DN would permit bushfires on site to burn without intervention, consistent with protection of life and property. Suggested that the FESA and WA Planning Commission (December 2001) bulletin *Planning for Bushfire Protection* be reviewed during detailed plant design.	Yes, provided it is controlled and in accordance with fire regulations and protection of life and property.
	▪ As a general comment, CALM expressed satisfaction with the obvious efforts DN had exercised in trying to identify all potential environmental impacts and were impressed with the measures proposed to avoid, reduce or mitigate potential impacts.	DN notes this endorsement.

Stakeholder	Issue	Dampier Nitrogen Response
Dampier Archipelago Preservation Association	▪ DAPA is particularly happy with alternative wastewater discharge measures compared to 1998 proposal.	DN notes this endorsement.
	▪ Concerned with cumulative impacts but satisfied that these have been addressed by DN and do not anticipate any significant reduction in the amenity value of Hearson Cove.	DN notes this endorsement.
DEWCP, Karratha	▪ Identified general community concerns regarding amenity at Hearson Cove (dust, light, odour, noise, air quality). Expressed satisfaction with the assessments and commitments made by DN, and noted that concern with Hearson Cove amenity is more a result of government planning to develop the area as an industrial area rather than concerns with any particular proponent.	DN remains committed to implementing all practicable measures to reduce off-site signature to protect recreation amenity of Hearson Cove.
	▪ Requested DN examine possibility of reestablishing vegetation communities to be disturbed at another suitable location on site.	Preliminary analysis indicates that this may not be possible, although DN will continue to consider options.
	▪ Expressed concern over cumulative loss of Aboriginal sites on the Burrup Peninsula, although expressed satisfaction with Aboriginal heritage protection measures employed by DN.	DN's approach has been endorsed by DIA.
	▪ Requested effective monitoring of urea deposition effects.	Already committed to by DN.
	▪ Requested DN opt for use of 'environmentally friendly' anti-scalants, not just the cheapest.	DN has indicated the intention to use anti-scalants and biocides of low (negligible) toxicity.
	▪ Requested DN commit to 'reduction' of waste, not just re-use/recycling (as stated in the CER Supplement), and that there be no on-site burning of waste during construction.	DN is committed to waste reduction measures as a component of good business practice. No on-site burning of waste will occur.
	▪ Will DN consider working in a cooperative approach with other prospective Burrup industrial developers and the Shire of Roebourne to address waste disposal issues?	Yes, and liaison has already been established. The Shire of Roebourne has confirmed that their landfill facility is certified and able to accept the projected waste streams from all Burrup proponents, for those wastes which will be disposed to landfill (i.e. not diverted for reuse, recycling or specialist disposal).
	▪ Will DN practice 'waste stewardship' to confirm that waste consigned to contractors for disposal is properly disposed of in accordance with extant regulations.	Yes, as a component of the plant's EMP procedures.
	▪ Can 'adverse' tidal conditions (e.g. an incoming tide) be avoided when discharging N laden wastewater?	Possibly, but an incoming tide is probably the best condition under which to discharge N, permitting the mangroves in King Bay to act as N strippers. Otherwise, the level of N anticipated to be discharged (43 kg/d) is so low as to cause no discernible impact.

Stakeholder	Issue	Dampier Nitrogen Response
Shire of Roebourne	▪ Timing of construction, especially delivery of modules and potential impact upon road users and infrastructure.	Detailed planning for road moves will be contained in the project logistics plan. The largest module to be delivered to site will be in the order of 51 m and 450 t, with the next biggest module about half of that size. Planning for road moves will be cognizant of causing minimal disruption.
	▪ Workforce accommodation, during both construction and operation phases.	DN is a member of the Government taskforce established to manage workforce accommodation, and has joined in a partnership with State and local government and other Burrup industrial developers to provide a comprehensive package of measures for construction workforce accommodation. DN has also undertaken separate negotiations with accommodation providers to examine options. DN is also examining the best accommodation options for the operations workforce, with the objective of providing quality of life which promotes workforce stability.
Pilbara Development Commission/Karratha Chamber of Commerce and Industry	▪ Workforce accommodation, during both construction and operation phases.	See above
	▪ Capacity of local social services and infrastructure to cope with expanded Karratha/Dampier population.	This issue is noted by DN, but is essentially an issue for government. DN will cooperate and support government initiatives to the extent practicable.
	▪ Local community is satisfied with current plans for industrial development in King Bay/Hearson Cove area, but want Sate government to plan for any future developments to be at Maitland.	This is beyond the powers of DN to influence.
	▪ Requested DN support of local service providers and merchants.	DN will use local businesses where practicable, consistent with competitive business practices and quality of supply.
	▪ Protection of recreation amenity of Hearson Cove, noting that local community is confident that any impacts upon Hearson Cove from DN will be kept to a minimum by virtue of DN commitments, although long-term it is preferred that an alternative beach be provided by State government.	DN notes the support of the local community. The issue of alternative beach access is a matter for government.
Dampier Port Authority	▪ No issues of any concern. Satisfied with environmental assessments and commitments made by DN.	DN notes DPA's endorsement.
Nickol Bay Naturalists Club	▪ Noted potential for urea to accumulate in rock pools.	DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock polls would also be limited by ephemeral nature of polls. DN commits to include monitoring of rock polls for first 12 months of operations to assess if urea is having any affect upon rock pools.
	▪ Generally satisfied with environmental measures proposed by DN, especially protection of Pilbara olive python habitat through relocation of plant from rocky ridge area.	DN notes general support of Nickol Bay Naturalists Club.
Friends of the Burrup	▪ The planned meeting was cancelled at the request of the Friends of the Burrup, although dialogue with the group indicates no particular concerns with the DN proposal.	DN wishes to continue dialogue with this group, dependant upon advice of a new point of contact.

DAMPIER NITROGEN AMMONIA/UREA PROJECT – CER SUPPLEMENT
RESPONSE TO EPA SU COMMENTS, RECEIVED 8 JULY 2002

	EPA SU Comment	Category of Response [1]			
Ref		**1** (specific technical information requiring clarification or supplementary advice)	**2** (matters to be addressed through commitments)	**3** (matters which have been addressed to the greatest extent by the proponent, and requires EPA deliberation)	**4** (cumulative impacts to be addressed under 'Other Advice' section of assessment bulletin)
1	***Air Emissions***				
1.1	11/6/02: stacks should be high enough to avoid building wake effects. This does not seem to be the case (page 60). 8/7/02: If you have a lack of information on building heights, the alternative is to make a commitment to rerunning the modelling with more accurate information during the detailed design phase and to ensure that stacks are high enough to avoid building wake effects and topographical effects. Liaison with DEP's Air Quality Branch is strongly recommended.	Dampier Nitrogen will ensure that building wake effects are taken into account during detailed design in consultation with the DEP Air Quality Branch.	As shown in the model output file included in Appendix D of the CER Supplement, DN plant structures are tall enough for building wake effects to be disregarded except for when winds are blowing along the north/south wind line or from the southeast. When the wind is blowing from these directions, the model has included wake effects when calculating maximum downwind concentrations. The impact is expected to be minor, if at all, given the limited range of affected wind directions and the height of the stacks involved.		

[1] As recommended by the EPA Service Unit, facsimile received 8 July 2002.

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1.3	8/7/02: Please confirm that the 75mg/Nm^3 will be calculated as NO_2 at 15% O_2 reference level, dry, at STP. (Note that Table 3.12 does not give standards for gas turbines and that the standard stated for steam boilers is at 3% O_2). There is potential scope for reducing NOx levels further by reducing reformer emissions by the use of low NOx burners, as at CSBP. Has this been considered and if discounted why? Could you provide some comparison with NOx emissions with similar new ammonia and ammonia/urea plants worldwide?	The KU ammonia design incorporates low NOx burners. Latest advice from burner suppliers has confirmed this. NOx level can be reduced by omitting combustion air preheating, but this reduces the energy efficiency drastically, and is likely to result in adverse outcomes in relation to increased noise, and greater catalyst volumes requiring disposal at substantial cost. The latest NOx measurement in a KU ammonia plant was done in Saskferco in 1992. The guaranteed value was 200 mg/Nm^3, the actual measured 120-130 mg/Nm^3. Therefore the given limit of 150 mg/Nm^3 is appropriate. Dampier Nitrogen has already committed to adopting low-NOx burners for both gas turbines and the boiler (see Commitment 11 in Table 4.1).			
1.4	8/7/02: When are start up [air emissions] data likely to be available? It is preferable that this is available before the finalization of the EPA report. If not, I suppose the same logic as 1-1 could be applied, that the impacts of start-up and emergency emissions are considered after detail design.	As previously advised, emission data for these operating scenarios was not available at the time of preparing the air quality assessment.	These data will be provided by DN during detailed design.		
1.5	11/6/02: Ammonia emissions from the Granulation Plant are nearly double best practice concentration levels and more than double in kg/t product terms (European Fertilizer Manufacturer's Ass). Reason given is that wet scrubbers produce too much solution to dispose of. What about dry scrubbers such as activated C or gallium nitride? 8/7/02: Ammonia emission levels are still of some concern. At our meeting of 11/06/02 we discussed you providing some explanation of your reasons for the non-BAT emissions eg why the normal method of acid scrubbing is not feasible and what alternatives have been considered and discounted for what reasons. You need some justification of why BAT levels are not achievable	EFMA figure is based on using acid scrubbing. Reference is one Toyo designed plant in Piesteritz, Germany and one HFT designed plant in Carrara, Italy, where the generated nitrate solution can be processed in NPK plants nearby (NPK refers to Diammonium Phosphate, Mono Ammonium Phosphate, and Potassium-Sodium Nitrate). Where NPK plants are not nearby, the acid scrubbing would be converting a smaller waste gas			

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	some justification of why BAT levels are not achievable and that you have done your best to achieve them. The EPA report also needs to explain why we are accepting non-BAT levels. We have a lack of knowledge of nutrient impacts on the Burrup (but a very real possibility that there will be adverse impacts) of the combined and cumulative effects of NOx, ammonia and urea. This makes the acceptance of non-BAT levels difficult to justify without good reasons.	problem into a major liquid waste problem. *Consideration of dry scrubbers including activated carbon:* Activated carbon is not suitable for scrubbing ammonia (Reference David Healy of James Cummin & Sons 02 9748 2309). Activated carbon is suitable for non-water soluble, high molecular weight, or organic substances. Acid scrubbing of ammonia emissions would require 2,332 tpa of nitric acid to be transported from Perth, and require 3,864 tpa of ammonium nitrate to be returned to Perth district for potential use for agricultural purposes. This alternative would make the project non-viable. The proposed control measures represent BAT for the Pilbara, noting that measures assumed in EFMA guidelines do not eliminate the waste but only reconstitute it into a form which would present as more problematic for the Pilbara. Predicted emission levels are low enough to indicate no adverse environmental outcomes.	DN will review predicted ammonia emissions prior to works approval, and will continue close monitoring of evolving technologies and potential effects upon rock pools. Based on the above reviews and monitoring, DN will be able to respond through retrofit of appropriate technologies if economically viable.		
1.6	11/6/02: It is requested that all gas feed, including fuel gas, is desulphurised prior to burning. 8/7/02: Reduction of acid emissions is of importance for potential impacts on petroglyphs and vegetation and ephemeral pools. These are significant cumulative issues and therefore individual plants do need to show that they are doing everything possible to reduce impacts. In view of the fact that your emissions are likely to be considerably less than the 8.4 t/a estimated due to the low sulphur content of the gas, we are not pursuing desulphurisation of the fuel gas further. However should you find during your detailed design that this can be achieved in a cost neutral manner, there would be	Feed gas fed into the process will be desulphurised as a process requirement. DN is not planning to desulphurise fuel gas, and it is anticipated that actual SO_2 emissions will be even lower than those reported in the CER Supplement.			

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	environmental advantages to implementing it. Would you like to consider making a commitment to this effect?				
1.7	11/6/02: CO_2 commitment talks about identifying and monitoring beyond no regrets, should be implemented where practicable. Standard condition suggested by audit. 8/7/02: We can sort out the wording when Tim and I get together on the commitments table.		This is a commitment by DN. It is confirmed that measures will be implemented where practicable, in accordance with the objectives of the *Greenhouse Challenge* Programme.		
2	***Wastewater***				
2.1	11/6/02: In appendix and table 15.7 t/a N. In wastewater characteristics 3.5 t/a. According to reply to questions 3.5 t/a is BAT. This is what the discharge should be or lower cf Burrup Fertilizers and Methanex. 8/7/02: John Rich indicated at our meeting that he thought 3.5 t/a was the correct figure and this is what is given in Table 3.22. 15.7 t/a is substantially more than other users. Please provide a flow diagram showing where this ammonia/nitrogen and other contaminants are coming from, at what concentrations and what treatment you are providing for the wastewater stream. Table 3.24, as referenced in your answer, does not provide this. As required by DEP and Water Corporation you need to demonstrate best practice and waste minimization. As noted in the marine section comments ammonia is added for the conditioning of boiler feed. Please consider if this additive is the best in terms of having least environmental impact.	DN estimate the discharge of N will be 43 kg/day and will investigate alternatives to reduce this level during the detailed design phase, as noted in Section 3.2.5.4. DN endorses the principle of pursuing best practicable measures for waste minimisation, and to this end the current BAT levels of wastewater discharge will continue to be evaluated for further achievable reductions. A preliminary flow diagram indicating the N/ammonia sources and emission points, is attached. DN is currently considering a range of alternatives. Agrium has experience in phosphate dosing as an alternative. However, KU considers that an ammonia dosing system is preferable. Both options will be further investigated during the design phase. DN is also willing to consider local uses of N loaded blowdown water during detailed design.	Current levels of N in wastewater discharge will continue to be evaluated for further achievable reductions during detailed design. DN will further evaluate both dosing systems (ammonia- and phosphate-based) during the design phase. DN is also willing to consider local uses of N loaded blowdown water during detailed design.		
2.2	11/6/02: what treatment to be used – process water, domestic wastewater, contaminated stormwater and clean stormwater 8/7/02: Process wastewater – see [2.1] above Domestic wastewater – what N and P levels will the	*Process water* – see table 3.22, p. 83. *Domestic wastewater* – will be treated in an aerobic sewage treatment plant with discharge water quality given in Table 3.22. *Stormwater* – Treatment will be	Appropriate measures for stormwater treatment will be confirmed to the satisfaction of the DEP during finalisation of the Environmental Management Plan.		

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	plant attain? Table 3.22 gives different value for N from Appendix F. Stormwater – you need to differentiate between clean stormwater and contaminated stormwater. (i) Clean water is likely to need removal of sediment before discharge and may need some withholding and controlled discharge to prevent erosion. Please detail how this will be addressed. (ii) Potentially contaminated stormwater needs capture in lined ponds for treatment before discharge. A pond of the dimensions given will hold about 1350 m^3. For a 72-hour 1 in 100 rainfall event this will give you retention for 2500 m^2 out of a plant site of 20 ha. Could you detail for what area and for what storm events you have calculated contaminated water volumes and what treatment and holding time is planned (you say ammonia will be treated, how and to what level?). This is an important issue as the planned location of the ponds appears to be in the vicinity of a vegetation community which Ian Le Provost said at the EPA meeting would be avoided. Any loss of vegetation for ponds needs to be taken into account in the flora impact and management.	dependent upon the type of contamination (if any) encountered. For example, solids will be settled out of the stormwater and removed periodically from the stormwater pond. Stormwater containing ammonia will be reprocessed if concentration permits and oil will be skimmed. Further detail on the management of stormwater will be provided in EMP. *Response to (i):* It is noted that the proposed ammonia/urea project occupies only 11.7 ha of the total 66.5 ha within the lease boundary. Uncontaminated runoff from a considerable part of the site 18.2ha drains to the gully which discharges to the tidal flats at the south-west of the plant site. This water will be intercepted near the head of the gully and piped to discharge at the same location from which it currently discharges. The outlet structure will be designed in such a way that the discharge velocity is no higher than it is at present. Any sediment contained in this runoff will be the same as it would have been without the development and no removal of sediment from this stormwater should be required. Areas to the west and north of this major catchment will drain through existing slopes depressions and gullies as at present. Two further catchments to the east will drain across the eastern boundary as at present. There are two remaining catchments of 3.6ha and 2.1 ha which drain south from two large rock mounds towards the plant site. Runoff from these will be intercepted along the	The proponent has committed to locate the stormwater ponds in a position which avoids the *ABImTe/TeRm* vegetation community.		

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		northern boundary of the plant and conveyed through underground pipes to discharge onto the tidal flats. The discharge will be equipped with dissipaters to prevent local erosion. No removal of sediment will be required from any of the undisturbed areas. *Response to (ii):* An annual recurrence interval of 50 years is normally accepted as a design basis for stormwater pipes and channels. This is consistent with the CER Supplement. The design rainfall intensity for a particular catchment depends on the time of concentration. This is influenced primarily by distance from low to high point and the gradient. The calculated time of concentration for the large catchment is 13 minutes. The 50-year ARI intensity for this duration is 211 mm/hr. Using a runoff coefficient of 0.7 (appropriate to this type of terrain), the discharge is 7.47m^3/sec. Pipes would be designed to accommodate this flow. Other catchments would be treated similarly. In accordance with accepted industry practice, DN intends to collect and retain the first flush of runoff from the site, regardless of storm system intensity, and allow the remaining runoff to discharge to the tidal flats as "clean" water. A basin of 1170m^3 is required to contain the first flush volume. After allowing the water in the collection pond to settle, it will be reclaimed as process water. After the 15 mm first flush as described above, there will be no significant sediment or contaminants in the	DN will collect and retain the first flush of runoff from the plant site.		

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		storm water runoff. See also revised site layout (attached).			
2.3	11/6/02: Contaminated and clean stormwater ponds: need estimate of sizes and positions on the site. They do not seem to be accounted for in the vegetation losses under the plant site. Areas could be significant and position and vegetation clearance needs to be considered. 8/7/02: See [2.2] above.	(Already provided) The stormwater ponds will be 45 m x 15 m x 2 m depth and will be located to the south west of the plant, south of the admin buildings and west of the future expansion areas. DN has committed to place these on the already disturbed areas.			
3	***Noise***				
3.1	11/6/02: 65 dB(A) criteria not met at Burrup Fertilisers boundary when wind is from the west. This is unacceptable. Noise Regs must be met. Note that previous draft modelling showed boundary criterion met under adverse conditions. What will be the maximum noise level at Hearson Cove be when boundary noise limit is met? 8/7/02: Noted, but noise levels at the boundary should be met under all weather conditions.			As stated at the EPA briefing, DN is committed to complying with noise regulations of 65 dB(A) at the boundary (see also Sect. 3.2.2.5, p. 47). This will be confirmed through further modelling and site optimisation of potentially noisy plant components during detailed design (see also Appendix J).	
3.2	11/6/02: Noise levels are required to be BAT. Committed maximum noise levels should be comparable with Burrup Fertilisers and Syntroleum. (34, 37 at Hearson Cove). 8/7/02: Meeting the Noise Regs alone may not be sufficient since as you are aware there is no assigned level for recreational area. As you are aware the DEP's preferred target noise level at Hearson Cove is 45 d(B)A, at which level recreational values would be impacted but not so severely as to render the beach no longer suitable for recreational activities.		DN will ensure that: 1. the 65dB(A) criterion will be met at the plant boundary; 2. reasonable measures will be adopted with the objective of reducing cumulative noise at Hearson Cove in accordance with ALARP principle. These will be confirmed when definitive data are available during detailed design; 3. utilise the advice of an acoustic engineer to ensure the best feasible measures are incorporated into the final design.		
3.3	11/6/02: According to local residents Hearson Cove is used as a recreational area at night. 8/7/02: It is not clear what is meant by this. Does this mean when noise levels at the boundary are met under all meteorological conditions, the noise level at Hearson			In conditions where the noise level at the DN site boundary is 65 dB(A) (as is expected) 40 dB(A) [42 dB(A) cumulative] noise contribution is anticipated,	

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	Cove will not exceed 40 d(B)A? In this case, you would be 5 d(B)A below the target cumulative level of 45. What industries is the 42 cumulative worked out for?			incorporating all noise sources available at the time of modelling (as listed in the CER Supplement p.48).	
4	***Flora, Vegetation and Fauna***				
4.1	11/6/02: Cannot comment on vegetation loss through clearing – EPA needs to deal with this. 8/7/02: Could we have your amended plant layout asap please and could you also supply CALM with a copy? Also the amended flora report showing what proportion of other communities will now be affected by the relocation of storage, roads etc is needed. (The management of environmentally sensitive areas during construction and operation will also be important and can be developed with CALM in further refinement of your EMPs).	The updated plant layout, overlayed on the vegetation communities found on the DN lease, is attached. The proportion of vegetation communities to be affected has been re-calculated, and forwarded shortly to the EPA SU.	Any minor deviations to the plant footprint during detailed design will be discussed with and advice sought at a local level from CALM.	As reported during the EPA briefing, DN acknowledges potential effects upon vegetation, and has committed to applying all practicable measures to avoid, reduce or mitigate impacts. This has been demonstrated through the subsequent relocation of the ammonia storage tank and northern access road in order to further reduce potential disturbance to the *ChAbSg* community.	
4.2	11/6/02: Context needed for N background levels. Where were these measured? What was the source of N? Provide reference from source – Gillett. 8/7/02: Request for CSIRO reference.			Data were provided by CSIRO Atmospheric Research Division – Gillett (personal communication), representing the best available knowledge at this time.	
4.3	11/6/02: Statement on page 67 regarding outside industrial lease area applies to whole industrial area including mangroves at King Bay not to PRCL plant site. 8/7/02: Yes, which is outside background fluctuations. Therefore off-site (Dampier Nitrogen site) deposition rates of urea alone are not within the range considered to represent background fluctuations. This means that the increase of nutrients, especially when urea is considered with other N sources, cannot be dismissed as trivial.		DN is committed to employing BAT to minimise urea dust losses from the Project, including the use of double demisting and wet scrubbers.	Maximum predicted deposition rates on King Bay mangroves are 0.125 $\mu g/m^2.yr$. The advice received from CSIRO confirmed that such values are comparable to the background N deposition rate of 0.140 $\mu g/m^2.yr$ +/- 30% potential fluctuation as cited. DN does not consider this issue to be trivial, and therefore has adopted a precautionary approach to ensure that any potential effects can be monitored and managed effectively.	

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4.4	11/6/02: As correctly stated on page 67 there was meant to be an assessment of impact of atmospheric emissions on soil/plant nutrient availability and effects of acid deposition on vegetation, fauna and rock art. The nutrient impact study should have included all N sources ie NO_x, urea and ammonia, as loadings rather than concentrations. The effects of urea study contributes little value to the study, giving European examples and other not very relevant studies. It does not consider dry deposition. It also does not look at the effect of urea deposition on mangrove leaves. Your answer to my question says urea scalds mangrove leaves but provides no substantiation that the amount emitted by Plenty River will not scald leaves. It was suggested that some studies should be carried out which has not been done. Effects of long dry periods and urea build up followed by rainfall should have been considered. The effects of urea study raises the issue of effects on shallow pools which is then not addressed. 8/7/02: With the lack of knowledge on the effects of acidic and increased nutrient deposition on vegetation, the responsible thing is for each proposal to ensure that all emissions are BAT and as low as practicable. Cumulative impact assessment for all projects is needed on this and this needs to be further addressed by the EPA or OMP. (Our vegetation experts have corrected my layman's comment that your study added little value, in fact it draws attention to some very relevant information. The problem is that no conclusions can be drawn from the information for the Burrup.)	As part of the preparation of the CER Supplement, the proponent liaised with the Queensland EPA to seek advice regarding potential effects of urea dust on mangroves, based on operation of the Incitec plant at Gibson Island. It was confirmed that, in over 30 years operational experience, scalding effects on mangroves has never been raised as an issue for concern for fringing mangrove habitats nearby that plant, which has traditionally emitted much larger volumes of urea dust than the BAT levels anticipated from the DN project. It is acknowledged that dust may cause scalding of mangrove leaves if present in sufficient quantity, however, any detectable impact is considered extremely unlikely, given the distance between the loading facility and the mangroves and the proposed adoption of BAT loading technology which will largely eliminate urea losses during shiploading. No experiments have been conducted by the Proponent. A programme to monitor such effects will be established prior to plant operation as part of finalising the EMP.	As committed in the CER Supplement, DN is prepared to contribute to industry participation in a program to monitor effects, if any, on petroglyphs as part of the prospective King Bay-Hearson Cove Industry Group. DN is committed to ensuring that all emissions are as low as practicable. DN commits to develop a programme for monitoring of rock pools following significant rain events, in consultation with the DEP. This will include establishment of appropriate early warning triggers.	Ammonia emissions were not included, however, this is not considered to alter the conclusions of the report. The report represents the current state of knowledge of the effects of atmospheric nitrogen (both as deposition material and gases/aerosols) and relates this to the receiving environment. DN commits to environmental monitoring and progressive review of emission reduction technologies. It is acknowledged by the WA Government and the proponent that there are limited data able to directly applied to arid-zone Pilbara conditions. (Previously advised) DN has consulted with CALM regarding potential effects on rock pools. DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock pools would also be limited by ephemeral nature of those pools.	There is no recognised evidence available to either confirm or refute claims that industrial emissions are damaging petroglyphs on the Burrup peninsula. The government is developing an assessment and monitoring program to close this knowledge gap. The current draft proposal is to examine (a) the microclimate around the petroglyphs to establish the nature of the interactions of the local climate and environment with the rock art (4 year program). (b) assessment of acid deposition using a 'total deposition' approach (2 year program).
4.5	11/6/02: Statement on page 69 that exposure to any level (of NO_x?) resulted in a depression of growth and yield, particularly acacias (present on Burrup) then statement that PRCL levels unlikely to generate adverse impacts on native vegetation. 8/7/02: As above [4.4].				The context of this statement is that DN's contribution could have only a relatively minor impact to the NO_x related effects upon Burrup vegetation, noting current and

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					projected loadings in the Pilbara airshed. Please note DN's willingness to contribute to a cooperative research and monitoring programme with the WA Government, as detailed above (4.4).
4.6	11/6/02: Where's the flora study for shed site 2? 8/7/02: If you get permission to use the Western Stevedores' site, please inform us asap as this will simplify this matter. EPA needs to make decision on 2nd option.	Draft copy provided on 11 June 2002. DN confirms that the Option 1 (western) site is the clear preferred location for the urea storage shed. Whilst the Board of the DPA has endorsed in principle the availability of this area for DN, this is yet to be confirmed.		*[It is noted that the EPA SU may need to approach the EPA Chairman to agree on an appropriate form of words for the Assessment Bulletin <u>if</u> Option 2 storage shed option cannot be withdrawn.*	
6	***Miscellaneous Questions***				
6.3	11/6/02: drift from seawater cooling tower is 0.01% - what is this in volume, kL/h? 8/7/02: What is this in volume?	The rate of loss to be achieved will be 0.01% of cooling water circulation rate which is around half that recommended by in the Australian Standard at 0.02%. This corresponds to 5kL/h.			
6.5	11/6/02: rest of consultation? CALM's comments? 8/7/02: Is this all the stakeholder comments? What about DIA, any feedback from Aboriginal groups, WRC (drainage?)? Although the Conservation Council does not seem to have provided a submission on the original CER, I think you would be well-advised to establish contact with them before the EPA Bulletin is published. Also with Robin Chapple if you have not already done so. Note Stephen Treloar's comment about wastewater discharge, "My intent here was to avoid neep tides (small tidal movements with less dispersion characteristics) and USE incoming/outgoing tides - especially spring ones, to give greater dispersion/make use of Mangrove N stripping capability. Obviously what we are basically recommending is that they use whatever strategy will best avoid any problems rather than just pumping out N containing waste, as its produced, with no regard to tidal factors".	Consultation with DIA and aboriginal groups is being managed by Wanati as a specialist consultant to DN. The (former) WRC was consulted directly through its Karratha office. URS has been liaising directly with the WACC and Robin Chapple for some time in relation to proposed industrial development on the Burrup, and are aware of their position with respect to Burrup industrial development DEP Karratha's comment is noted, and DN will take into account tidal factors where possible to ensure the best environmental outcome, noting that the predicted rate of assimilation of the N in wastewater is so rapid that tidal effects are considered of minimal consequence.		DN has consulted with all key stakeholders as identified in consultation with the DEP at the commencement of the work programme for the CER Supplement. The outcomes of these consultations were forwarded previously.	

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6.6	11/6/02: Management of pipeline risk is required. Outline of measures taken to prevent leaks, damage, accidents etc. 8/7/02: I have not looked at the draft EMP yet. In view of the changes to the plant layout it will be necessary for you to review your risk contours. Please liaise with MPR regarding this and let us have a copy of your revised contours. Also, if it is not too much trouble, could you use the REVISED SYNTROLEUM risk contours. I enclose information on the revised contours. We have realized that the contours used by Burrup Fertilisers were not the correct ones and this has perpetuated the error. (John has indicated that DN is not proposing to re-run risk contours with the new location of the ammonia storage tank. In this case a written professional opinion that the contours will still meet EPA criteria is requested and please also check with MPR regarding their requirements).	DN has authorised QEST to re-model the risk contours based with the new position of the ammonia tank. QEST has also obtained from DEP the revised, non-publicly available Syntroleum risk contours so as to manually review and assess the impact. QEST has verified that, based on a before/after comparative analysis of risk from the re-location of the ammonia tank, there is no visible difference in the risk profile of the project, and will not influence conformance with the relevant EPA risk criteria. An addendum report has been prepared and QEST will be meeting with MPR this week to ensure that they are satisfied that risk has been appropriately addressed. The addendum report is provided to the EPA SU for reference (as attached).	Intended measures for management of pipeline risk are outlined in CER Supplement and Draft EMP. Actual design and operations risk reduction and response procedures will be determined during detailed design stage and development of plant operating procedures.		
6.7	Urea emissions. I have not raised this before as your documentation has indicated that you are applying best practice technology. However Xuan has now questioned if the level of 35 mg/m^3 is best practice as some urea plants are meeting 5 mg/m^3, with the use of wet cyclones and bag filters. Could you please explain what pollution control measures you are proposing and whether it is possible to reduce urea emissions further with newer technology.			DN and KU have confirmed that, to their knowledge, there are no urea granulation plants being able to achieve 5 mg/m^3 urea dust emissions. The EFMA values for dust emission represent the Best Available Technology. The dust is downstream of the scrubber and double high performance demisters. These particles pass the scrubber and the demister as water-urea solution droplets. A closed air circuit faces the problem that the dust loaded air has to be re-heated and the respective heaters would plug with urea (note, air flow is	

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				1,050,000 Nm^3/hr at 100% operation). HFT are the scrubber suppliers and are investigating the subject, but they do not have a solution available yet or in the near future. In the Incitec project, KU had the same discussion and eventually 50 mg/m^3 was accepted. References for HFT granulators built by KU: QAFCO 3: Design standard 35 mg/Nm^3 Incitec: Design standard 35 mg/Nm^3 Dust emission (for DN project) is 287 tpa at 35 mg/Nm^3. KU is prepared to guarantee a dust design standard of 35 mg/Nm^3, however they are expecting that actual performance will be even better, with an expected value of 25 mg/Nm^3. KU have built scrubbers of different suppliers including Joy or Koch for this duty. However, a scrubbing technology is being developed by Kimre (Kimre Inc. Phase Separation Technology, Miami, FL, USA) for other fertiliser plants and is now being applied to urea granulation offgas with promising results in the range of 10 to 20 mg/Nm^3. Tests in a pilot plant (150 mtpd) of Norsk Hydro with Kimre packages showed lower figures than with the traditional Joy scrubbers. First installation in an industrial size plant (1000 mtpd, Norsk Hydro Sluiskil, Holland) is ongoing and commissioning is	

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			DN will offer best practice and will endeavour to reduce emissions after further design work.	expected this year. Adequate operation experience has to be gained with this installation, before any lower guarantees would be considered. DN will offer best practice and will endeavour to reduce emissions after further design work.	
6.8	Could you also please provide some information an ammonium carbamate – its toxicity, odour and potential for release. Also are there any other odourous or toxic materials likely to be emitted in minor quantities under normal or upset conditions?	Ammonium Carbamate is an unstable intermediate product, which decomposes under ambient conditions into ammonia, water and carbon dioxide. It has the same hazardous classification as ammonia. Under normal operating conditions no ammonium carbamate is released. It may be released under upset conditions. Upset conditions in the urea plant are a very rare case and a release of ammonium carbamate happens about one time per year. UF-85 is used as a granulation additive in small concentrations (0.55 %wt in final product). UF-85 consist of 65%wt formaldehyde, 25%wt urea and 15%wt water and is a commodity.			
6.9	Presumably it is not possible to recycle H_2 as fuel somewhere in the process rather than to flare it? Could you provide the reasons for this please?	There are no H_2 containing gasses or any other gases flared during normal operation (ie. from start-up conditions only). The H_2 in the ammonia synthesis purge gas is separated to 86% by a membrane system and recycled to the process, while the remaining purge gas containing the remainder of the hydrogen is used as fuel in the primary reformer.			
6.10	The desalination plant is still listed as optional. Please clarify if this is included in the proposal or not. If it is included, has space been allowed for it in the utilities area of the plant?	This is confirmed, space is provided in the utilities area.			

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6.11	Please confirm that the ammonia plant will use Kruppe Udhe technology.	Yes. KU is part of the Dampier Nitrogen consortium. KU technology will be utilized, subject to the outcomes of the detailed engineering study anticipated in the fourth quarter of 2002.			
7	**Terrestrial Branch comments**				
7.1	There is an over emphasis on the limited review of Welker (2002) and recapitulation of older material up to and including the BLUMP (which has considerable inaccuracies about vegetation). The emphasis should be on the new detail revealed by recent work, which highlights that the Burrup is different from other parts of the Pilbara, and provides a context within the Burrup for proposals. An authoritative review of vegetation assessment is provided in Appendix H, but some of this is not in the main text. Particularly: Section 3.2.11.4. The setting of the environmental impact context is incomplete. Tables are presented, but they are only partially interpreted and placed in context. This is because *they are not accompanied by the sections from the consultant's review which outline the impact of the project and the cumulative effect of industry in the vicinity (namely 7.2, 7.3 & 7.4*). The cumulative impacts of industry on vegetation of midslope soils is an issue. Most vegetation is limited in extent because of the large number of vegetation types forming the mosaic on the peninsula. At present what seems the most significant vegetation is less impacted by avoiding rockpiles. However, the general difference of the vegetation of the Burrup from the adjacent hinterland, which also imparts significance, appears not to be given adequate emphasis. A useful source of information for this topic is the review in Appendix H (Astron 2002). It outlines some of the cumulative effects on vegetation, and the significance of the King Bay-Hearson Cove area in particular. A large portion of certain types of the peninsula's vegetation is affected.			The proponent undertook a detailed review of vegetation effects in relation to recent work undertaken by Trudgen and Welker, as instructed by the EPA. DN is willing to use other reports if the DEP can provide details of material which may be available. Comments noted. DN has undertaken the best possible assessment and adopted all available measures to minimise vegetation impacts, in accordance with EPA advice and endorsement at the briefing on 20th June 2002. The text was introduced (see p. 106) as a summary of a comprehensive analysis, and the reader was encouraged to refer to Appendix H, much of which extends beyond the scope of the DN assessment. The sub-consultant who undertook this review was consulted to ensure that they were satisfied with the contents of the summary text prior to finalisation of the environmental assessment.	The proponent acknowledges the comment that cumulative impacts of industry on vegetation of midslope soils is an important factor, and the general difference of the vegetation of the Burrup from the adjacent hinterland is noted (see Section 3.2.11.3 of the CER Supplement). It is noted that more work needs to be done at a strategic level to further consider the local and regional context of the salt flats of Hearson Cove. See commitment No. 2 (Table 4.1) to contribute towards a further regional survey of the samphire vegetation communities in the KB-HC valley.

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	It draws attention to: i) The combined effect on vegetation of King Bay – Hearson Cove industry being very high, due to the high incidence of bare areas (rock, mudflat or pre-disturbed). That is, there is limited vegetated area, much of which is impacted. The combined area is also significant compared to the amount in the Conservation area. ii) 10 of 11 vegetation types in the proposal area are threatened by combined industry, and 2 to a major extent by the proposal alone. Combined industry has yet to address the lack of local and regional context of the salt flats of Hearson Cove, and more work is needed.				
7.2	The second part of Appendix F has a short review of the effects of nutrients on vegetation (Campbell 2002) which outlines some clear principles that appear not to have come forward in the main text. These include: i) The continued use of World Health levels of N in the environment against an Australian background. This is inappropriate for the key reason that there are very low levels of nutrients in much of the Australian environment (Campbell 2002 clearly alludes to this); ii) The text does not acknowledge (3.2.3.6) that the review concludes that the most susceptible areas to immediate impacts will be the rockpools; iii) The text does not acknowledge that the review indicates that other major likely outcome of a change in nutrients is a change in plant community composition (to the advantage of invasive species); iv) The text does not acknowledge that the review indicates weeds are likely to be advantaged. (Here the control of weeds is advocated by the review, but this is unlikely to prevail in the long-term if the natural levels of nutrients have been changed).		Best available weed control measures, in combination with the adoption of BAT strategies to ensure that source emissions are minimized to the greatest extent practicable, will be used to mitigate potential effects of urea dust emissions.	As previously advised, DN has consulted with CALM regarding potential effects on rock pools. DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock pools would also be limited by ephemeral nature of those pools. DN commits to include monitoring of rock pools for first 12 months of operations to assess if any potential effects are evident. The CER Supplement acknowledges that weed growth may be promoted in the vicinity of the project lease, as a result of urea dust emissions. Best available weed control measures, in combination with the adoption of BAT strategies to ensure that source emissions are minimized to the greatest extent practicable, are the best means of mitigating potential effects in light of the current uncertainty.	

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7.3	Combined emissions are a major issue for the combined industry which clearly need to be managed and modelled jointly. A) A very significant feature of the climate of the Burrup is persistent ambient, maritime, moisture, which attenuates the arid environment. It is a key point of difference with the hinterland, which otherwise shares the same likelihood of cyclonic rain. That dew is a key phenomenon is indicated by regional maps in Gentilli (1971), the general observations of Burbidge (1944) and Suijendorp (1965) on the near-coastal zone, and the evident dew in the mornings at Dampier (pers. obs.). It is this phenomenon, combined with condensation surfaces provided by the major rock outcrops (Geological Survey of Western Australia 1979), that are likely to be key to the biota of the peninsula. Emerging issues for the combined industry are: i. Synergies between NO_X and SO_X in dew, rainfall and soil; ii. How NO_X & SO_X will ultimately alter the different soils (including any buffering capacity of the soils and how long it might resist impact); iii. How NO_X & SO_X will affect mineralization from rocks; iv. Which of N, S & P will be most influential (P is most likely to be limiting); v. In the event of a plant failure the combined influence of Burrup Fertilisers and the Ammonia plant needs to be considered; These all require very thorough review, and clarification of knowledge deficit and risk. B) The Methanex PER provides information on total N deposition that shows the impacts will be significant on short-term time scales at an ecological level. Combining the data of Methanex (2002) and Casson (1994) it is evident that the surface soil pool of nutrients is likely to double under emission loads within 25 years (see the following table). Note well that the value for industry is based on a conservative value of deposition of 5% of emission, so it is very likely that the pool will be exceeded in less than 25 years. C) Clearly there is an urgent need to model the wind/humidity/dew/air inversions etc for the Peninsula and plan the height, direction and timing of emissions so				Comments noted. DN agrees with the DEP's comment that cumulative emissions need to considered and managed in a cooperative manner (see Commitment No. 25 in Table 4.1). Comments noted. DN agrees with the DEP's comment that cumulative emissions need to considered and managed in a cooperative manner (see Commitment No. 25 in Table 4.1).

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	that they will be widely dispersed, rather than have them settle and accumulate in situ.				
7.4	*Fauna* This fauna review presents no information additional to the original CER and does not include reference to significant recent studies or reviews of the fauna on the Burrup Peninsula. In particular two reports commissioned in 2001 titled "The Identity of Planigale on Burrup Peninsula" and "The Lerista muelleri Complex on the Burrup Peninsula" and references contained within these would have been useful in a fauna assessment of the project area. These reports and references should be reviewed and considered in the completed fauna survey. The proponent should review recent literature and relate the information to likely fauna impacts on their site and cumulative impacts from industrial developments particularly in the King Bay-Hearson Cove area as well as the Burrup Peninsula as a whole to demonstrate that there will be no significant losses to regional biodiversity. As the fauna survey has not been completed, it should be demonstrated prior to the finalization of the assessment that fauna impacts will not represent a "fatal flaw" for the development of the site.		DN will ensure further site-specific surveys to investigate the occurrence of Priority Fauna species to be conducted prior to construction in consultation with CALM, scheduled to occur concurrently with the wet-season flora survey.	Please refer to the updated biological assessment review (Appendix H, and summarized in CER Supplement), and Appendix I (ENZER land snail survey). These reports, in addition to further consultation with CALM and other key stakeholders, represent an update of the information provided in the 1998 CER. Disturbance of fauna habitats has been minimised by avoiding the significant rocky areas towards the northern end of the Project lease. Please note DN's commitment to ensure further site-specific surveys to investigate the occurrence of Priority Fauna species to be conducted prior to construction in consultation with CALM, scheduled to occur concurrently with the wet-season flora survey. This will enable areas to be identified within the Project area to be avoided during both construction and operation phases of the Project. DN will also prepare and implement a Fauna Management Plan which will identify procedures, monitoring requirements, workforce training and responsibilities to minimise disturbance of significant terrestrial fauna. *[commitment, already listed in Table 4.1]*	

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8	**Marine Branch comments**				
8.1	CWT & pipelines – fiberglass reinforced and non-corrosive materials. The proponent is to be commended for incorporating this element into the design.			Support noted.	
8.2	PRCL have agreed to meet the TDS (salinity) and temperature constraints ' under normal operating conditions'. What does this mean? The proponent should state for what percentage of time (eg 98 %) 'normal operating conditions' can be expected. The proponent should explain what the effluent characteristics are likely to be under departures from normal operating conditions.	Normal operating conditions with respect to salinity constraints will apply for 90% of the operating days for the first year and 98% of the following years. During up set conditions of the cooling tower and/or the desalination plant it may happen that the salinity will exceed the limits for a few hours. It is of paramount importance for the operator to come back to normal values as soon as possible, as the plant cannot be operated for long with high salinity. The constraint of the return temperature not exceeding the sea water temperature by more than 2°C means linking two parameters, which actually can not be linked to each other: The sea water temperature depends on long term (seasonal) changes in the sea. The brine return temperature depends on the wet bulb temperature of the ambient air and therefore fluctuates quite a lot on a short term (hourly basis). E.g. on a hot day in the winter time the sea water temperature is low, but the wet bulb temperature and therefore the return temperature is high. At that moment the return temperature may exceed the sea water temp. by more than 2°C for a few hours. Note, this still complies with the Water Corporation common user discharge requirements that require brine discharge temperature to be less than 2^{o}C above inlet seawater temperature for 80% of the time.			

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8.3	Table 3.22 and 3.23. The proponent is asked to confirm that these tables characterise the full combined effluent (including all streams) exiting the plant to the WC main brine return line.	Effluent characteristics will be as shown in Table 3.22 and 3.23 with the exception of nitrogen levels. Nitrogen discharge will be 43 kg/day and alternatives to reduce this discharge will be investigated during the design phase of the project.			
8.4	Appendix F, Section 6.1 provides annual nitrogen load estimates of 15,700 kg N/a (maximum) and 7,300 kg N/a (target) for process wastewater, and 73 kg N/a for domestic wastewater. I am unable to reconcile these quantities with the estimates provided in Table 3.22, namely 345-3,450 kg N/a, and 1.46 – 2.92 kg N/a, respectively. The proponent is requested to resolve this apparent discrepancy, also noting the concerns expressed by the DEP in respect of nutrient loadings (see comments on Appendix F).	The annual nitrogen load estimate of 15,700 kg/a (max) used for the cumulative N assessment is consistent with the current proposed discharge level of 43kg/d, as described in the CER Supplement. The value of 7,300 kg/a (target) corresponds to the reported target of 20 kg/d (to be confirmed during detailed design), however since release of the CER Supplement DN are not pursuing this 20kg/d target level, but instead are evaluating two options which may provide greater reductions. The proponent acknowledges that Table 3.22 reports anticipated N contribution as 345-3,450 kg/a. This range corresponds to the potential target levels of 1-10 kg/d that are yet to be confirmed as viable in this application, but are being further investigated by DN. This entry in Table 3.22 should specify 15,700 kg N/a (target 345-3,450 kg/a), as described in the text on page 86.			
8.5	*Catalysts and other process chemicals* The PER has described various aspects of the process, including various chemicals that are used. These include catalysts based on Cobalt, Molybdenum, Zinc, Nickel, Chromium, Copper, Palladium. Other substances used include Piperazine, Amerel 1500. The proponent should address the risk of these contaminants contaminating the marine environment.	There is nil risk to the marine environment. Catalysts are not used in the water cycles of the project design.			

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8.6	*Treatment Chemicals* The proponent proposes using biocides and anti-scalants in the seawater cooling system. As an environmental justification for the use of these biocides the LC50 values for one fish species has been presented. These data refer to the ACUTE toxicity of the products to a single fish species that is probably not found in the north-west of Australia. No information has been given on the chronic toxicity of these products to a range of locally occurring species at different trophic levels. Neither has any information been given as to the loading or fate of these products (or their derivatives after use) in the environment. The proponent is requested to supply the above requested information.	The LC50 values of biocides were provided in line with typical toxicity data, information on specific north-west fish species is not available. Such LC50 data is derived from commercially available MSDS and compared with ANZECC guidelines. A copy of these MSDS is available on request.	If proposed treatment chemicals promise an unacceptable impact or risk to the environment, then DN will agree a plan with the DEP to mitigate or more completely research this impact. This plan may include a consideration of alternative treatment chemicals and/or a toxicological study on local marine fauna.	The assessment has been undertaken to the greatest extent practicable with the available knowledge. If independent experts confirm that the use of these treatment chemicals at the proposed concentrations represent a reasonable risk, the proponent will undertake a toxicological study on local marine fauna.	To be addressed in conjunction with other prospective industries as part of the Government-Industry Taskforce, there may be the potential for a cooperative toxicological study on local marine fauna.
8.7	In Table 3.24, the term dosing rate with units ppm is very confusing. Please explain adequately what this is.	1-10 ppm means an additive will be added to achieve a concentration of 1-10 ppm in the seawater cooling system.			
8.8	With respect to the use of chlorine, it is said that it will be chemically reduced to a non-toxic form prior to being discharged from the PRCL plant. What will those non-toxic forms be? *(sodium sulphate and sodium chloride)* What are the risks that residual chlorine will be discharged? What control/monitoring/contingency measures will be taken to ensure that there is no residual chlorine discharged from the PRCL plant? (Chlorine monitor(s) will be in place).	Will use sodium metabisulphite to reduce the 'free' chlorine. Monitoring details will be confirmed with the DEP as part of the final EMP. No ANZECC criteria relates to these additives or their active constituents.			
8.9	*Boiler Feedwater Conditioning* The proponent states (p86) that the use of ammonia for conditioning is preferred over the use of phosphates ….. 'to minimize the discharge of phosphates to the environment'. Yet the proponent has not provided any discussion as to whether the marine environment is phosphorus limited or nitrogen limited. In the absence of this information, the above statement appears to be totally arbitrary. Please address.	Noted. DN is aware of the recent data presented by Pearce et al. which suggest that at certain times of the year there may be potential for phosphorus to act as the limiting nutrient. DN is aware that the alternative technology is using phosphates, rather than ammonia. This is preferred by Agrium, however KU as the technology provider has advised that this may present inherent problems. DN will investigate both options during detailed engineering design, and consult with DEP Marine Branch prior to works approval.	DN will further evaluate both dosing systems (ammonia- and phosphate-based) during detailed engineering design, and consult with DEP Marine Branch prior to works approval.		

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8.10	The proponent states (p86) that blowdown is required at a rate of 12 m^3/hr carrying a concentration of 150 ppm ammonia (43 kg/d). In terms of N load, this cannot be reconciled with the N load provided in Table 3.22. The proponent is requested to resolve this apparent discrepancy, also noting the concerns expressed by the DEP in respect of nutrient loadings (see comments on Appendix F).	As previously confirmed, N load will be 43 kg/d and alternatives to reduce this discharge will be investigated during the design phase of the project (refer to Response 8.3).			
8.11	The proponent refers to the potential for stimulation of macroalgae on rocky shores, and yet there seems to have been no consideration of potential nutrient effect on coral communities which inhabit these rocky shores.	The WAWC outfall dispersion modeling indicates that any increase in nutrient concentration at the adjacent rocky shores would be very low. At such low levels the impacts on corals are indeterminate. Potential impacts were considered in Section 3.1 of Appendix F.			
8.12	Cumulative Impact Assessment. It needs to be emphasized that the EPA had two paramount principles in its Section 46 report of march 2002. These were: · Waste minimization and best practice · Cumulative impacts on environment to be acceptable.			Noted and endorsed by the proponent.	
8.13	The DEP notes the proponent's commitment that ' Liquid effluent and stormwater runoff will be managed to maintain or improve the quality of surface and marine waters'. The monitoring referred to (p89) is inadequately described and inadequate in its scope. · What does 'periodically' mean? · What levels of analytical reporting are required? · Sampling, handling, analysis, data analysis procedures, and reporting in digital format? · Need for periodic screening analysis of effluent, to determine if there is unsuspected contamination directly from the PRCL plant, or indirectly from external to the plant (eg atmospheric deposition from other industries). · How will the PRCL industry monitoring commitments dovetail with the monitoring to be carried out by the Water Corporation as part of its overall environmental management responsibilities for the seawater supply/brine return facility. The DEP preferred position is that, at the point of total effluent discharge from PRCL into the WC brine return	The correct context of this statement is that the proponent acknowledges the intent of the EPA's standard management objective in relation to discharge water quality, based on the guidance provided by the ANZECC guidelines. In addition, discharges to the WAWC brine return facility will comply with appropriate criteria for acceptance.	It was not the intention of the CER Supplement to identify all monitoring details. This is to be addressed in finalizing the EMP in consultation with the WAWC and the DEP. Monitoring commitments will be implemented so as to complement the WAWC's management responsibilities for the seawater supply/return facility. The 99% species protection criteria will be met, as listed in	Agreed. The 99% species protection criteria for toxicants	

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	facility, the effluent quality should meet the 99 % species protection levels or twice the filtered value of unpolluted seawater (ie regional background level), whichever is the greater. This allows for the natural toxicant levels in seawater and concentration of toxicants in the brine due to evaporation.		Table 3.23 of the CER Supplement.	will be met.	
8.14	*Stormwater* The PER (p 88) proposes that potentially contaminated stormwater will be directed to the retention pond for retention, testing and treatment 'as necessary'. The DEP has a range of concerns in this respect: · The testing is proposed is for sediment load, salinity, pH and 'other relevant parameters'. The proponent needs to state explicitly what the other relevant parameters are. These should include nitrogen and phosphorus and selected other contaminants, based on a knowledge of the chemicals used in the plant as feed materials, catalysts, treatment chemicals, etc. · The test criteria at which treatment of the stormwater would be activated have not been stated, and should be developed as part of the environmental management plan. · The proponent needs to be able to characterize more fully the quality of site runoff, and needs to commit to manage this runoff so that it will not result in water quality degradation. The stormwater management plan (and site plan) needs to be more carefully designed, with a view to minimizing stormwater contamination, promoting recycling and reuse, addressing the above dot points. The assumption is made in the PER that it is possible to delineate areas of the site which will only generate 'clean' stormwater from those areas of the site which will generate 'potentially contaminated' stormwater. No explanation of how this differentiation will be made has been presented. Also, no consideration seems to have been given to the fact that the Burrup Peninsula is increasingly becoming the site of a large industrial complex. Because of this, there is potential for contaminant atmospheric deposition from other industries to impinge on the Plenty River site, creating the potential for stormwater drainage to be contaminated. (While this issue is of concern with respect to marine impacts, the need for stormwater	The proponent has responded to this question in detail previously. Please refer to Comment No. 2.2 for details on the appropriate design and management of stormwater.	Noted. DN believes it has addressed stormwater management considerations to the greatest extent appropriate for environmental assessment (see also Response 2.2). The details of proposed measures will be confirmed in the finalisation of the EMP and final detailed design.		

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	retention needs to be balanced with the size of ponds and the clearing of vegetation. The proponent should also consider this impact – comment from A Barter.)				
8.15	*APPENDIX F* *Analysis of Nitrogen Contributions* The Table on page 16 does nothing to suggest that the nitrogen loads to Mermaid Sound are insignificant. On a per squ km basis they are comparable to the Cairns and Tully tropical systems; on a per cub km basis they are in excess of Cairns and Tully. The Table of N inputs to Perth's coastal waters is not transferable, because it is a temperate, not a tropical marine system. Of all the estimated N inputs to the marine environment from PRCL, discharge of process wastewater via the WAWC outlet is by far the greatest contributor. This point discharge occurs in the inner, more poorly flushed part of the Dampier Archipelago. PRCL constitutes the greatest direct, point source discharge of N to the marine environment (via the WC outfall). Based on estimates presented in the supplementary PER, the PRCL direct N input to Mermaid Sound are far in excess of the other proposed industries. The estimates of dry airborne deposition of N are order of magnitude estimates only, however they do indicate the urgent need for dry deposition rates to be studied more carefully in a cumulative sense for all of the industries on the Burrup. The environmental implications of the substantial estimates of airborne deposition of N as urea particulates and airborne gases (NOx and NH_3) to Nickol Bay has not been discussed in detail. Results of hydrodynamic modeling of particle trajectories showed surprisingly long residence times in Nickol Bay, and on this basis Pearce et al (in press) have suggested that Nickol Bay may be a relatively enclosed system. It is therefore appropriate that the company should provide a cumulative assessment of nutrient inputs to Nickol Bay, and their potential environmental effects. The EPA has emphasized that all industries proposing to establish on the Burrup are to make best practice and waste minimization a primary goal. PRCL should review and amend its effluent and emissions treatment processes to substantially reduce its N loads to both the marine and atmospheric environments.			Noted. The purpose of Section 9 of Appendix F is to place the industrial inputs of Mermaid Sound into perspective. Due to current gaps in understanding (as identified in the table on page 16 of this assessment), it is not possible to make the comparisons drawn by the Marine Branch. The inclusion of Perth data (along with that from Darwin) in the table on page 18 allows comparisons with areas with which readers are more likely to be familiar. It is noted that the daily N loads cited in this table do not include industrial, riverine, groundwater or atmospheric inputs for either Perth or Darwin.	

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	Work is also urgently required to develop a better understanding of what constitutes an environmentally safe load of nutrients to the Mermaid Sound and Nickol Bay. That understanding presently does not exist.				Comment noted.
8.16	*Phosphorus Inputs* Pearce et al. (submitted) have presented data which suggest that in inshore areas of Mermaid Sound the N:P ratio may, at certain times of the year exceed the Redfield ratio. Under these conditions there may be potential for phosphorus to act as the limiting nutrient. This suggests that a similar review of cumulative phosphorus inputs should be carried out for Mermaid Sound and Nickol Bay.				Comment noted.
8.17	*Effects of Atmospheric Deposition on Vegetation* In the section 'Potential Effects [of air contamination] on Biophysical Attributes, there has been no reference to impacts on mangroves. The effect of urea to be able to 'burn' leaf tissue or impact mangroves in other ways does not seem to have been addressed, although this issue has been previously raised by the DEP. (Your answer is noted, however there is no supporting evidence to conclude that the urea deposition on mangroves or other vegetation leaves is at a level that would not cause an effect. In this circumstance it is expected that the proponent will not only monitor but will define a threshold effect and a trigger level for management action –see following paragraphs – A Barter).	As part of the preparation of the CER Supplement, the proponent liaised with the Queensland EPA to seek advice regarding potential effects of urea dust on mangroves, based on operation of the Incitec plant at Gibson Island. It was confirmed that, in over 30 years operational experience, scalding effects on mangroves has never been raised as an issue for concern for fringing mangrove habitats nearby that plant, which has traditionally emitted much larger volumes of urea dust than the BAT levels anticipated from the DN project. It is acknowledged that dust may cause scalding of mangrove leaves if present in sufficient quantity, however, any detectable impact is considered extremely unlikely, given the distance between the plant and the mangroves. No experiments have been conducted by the Proponent. A programme to monitor such effects will be established prior to plant operation as part of finalising the EMP. Establishment of appropriate early warning triggers will be discussed further with the DEP.			

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8.18	Returning to vegetation in general, including mangroves. The subsection 'Urea Deposition' concerns itself with potential N fertilization on vegetation. However, it only considers the contribution from urea deposition, and does not consider the cumulative fertilizer potential including contributions from wet and dry deposition of NOx, which appears to be able to contribute significantly.		Commitments have been made to monitor for potential effects of N-containing compounds, which may be able to integrated with the cooperative KB-HC industry group, and adopt practicable measures to minimise emissions during detailed design	The proponent initiated two independent reviews to determine the current state of knowledge regarding urea deposition effects. Both reviews concluded that the modelled urea deposition rates are well below those rates which have been correlated to N deposition loads witnessed to have polluted European ecosystems, and less than those used in field fertilizer trials on native vegetation. However, no data exist regarding the effects on vegetation of N deposition at this range within the Burrup setting. Commitments have been made to monitor for potential effects of N-containing compounds, which may be able to integrated with the cooperative KB-HC industry group, and adopt practicable measures to minimise emissions during detailed design	
8.19	PRCL (p68) has committed (?) to undertake vegetation (?) monitoring for 'secondary impacts'. The issue of establishing early warning indicators and triggers for management has not been addressed. The issue of what management commitments will be given to mitigate effects if these trigger values are exceeded has not been addressed. The proponent needs to propose the triggers and commit to management actions, should these triggers be exceeded.		DN will liaise with the DEP and other prospective industries to ensure the establishment of an appropriate monitoring programme for secondary effects on vegetation from atmospheric emissions on the Burrup. DN is tracking evolving technologies which will ensure that, in response to ongoing monitoring of potential effects, the best available techniques may be applied to ensure emissions are kept to best practicable levels.		
8.20	The absence of information (p68) on the impacts of atmospheric deposition on Pilbara vegetation in general, and mangroves in particular is acknowledged by the proponent.				Noted.

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8.21	What are the environmental implications of a spill of ammonia or urea on marine life Has the increased risk of siting the proposed urea storage shed close to shore been evaluated.	DN has raised the base level of the storage shed to accommodate a 1-in-300 year event. This is to be further addressed through the DPA's proposed Port Environmental Management Plan		An assessment of the potential risks associated with spillages of urea and ammonia are addressed in Section 3.2.8.2 and 3.2.8.3 of the CER Supplement respectively.	
9	**Australian Greenhouse Office comments**				
9.1	The AGO have provided some comments to Environment Australia on PRCL's ammonia/urea plant on the Burrup Peninsula. They note that the proponent has used a different methodology to estimate emissions and while this approach seems to be appropriate, further details on the emissions estimation should be provided to enable the AGO to confirm the inventory of greenhouse gas emissions.			(As previously advised, p. 75) The values presented in the GHG assessment are based on design data and vendor information from Krupp Uhde. DN and Krupp Udhe reviewed the relevant workbooks published by the Australian Greenhouse Office. The revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories was also reviewed to consider the methodologies described. Upon reviewing the above methodologies, it was determined that the calculations undertaken by KU represent very accurate estimates through directly simulating the combustion in the reformer as well as the CO_2 generation in the process and its subsequent separation. This is further supported by the following considerations: · the ammonia urea plant is self-contained with respect to energy, deriving all its power and steam energy from the one source of gas and not requiring imported power; · Krupp Udhe's process mass balance and energy balance models are accurate and have been used in the design of similar plants; · the mass balance uses the analysis of the actual natural gas feedstock available from the NWS and not a	

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				typical natural gas; and · these models are used for the design of the plant components and for estimating operating costs for contractual purposes. As a result, the data provided represents an accurate estimate using specific design data and simulations, rather than the methodologies defined in the workbooks which are significantly more generic in nature.	
9.2	The AGO noted the listing of the "no regrets" measures that have been included in the proposed design of the plant. They seek details on the greenhouse gas and fuel savings from these measures, as well as information on equipment efficiencies and other technical details.		DN is committed to join the voluntary *Greenhouse Challenge* Programme in cooperation with the AGO. As part of establishing a detailed Cooperative Agreement prior to plant commissioning, DN will then be in a position to determine precisely what efficiency measures will be set as targets for minimizing GHG's. This information is not currently available.		
9.3	The AGO also seeks similar advice on PRCL's list of possible "beyond no regrets" measures. The AGO also requests a listing of other mitigation measures which it considered but did not implement in the plant design, along with an accompanying explanation supported by sufficient technical details and an estimation of greenhouse gas emissions savings forgone.		As part of the *Greenhouse Challenge* Cooperative Arrangement with the AGO, DN will conduct detailed investigations of possible 'beyond no regrets' measures and their respective GHG gains.	The plant has been designed to maximize the Project's energy efficiency and DN will work with the AGO to continue to investigate ways of further improving this through the operations phase. As part of the *Greenhouse Challenge* Cooperative Arrangement with the AGO, DN will conduct detailed investigations of possible 'beyond no regrets' measures and their respective GHG gains.	

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9.4	The AGO notes that the proponent will be preparing a greenhouse gas emissions management plan and seeks information on how this plan will be prepared and implemented, as well as details on the plan.		A Greenhouse Gas Emissions Management Plan will be prepared with the AGO and DEP as part of finalizing the EMP during detailed engineering design. This will involve DN optimizing the Project's GHG efficiency and confirming the inventory as part of detailed engineering phase, and then working with the AGO and DEP to develop a set of agreed objectives, targets and performance measures to ensure greenhouse emissions are minimized as far as practicable over the life of the project.		
9.5	The AGO will provide Environment Australia with comments on the proponent's contention that emissions from the urea post production, should not accrue either to Australia or the proponent.			Noted. The proponent has received the AGO's comments in writing, which has been forwarded to the EPA SU.	
10	**CALM Comments**				
10.1	*Infrastructure* Infrastructure corridors on the Burrup are very limited. Pipelines need to be built to the maximum appropriate size to allow for expansion as well as use by other projects. There is no indication from the proponent that they are aware that infrastructure corridor space is limited.	DN is willing to consider cooperative arrangements with other prospective industries where practicable so as to ensure that infrastructure corridor space is efficiently utilised. This is an issue which needs to be strategically coordinated by the OMP.			
10.2	In Table 1.1 it indicates two pipelines which are of concern to us. They are: i) Natural gas pipeline 200mm diameter, 4.2-4.8 Mpag pressure. At section 1.5 it indicates this will be a dedicated pipeline. At section 2.3.1 it indicates the pipeline will be shared. There is no information on agreements with other companies to share the same quality gas and same pipeline pressure. It also indicates there will be an interconnection into the existing Dampier-Bunbury gas pipeline for emergencies. If this is possible then it raises the issue of whether the proponent could use the existing Dampier-Bunbury pipeline all the time.	The gas supplier has determined that a separate pipeline is required. DN has no part in determining this requirement.			

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	The pipeline size and pressure do not meet the recommendations in the Burrup Services Corridor – Development Plan, February 2000 by the DRD.				
10.3	ii) Methanol pipeline It appears likely that a methanol plant will be built on the Burrup in the near future. Two plants are currently proposed. The need for a methanol pipeline to transfer methanol from the port to the plant site is questioned. There is no indication the company is prepared to work with Government to minimise infrastructure requirements in the longer term or to share infrastructure with other existing and future projects. *Recommendation.* - Detailed plans are required at a scale of 1:5000 detailing the location and size of all pipelines and powerlines. These plans must be developed with the Office of Major Projects and detail the measures that will be taken to minimise impacts on future development in these corridors. - The recommendations and guidelines outlined in the report 'Burrup Services Corridor – Development Plan' Feb 2001 by the DRD should be implemented. - Approval for the methanol pipeline be conditional that if a methanol plant is built on the Burrup then the methanol pipeline is not to be built.	See response to Comment 10.1 above. DN will develop detailed plans with the Office of Major Projects as recommended, during detailed engineering design. DN will work with OMP, who has the responsibility for managing the infrastructure corridors.	DN will examine potential for use of locally produced methanol should a methanol plant be developed in the King Bay/Hearson Cove area. This will then remove the need for the methanol pipeline.		
10.4	*1.5.1 Urea Storage* We agree with PRCL that the preferred stockpile site is Option 1. This minimizes impacts on native vegetation and significant flora. This section also indicates the urea shed in option 2 has been shifted to avoid the MPR services corridor. This Department is not aware of any proposed services corridor at this location.	The MPR's Burrup West service corridor, referred to in this section, is shown in Figure 1.3 of the CER Supplement.		Noted and agreed by DN.	

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10.5	*2.3.1 Materials Transport.* It states the ammonia export pipeline will have a temperature of -30^{o}C. It is unclear if the outside temperature of the pipeline will be a hazard to wildlife. If a hazard is likely then this will require management.	(Previously advised) The pipeline (incorporating export and vapour return systems) will be double-skinned with 100 mm of insulation between the inner and outer skins. External skin temperature will therefore be dependent upon ambient air temperature and solar insolation, and highly unlikely to represent a hazard to wildlife.			
10.6	*3.2.1.4 Risk Management* Fire fighting facilities. Fire is part of the surrounding environment and periodic fires are inevitable, whether planned or unplanned. There are concerns over the potential for secondary impacts by extending plant operational and management demands in relation to fire into fire management in the surrounding natural environment outside the lease. This Department's view is that when a fire occurs on the land around the plant, the people responsible for managing fires in the surrounding areas remain free to make decisions regarding whether or not to let the fire burn. There are concerns that there will be pressure put on fire managers to put the fire out from the plant staff as it may be adversely impacting on production. Recommendation: - A commitment is given by the proponent that there will be no demands made on managers of adjacent lands to extinguish any wildfires, in circumstances other than when they pose a significant direct threat to the plant; - In designing the plant layout, the document 'Planning for Bushfire Protection' Dec 2001, FESA & WA Planning Commission be consulted and incorporated.		(Previously advised) DN is willing to adopt these recommendations, provided it is controlled and in accordance with fire regulations and protection of life and property. These measures will be incorporated into the final EMP based on further consultation with CALM.		

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10.7	*3.2.9.2 Light overspill* The company indicates it is aware of the potential impacts of light spill on surrounding environments. We are not familiar with Australian Standard AS 4282 Control of Obtrusive Effects of Outdoor Lighting. It is proposed to use this standard to minimise light spill. This Department is concerned that this may not be the best that can be done to eliminate light spill, and that a higher level of light spill control may be possible. *Recommendation:* The above standard should be used as a guide, but consideration should be given to improving on this standard where possible to eliminate light spill.	DN has already committed to keeping light overspill to a minimum, using AS 4282 as a guide, consistent with site safety and security requirements.	DN is committed to keeping light overspill to a minimum, using AS 4282 as a guide, consistent with site safety and security requirements.		
10.8	*3.2.11.4 Conservation significance of vegetation on PRCL lease* This section indicates that there are a number of very restricted vegetation units that will be significantly impacted by this development. These vegetation units are potentially Threatened Ecological Communities and following evaluation may be proposed to be nominated for listing as such. The electronic data required to allow this assessment to take place have not yet been received. *Recommendation* If the proposal is approved a condition should be imposed requiring that developments may only proceed after a thorough investigation of the conservation status of vegetation associations present on site and where rare or threatened ecological communities can be protected to the satisfaction of this Department.			The proponent has addressed vegetation impacts to the greatest extent possible, as presented at the EPA Briefing on 20 June 2002. All possible measures have been taken by DN so as to ensure that the two communities, of highest conservation significance, will be essentially undisturbed (eg. through relocation of ammonia storage tank, realignment of northern access road and power transmission lines, and selection of stormwater pond in previously disturbed areas).	
10.9	*Fig 1.2 General Site Location Plan* This indicates an access road to the north on to Village Road. The road is justified in section 2.3.3 by the statement 'this will provide alternative egress points in the event of emergency'. There are other alternative access routes that could be developed that would have less environmental impact. *Recommendation* The access to Village Road be rejected and alternatives with less environmental impact pursued.	DN has altered the proposed alignment of the emergency access road from Village Road, from that shown in Figure 1.2, in order to further minimise impacts on regionally significant vegetation. This emergency access road is required from a public risk perspective. Alternative road access alignments are being considered by Main Roads and OMP, as described in Section 2.3.3 of the CER Supplement. Whilst acknowledging that it does not have primary responsibility to make this decision,	Whilst acknowledging that it does not have primary responsibility to make this decision, DN will liaise with Main Roads and OMP in order to		

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		DN will liaise with these agencies in order to promote the option with the best environmental outcome.	promote the option for alternative road access alignments with the best environmental outcome.		
10.10	*Appendix F. Effects on Vegetation of Predicted Urea deposition rates* This report has been unable to determine the impacts of the ammonium deposition rates will have on the small calcareous freshwater pools found on the Burrup. *Recommendation* Further work is required to determine the impacts of emissions on these pools.	As previously advised, DN has consulted with CALM regarding potential effects on rock pools. DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock pools would also be limited by ephemeral nature of those pools. DN commits to establishing a monitoring programme for rock pools in consultation with the DEP.	DN commits to establishing a monitoring programme for rock pools in consultation with the DEP.		
11	**Air Quality Branch Comments** (received 10 July 2002, and clarified with Air Quality Branch 11 July 2002)				
11.1	[Request for re-modelling of AUSPLUME to be undertaken] The presented maximum hours in the report were actually the annual ninth highest hour. The ninth highest hour has been used in some circumstances but is not appropriate for the current proposal. This is especially true given that the Pilbara Air Quality Modelling report shows that AUSPLUME significantly under predicted observed concentrations for Dampier.	The air quality assessment adopted the standard widely-used industry approach to use the 99.9 percentile to overcome the need to place reliance on a single predicted value (that is, to allow for potential over-predictions due to extreme meteorological conditions input to the model), as stated in the Ausplume Gaussian Plume Dispersion Model Technical User Manual (EPAV, 1999). However, the proponent acknowledges the recent advice from the DEP Air Quality Branch (July '02) which suggests that the model may under-predict observed ground level concentrations at Dampier at the 99.9 percentile level. In response to this advice, the proponent has volunteered to re-model glc's based on using the maximum predicted value, which will be provided shortly. *[see URS Memorandum tabled 'Remodelling of NO_X emissions on the Burrup*			

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		Peninsula' dated 15/7/02]			
11.2	10/7/'02: Stack heights and emissions for Syntroleum are wrong. I am still waiting for Syntroleum to get back to me regarding the correct stack dimensions. 11/7/'02: [Current emission estimates for Syntroleum used by DN are actually higher than those revised and anticipated to be received. Current cumulative emission estimates are likely to represent a conservative over-estimate, and not a critical factor in the assessment– A. Blockley, pers. comm.]	The proponent confirms that the Syntroleum emission rates used in the assessment were correct at the time of the modelling, and had sought verification of the emission estimates by the Air Quality Branch prior to commencing Ausplume & TAPM modelling in January. DN was not informed of the change in Syntroleum emission estimates, from the publicly available data in the PER, until one week prior to the EPA briefing on the 20th June 2002, after the air quality assessment was published. As the revised Syntroleum emission data could not be made available in time for inclusion in the revised modelling presented in the memo currently being prepared, the emission data has been left unchanged. As noted by A. Blockley, Syntroleum has decreased its NOx emissions and increased its stack heights, hence the data used in the DN assessment is conservative.			
11.3	Building wake effects were not incorporated for all industries.		(See also response to Comment No. 1.1). The air quality assessment took into account potential building wake effects for the two proposed industries for which detailed site-specific building details were available (ie. PRCL and GTL). The specific locations of adjacent buildings on other proposed projects are not readily available, and compiling and entering this data as input files for all existing and proposed industries on the Burrup represents a massive task well beyond the scope of the current assessment. DN is prepared to facilitate a 'whole-of-		DN is prepared to facilitate a 'whole-of-industry' approach in addressing cumulative atmospheric modelling in a standardised manner as part of the KB-HC Industry Group, and will support Government initiatives as previously advised.

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			industry' approach in addressing cumulative atmospheric modelling in a standardised manner as part of the KB-HC Industry Group, and will support Government initiatives as previously advised. Building wake effects will be taken into account by DN during detailed design (see Comment No. 1.1).		
11.4	Methanex emissions were not included and Hamersley emissions were quite different from those used elsewhere.	As previously advised (p. 58 of CER Supplement), Methanex's emissions were not publicly available in time to be included in the modelling assessment. Hamersley Iron's emissions were revised slightly based on subsequent confirmation with HI environmental advisers (December 2001) prior to commencement of modelling.			
11.5	NO_2/NO_x conversion used a combination of Jansen and CSIRO techniques. We believe this to be inconsistent and makes it difficult to compare results.	DN believes that the NO_2/NO_x conversion used in the air quality assessment when modelling the DN emissions in isolation represents the most rigorous technique. Nonetheless, for ease of comparison with other modelling results, the simplified CSIRO approach has been accommodated in the re-modelling.			

Summary of Issues Arising From Stakeholder Consultations in Karatha/Dampier – 5 and 6 June 2002

Stakeholder	Issue	Dampier Nitrogen Response
CALM, Karratha	▪ CALM expressed concern that some vegetation communities that will be impacted by the proposed development may be classified as Threatened Ecological Communities as a result of the recent Trudgeon report. ▪ CALM advises that they cannot give definitive advice on the significance of projected impacts upon vegetation until they have had time to consider the Trudgeon and Welker reports.	Consideration is being given to relocating the ammonia storage tank and realigning the northern access roadway in order to reduce or totally avoid impact to the ChAbSg community. There is limited latitude to move the plant footprint to avoid the AbTa/AbImTe community, although detailed site planning will aim to minimize impact. DN notes that no impacts at a species level will result from the proposed ammonia/urea plant construction, and that inaccuracies in the Trudgeon mapping (identified by Astron site surveys) indicate that these communities may have a slightly wider distribution than that noted in the mapping. Impacts upon *Terminalia supranatifolia* at the Option 2 urea storage shed site are noted, and form the basis for Option 1 being the preferred site. URS has consulted with OMP to ensure the transfer of vegetation data obtained by OMP to the CALM endangered species and communities unit at Woodvale.
	▪ Questioned size, pressure and future expansion plans for the gas supply pipeline, while acknowledging that these were not issues under the control of DN. Requested DN demonstrate commitment to work with government to minimize infrastructure requirements on the Burrup.	DN is a customer of the pipeline service provider and has no role in planning, construction or operation of the pipeline. To the extent available, DN supports government in any endeavour to minimize infrastructure requirements, noting the capital and maintenance cost savings to be achieved.
	▪ If it is possible to connect to the existing DBNGP for emergency supply, why can't this be the normal condition, i.e. why is a separate gas supply pipeline required for industry?	The gas supplier has determined that a separate pipeline is required DN has no part in determining this requirement.
	▪ What will be the external skin temperature of ammonia export pipeline.	The pipeline (incorporating export and vapour return systems) will be double-skinned with 100 mm of insulation between the inner and outer skins. External skin temperature will therefore be dependent upon ambient air temperature and solar insolation.
	▪ CALM sought commitment that light overspill would be kept to the minimum.	DN has already committed to this, consistent with site safety and security requirements.
	▪ Where will the methanol pipeline go?	Between the wharf and plant, along the service corridor. DN will examine potential for use of locally produced methanol should a methanol plant be developed in the King bay/Hearson Cove area.
	▪ CALM sought commitment that DN would permit bushfires on site to burn without intervention, consistent with protection of life and property. Suggested that the FESA and WA Planning Commission (December 2001) bulletin *Planning for Bushfire Protection* be reviewed during detailed plant design.	Yes, provided it is controlled and in accordance with fire regulations and protection of life and property.
	▪ As a general comment, CALM expressed satisfaction with the obvious efforts DN had exercised in trying to identify all potential environmental impacts and were impressed with the measures proposed to avoid, reduce or mitigate potential impacts.	DN notes this endorsement.

Stakeholder	Issue	Dampier Nitrogen Response
Dampier Archipelago Preservation Association	▪ DAPA is particularly happy with alternative wastewater discharge measures compared to 1998 proposal.	DN notes this endorsement.
	▪ Concerned with cumulative impacts but satisfied that these have been addressed by DN and do not anticipate any significant reduction in the amenity value of Hearson Cove.	DN notes this endorsement.
DEWCP, Karratha	▪ Identified general community concerns regarding amenity at Hearson Cove (dust, light, odour, noise, air quality). Expressed satisfaction with the assessments and commitments made by DN, and noted that concern with Hearson Cove amenity is more a result of government planning to develop the area as an industrial area rather than concerns with any particular proponent.	DN remains committed to implementing all practicable measures to reduce off-site signature to protect recreation amenity of Hearson Cove.
	▪ Requested DN examine possibility of reestablishing vegetation communities to be disturbed at another suitable location on site.	Preliminary analysis indicates that this may not be possible, although DN will continue to consider options.
	▪ Expressed concern over cumulative loss of Aboriginal sites on the Burrup Peninsula, although expressed satisfaction with Aboriginal heritage protection measures employed by DN.	DN's approach has been endorsed by DIA.
	▪ Requested effective monitoring of urea deposition effects.	Already committed to by DN.
	▪ Requested DN opt for use of 'environmentally friendly' anti-scalants, not just the cheapest.	DN has indicated the intention to use anti-scalants and biocides of low (negligible) toxicity.
	▪ Requested DN commit to 'reduction' of waste, not just re-use/recycling (as stated in the CER Supplement), and that there be no on-site burning of waste during construction.	DN is committed to waste reduction measures as a component of good business practice. No on-site burning of waste will occur.
	▪ Will DN consider working in a cooperative approach with other prospective Burrup industrial developers and the Shire of Roebourne to address waste disposal issues?	Yes, and liaison has already been established. The Shire of Roebourne has confirmed that their landfill facility is certified and able to accept the projected waste streams from all Burrup proponents, for those wastes which will be disposed to landfill (i.e. not diverted for reuse, recycling or specialist disposal).
	▪ Will DN practice 'waste stewardship' to confirm that waste consigned to contractors for disposal is properly disposed of in accordance with extant regulations.	Yes, as a component of the plant's EMP procedures.
	▪ Can 'adverse' tidal conditions (e.g. an incoming tide) be avoided when discharging N laden wastewater?	Possibly, but an incoming tide is probably the best condition under which to discharge N, permitting the mangroves in King Bay to act as N strippers. Otherwise, the level of N anticipated to be discharged (43 kg/d) is so low as to cause no discernible impact.

Stakeholder	Issue	Dampier Nitrogen Response
Shire of Roebourne	▪ Timing of construction, especially delivery of modules and potential impact upon road users and infrastructure.	Detailed planning for road moves will be contained in the project logistics plan. The largest module to be delivered to site will be in the order of 51 m and 450 t, with the next biggest module about half of that size. Planning for road moves will be cognizant of causing minimal disruption.
	▪ Workforce accommodation, during both construction and operation phases.	DN is a member of the Government taskforce established to manage workforce accommodation, and has joined in a partnership with State and local government and other Burrup industrial developers to provide a comprehensive package of measures for construction workforce accommodation. DN has also undertaken separate negotiations with accommodation providers to examine options. DN is also examining the best accommodation options for the operations workforce, with the objective of providing quality of life which promotes workforce stability.
Pilbara Development Commission/Karratha Chamber of Commerce and Industry	▪ Workforce accommodation, during both construction and operation phases.	See above
	▪ Capacity of local social services and infrastructure to cope with expanded Karratha/Dampier population.	This issue is noted by DN, but is essentially an issue for government. DN will cooperate and support government initiatives to the extent practicable.
	▪ Local community is satisfied with current plans for industrial development in King Bay/Hearson Cove area, but want Sate government to plan for any future developments to be at Maitland.	This is beyond the powers of DN to influence.
	▪ Requested DN support of local service providers and merchants.	DN will use local businesses where practicable, consistent with competitive business practices and quality of supply.
	▪ Protection of recreation amenity of Hearson Cove, noting that local community is confident that any impacts upon Hearson Cove from DN will be kept to a minimum by virtue of DN commitments, although long-term it is preferred that an alternative beach be provided by State government.	DN notes the support of the local community. The issue of alternative beach access is a matter for government.
Dampier Port Authority	▪ No issues of any concern. Satisfied with environmental assessments and commitments made by DN.	DN notes DPA's endorsement.
Nickol Bay Naturalists Club	▪ Noted potential for urea to accumulate in rock pools.	DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock polls would also be limited by ephemeral nature of polls. DN commits to include monitoring of rock polls for first 12 months of operations to assess if urea is having any affect upon rock pools.
	▪ Generally satisfied with environmental measures proposed by DN, especially protection of Pilbara olive python habitat through relocation of plant from rocky ridge area.	DN notes general support of Nickol Bay Naturalists Club.
Friends of the Burrup	▪ The planned meeting was cancelled at the request of the Friends of the Burrup, although dialogue with the group indicates no particular concerns with the DN proposal.	DN wishes to continue dialogue with this group, dependant upon advice of a new point of contact.

DAMPIER NITROGEN AMMONIA/UREA PROJECT – CER SUPPLEMENT
RESPONSE TO EPA SU COMMENTS, RECEIVED 8 JULY 2002

	EPA SU Comment	Category of Response [1]			
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1	***Air Emissions***				
1.1	11/6/02: stacks should be high enough to avoid building wake effects. This does not seem to be the case (page 60). 8/7/02: If you have a lack of information on building heights, the alternative is to make a commitment to rerunning the modelling with more accurate information during the detailed design phase and to ensure that stacks are high enough to avoid building wake effects and topographical effects. Liaison with DEP's Air Quality Branch is strongly recommended.	Dampier Nitrogen will ensure that building wake effects are taken into account during detailed design in consultation with the DEP Air Quality Branch.	As shown in the model output file included in Appendix D of the CER Supplement, DN plant structures are tall enough for building wake effects to be disregarded except for when winds are blowing along the north/south wind line or from the southeast. When the wind is blowing from these directions, the model has included wake effects when calculating maximum downwind concentrations. The impact is expected to be minor, if at all, given the limited range of affected wind directions and the height of the stacks involved.		

[1] As recommended by the EPA Service Unit, facsimile received 8 July 2002.

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1.3	8/7/02: Please confirm that the 75mg/Nm^3 will be calculated as NO_2 at 15% O_2 reference level, dry, at STP. (Note that Table 3.12 does not give standards for gas turbines and that the standard stated for steam boilers is at 3% O_2). There is potential scope for reducing NOx levels further by reducing reformer emissions by the use of low NOx burners, as at CSBP. Has this been considered and if discounted why? Could you provide some comparison with NOx emissions with similar new ammonia and ammonia/urea plants worldwide?	The KU ammonia design incorporates low NOx burners. Latest advice from burner suppliers has confirmed this. NOx level can be reduced by omitting combustion air preheating, but this reduces the energy efficiency drastically, and is likely to result in adverse outcomes in relation to increased noise, and greater catalyst volumes requiring disposal at substantial cost. The latest NOx measurement in a KU ammonia plant was done in Saskferco in 1992. The guaranteed value was 200 mg/Nm^3, the actual measured 120-130 mg/Nm^3. Therefore the given limit of 150 mg/Nm^3 is appropriate. Dampier Nitrogen has already committed to adopting low-NOx burners for both gas turbines and the boiler (see Commitment 11 in Table 4.1).			
1.4	8/7/02: When are start up [air emissions] data likely to be available? It is preferable that this is available before the finalization of the EPA report. If not, I suppose the same logic as 1-1 could be applied, that the impacts of start-up and emergency emissions are considered after detail design.	As previously advised, emission data for these operating scenarios was not available at the time of preparing the air quality assessment.	These data will be provided by DN during detailed design.		
1.5	11/6/02: Ammonia emissions from the Granulation Plant are nearly double best practice concentration levels and more than double in kg/t product terms (European Fertilizer Manufacturer's Ass). Reason given is that wet scrubbers produce too much solution to dispose of. What about dry scrubbers such as activated C or gallium nitride? 8/7/02: Ammonia emission levels are still of some concern. At our meeting of 11/06/02 we discussed you providing some explanation of your reasons for the non-BAT emissions eg why the normal method of acid scrubbing is not feasible and what alternatives have been considered and discounted for what reasons. You need some justification of why BAT levels are not achievable	EFMA figure is based on using acid scrubbing. Reference is one Toyo designed plant in Piesteritz, Germany and one HFT designed plant in Carrara, Italy, where the generated nitrate solution can be processed in NPK plants nearby (NPK refers to Diammonium Phosphate, Mono Ammonium Phosphate, and Potassium-Sodium Nitrate). Where NPK plants are not nearby, the acid scrubbing would be converting a smaller waste gas			

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	some justification of why BAT levels are not achievable and that you have done your best to achieve them. The EPA report also needs to explain why we are accepting non-BAT levels. We have a lack of knowledge of nutrient impacts on the Burrup (but a very real possibility that there will be adverse impacts) of the combined and cumulative effects of NOx, ammonia and urea. This makes the acceptance of non-BAT levels difficult to justify without good reasons.	problem into a major liquid waste problem. *Consideration of dry scrubbers including activated carbon:* Activated carbon is not suitable for scrubbing ammonia (Reference David Healy of James Cummin & Sons 02 9748 2309). Activated carbon is suitable for non-water soluble, high molecular weight, or organic substances. Acid scrubbing of ammonia emissions would require 2,332 tpa of nitric acid to be transported from Perth, and require 3,864 tpa of ammonium nitrate to be returned to Perth district for potential use for agricultural purposes. This alternative would make the project non-viable. The proposed control measures represent BAT for the Pilbara, noting that measures assumed in EFMA guidelines do not eliminate the waste but only reconstitute it into a form which would present as more problematic for the Pilbara. Predicted emission levels are low enough to indicate no adverse environmental outcomes.	DN will review predicted ammonia emissions prior to works approval, and will continue close monitoring of evolving technologies and potential effects upon rock pools. Based on the above reviews and monitoring, DN will be able to respond through retrofit of appropriate technologies if economically viable.		
1.6	11/6/02: It is requested that all gas feed, including fuel gas, is desulphurised prior to burning. 8/7/02: Reduction of acid emissions is of importance for potential impacts on petroglyphs and vegetation and ephemeral pools. These are significant cumulative issues and therefore individual plants do need to show that they are doing everything possible to reduce impacts. In view of the fact that your emissions are likely to be considerably less than the 8.4 t/a estimated due to the low sulphur content of the gas, we are not pursuing desulphurisation of the fuel gas further. However should you find during your detailed design that this can be achieved in a cost neutral manner, there would be	Feed gas fed into the process will be desulphurised as a process requirement. DN is not planning to desulphurise fuel gas, and it is anticipated that actual SO_2 emissions will be even lower than those reported in the CER Supplement.			

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	environmental advantages to implementing it. Would you like to consider making a commitment to this effect?				
1.7	11/6/02: CO_2 commitment talks about identifying and monitoring beyond no regrets, should be implemented where practicable. Standard condition suggested by audit. 8/7/02: We can sort out the wording when Tim and I get together on the commitments table.		This is a commitment by DN. It is confirmed that measures will be implemented where practicable, in accordance with the objectives of the *Greenhouse Challenge* Programme.		
2	***Wastewater***				
2.1	11/6/02: In appendix and table 15.7 t/a N. In wastewater characteristics 3.5 t/a. According to reply to questions 3.5 t/a is BAT. This is what the discharge should be or lower cf Burrup Fertilizers and Methanex. 8/7/02: John Rich indicated at our meeting that he thought 3.5 t/a was the correct figure and this is what is given in Table 3.22. 15.7 t/a is substantially more than other users. Please provide a flow diagram showing where this ammonia/nitrogen and other contaminants are coming from, at what concentrations and what treatment you are providing for the wastewater stream. Table 3.24, as referenced in your answer, does not provide this. As required by DEP and Water Corporation you need to demonstrate best practice and waste minimization. As noted in the marine section comments ammonia is added for the conditioning of boiler feed. Please consider if this additive is the best in terms of having least environmental impact.	DN estimate the discharge of N will be 43 kg/day and will investigate alternatives to reduce this level during the detailed design phase, as noted in Section 3.2.5.4. DN endorses the principle of pursuing best practicable measures for waste minimisation, and to this end the current BAT levels of wastewater discharge will continue to be evaluated for further achievable reductions. A preliminary flow diagram indicating the N/ammonia sources and emission points, is attached. DN is currently considering a range of alternatives. Agrium has experience in phosphate dosing as an alternative. However, KU considers that an ammonia dosing system is preferable. Both options will be further investigated during the design phase. DN is also willing to consider local uses of N loaded blowdown water during detailed design.	Current levels of N in wastewater discharge will continue to be evaluated for further achievable reductions during detailed design. DN will further evaluate both dosing systems (ammonia- and phosphate-based) during the design phase. DN is also willing to consider local uses of N loaded blowdown water during detailed design.		
2.2	11/6/02: what treatment to be used – process water, domestic wastewater, contaminated stormwater and clean stormwater 8/7/02: Process wastewater – see [2.1] above Domestic wastewater – what N and P levels will the	*Process water* – see table 3.22, p. 83. *Domestic wastewater* – will be treated in an aerobic sewage treatment plant with discharge water quality given in Table 3.22. *Stormwater* – Treatment will be	Appropriate measures for stormwater treatment will be confirmed to the satisfaction of the DEP during finalisation of the Environmental Management Plan.		

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	plant attain? Table 3.22 gives different value for N from Appendix F. Stormwater – you need to differentiate between clean stormwater and contaminated stormwater. (i) Clean water is likely to need removal of sediment before discharge and may need some withholding and controlled discharge to prevent erosion. Please detail how this will be addressed. (ii) Potentially contaminated stormwater needs capture in lined ponds for treatment before discharge. A pond of the dimensions given will hold about 1350 m^3. For a 72-hour 1 in 100 rainfall event this will give you retention for 2500 m^2 out of a plant site of 20 ha. Could you detail for what area and for what storm events you have calculated contaminated water volumes and what treatment and holding time is planned (you say ammonia will be treated, how and to what level?). This is an important issue as the planned location of the ponds appears to be in the vicinity of a vegetation community which Ian Le Provost said at the EPA meeting would be avoided. Any loss of vegetation for ponds needs to be taken into account in the flora impact and management.	dependent upon the type of contamination (if any) encountered. For example, solids will be settled out of the stormwater and removed periodically from the stormwater pond. Stormwater containing ammonia will be reprocessed if concentration permits and oil will be skimmed. Further detail on the management of stormwater will be provided in EMP. *Response to (i):* It is noted that the proposed ammonia/urea project occupies only 11.7 ha of the total 66.5 ha within the lease boundary. Uncontaminated runoff from a considerable part of the site 18.2ha drains to the gully which discharges to the tidal flats at the south-west of the plant site. This water will be intercepted near the head of the gully and piped to discharge at the same location from which it currently discharges. The outlet structure will be designed in such a way that the discharge velocity is no higher than it is at present. Any sediment contained in this runoff will be the same as it would have been without the development and no removal of sediment from this stormwater should be required. Areas to the west and north of this major catchment will drain through existing slopes depressions and gullies as at present. Two further catchments to the east will drain across the eastern boundary as at present. There are two remaining catchments of 3.6ha and 2.1 ha which drain south from two large rock mounds towards the plant site. Runoff from these will be intercepted along the	The proponent has committed to locate the stormwater ponds in a position which avoids the *ABImTe/TeRm* vegetation community.		

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		northern boundary of the plant and conveyed through underground pipes to discharge onto the tidal flats. The discharge will be equipped with dissipaters to prevent local erosion. No removal of sediment will be required from any of the undisturbed areas. *Response to (ii):* An annual recurrence interval of 50 years is normally accepted as a design basis for stormwater pipes and channels. This is consistent with the CER Supplement. The design rainfall intensity for a particular catchment depends on the time of concentration. This is influenced primarily by distance from low to high point and the gradient. The calculated time of concentration for the large catchment is 13 minutes. The 50-year ARI intensity for this duration is 211 mm/hr. Using a runoff coefficient of 0.7 (appropriate to this type of terrain), the discharge is 7.47m^3/sec. Pipes would be designed to accommodate this flow. Other catchments would be treated similarly. In accordance with accepted industry practice, DN intends to collect and retain the first flush of runoff from the site, regardless of storm system intensity, and allow the remaining runoff to discharge to the tidal flats as "clean" water. A basin of 1170m^3 is required to contain the first flush volume. After allowing the water in the collection pond to settle, it will be reclaimed as process water. After the 15 mm first flush as described above, there will be no significant sediment or contaminants in the	DN will collect and retain the first flush of runoff from the plant site.		

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		storm water runoff. See also revised site layout (attached).			
2.3	11/6/02: Contaminated and clean stormwater ponds: need estimate of sizes and positions on the site. They do not seem to be accounted for in the vegetation losses under the plant site. Areas could be significant and position and vegetation clearance needs to be considered. 8/7/02: See [2.2] above.	(Already provided) The stormwater ponds will be 45 m x 15 m x 2 m depth and will be located to the south west of the plant, south of the admin buildings and west of the future expansion areas. DN has committed to place these on the already disturbed areas.			
3	***Noise***				
3.1	11/6/02: 65 dB(A) criteria not met at Burrup Fertilisers boundary when wind is from the west. This is unacceptable. Noise Regs must be met. Note that previous draft modelling showed boundary criterion met under adverse conditions. What will be the maximum noise level at Hearson Cove be when boundary noise limit is met? 8/7/02: Noted, but noise levels at the boundary should be met under all weather conditions.			As stated at the EPA briefing, DN is committed to complying with noise regulations of 65 dB(A) at the boundary (see also Sect. 3.2.2.5, p. 47). This will be confirmed through further modelling and site optimisation of potentially noisy plant components during detailed design (see also Appendix J).	
3.2	11/6/02: Noise levels are required to be BAT. Committed maximum noise levels should be comparable with Burrup Fertilisers and Syntroleum. (34, 37 at Hearson Cove). 8/7/02: Meeting the Noise Regs alone may not be sufficient since as you are aware there is no assigned level for recreational area. As you are aware the DEP's preferred target noise level at Hearson Cove is 45 d(B)A, at which level recreational values would be impacted but not so severely as to render the beach no longer suitable for recreational activities.		DN will ensure that: 1. the 65dB(A) criterion will be met at the plant boundary; 2. reasonable measures will be adopted with the objective of reducing cumulative noise at Hearson Cove in accordance with ALARP principle. These will be confirmed when definitive data are available during detailed design; 3. utilise the advice of an acoustic engineer to ensure the best feasible measures are incorporated into the final design.		
3.3	11/6/02: According to local residents Hearson Cove is used as a recreational area at night. 8/7/02: It is not clear what is meant by this. Does this mean when noise levels at the boundary are met under all meteorological conditions, the noise level at Hearson			In conditions where the noise level at the DN site boundary is 65 dB(A) (as is expected) 40 dB(A) [42 dB(A) cumulative] noise contribution is anticipated,	

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	Cove will not exceed 40 d(B)A? In this case, you would be 5 d(B)A below the target cumulative level of 45. What industries is the 42 cumulative worked out for?			incorporating all noise sources available at the time of modelling (as listed in the CER Supplement p.48).	
4	***Flora, Vegetation and Fauna***				
4.1	11/6/02: Cannot comment on vegetation loss through clearing – EPA needs to deal with this. 8/7/02: Could we have your amended plant layout asap please and could you also supply CALM with a copy? Also the amended flora report showing what proportion of other communities will now be affected by the relocation of storage, roads etc is needed. (The management of environmentally sensitive areas during construction and operation will also be important and can be developed with CALM in further refinement of your EMPs).	The updated plant layout, overlayed on the vegetation communities found on the DN lease, is attached. The proportion of vegetation communities to be affected has been re-calculated, and forwarded shortly to the EPA SU.	Any minor deviations to the plant footprint during detailed design will be discussed with and advice sought at a local level from CALM.	As reported during the EPA briefing, DN acknowledges potential effects upon vegetation, and has committed to applying all practicable measures to avoid, reduce or mitigate impacts. This has been demonstrated through the subsequent relocation of the ammonia storage tank and northern access road in order to further reduce potential disturbance to the *ChAbSg* community.	
4.2	11/6/02: Context needed for N background levels. Where were these measured? What was the source of N? Provide reference from source – Gillett. 8/7/02: Request for CSIRO reference.			Data were provided by CSIRO Atmospheric Research Division – Gillett (personal communication), representing the best available knowledge at this time.	
4.3	11/6/02: Statement on page 67 regarding outside industrial lease area applies to whole industrial area including mangroves at King Bay not to PRCL plant site. 8/7/02: Yes, which is outside background fluctuations. Therefore off-site (Dampier Nitrogen site) deposition rates of urea alone are not within the range considered to represent background fluctuations. This means that the increase of nutrients, especially when urea is considered with other N sources, cannot be dismissed as trivial.		DN is committed to employing BAT to minimise urea dust losses from the Project, including the use of double demisting and wet scrubbers.	Maximum predicted deposition rates on King Bay mangroves are 0.125 $\mu g/m^2.yr$. The advice received from CSIRO confirmed that such values are comparable to the background N deposition rate of 0.140 $\mu g/m^2.yr$ +/- 30% potential fluctuation as cited. DN does not consider this issue to be trivial, and therefore has adopted a precautionary approach to ensure that any potential effects can be monitored and managed effectively.	

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4.4	11/6/02: As correctly stated on page 67 there was meant to be an assessment of impact of atmospheric emissions on soil/plant nutrient availability and effects of acid deposition on vegetation, fauna and rock art. The nutrient impact study should have included all N sources ie NO_x, urea and ammonia, as loadings rather than concentrations. The effects of urea study contributes little value to the study, giving European examples and other not very relevant studies. It does not consider dry deposition. It also does not look at the effect of urea deposition on mangrove leaves. Your answer to my question says urea scalds mangrove leaves but provides no substantiation that the amount emitted by Plenty River will not scald leaves. It was suggested that some studies should be carried out which has not been done. Effects of long dry periods and urea build up followed by rainfall should have been considered. The effects of urea study raises the issue of effects on shallow pools which is then not addressed. 8/7/02: With the lack of knowledge on the effects of acidic and increased nutrient deposition on vegetation, the responsible thing is for each proposal to ensure that all emissions are BAT and as low as practicable. Cumulative impact assessment for all projects is needed on this and this needs to be further addressed by the EPA or OMP. (Our vegetation experts have corrected my layman's comment that your study added little value, in fact it draws attention to some very relevant information. The problem is that no conclusions can be drawn from the information for the Burrup.)	As part of the preparation of the CER Supplement, the proponent liaised with the Queensland EPA to seek advice regarding potential effects of urea dust on mangroves, based on operation of the Incitec plant at Gibson Island. It was confirmed that, in over 30 years operational experience, scalding effects on mangroves has never been raised as an issue for concern for fringing mangrove habitats nearby that plant, which has traditionally emitted much larger volumes of urea dust than the BAT levels anticipated from the DN project. It is acknowledged that dust may cause scalding of mangrove leaves if present in sufficient quantity, however, any detectable impact is considered extremely unlikely, given the distance between the loading facility and the mangroves and the proposed adoption of BAT loading technology which will largely eliminate urea losses during shiploading. No experiments have been conducted by the Proponent. A programme to monitor such effects will be established prior to plant operation as part of finalising the EMP.	As committed in the CER Supplement, DN is prepared to contribute to industry participation in a program to monitor effects, if any, on petroglyphs as part of the prospective King Bay-Hearson Cove Industry Group. DN is committed to ensuring that all emissions are as low as practicable. DN commits to develop a programme for monitoring of rock pools following significant rain events, in consultation with the DEP. This will include establishment of appropriate early warning triggers.	Ammonia emissions were not included, however, this is not considered to alter the conclusions of the report. The report represents the current state of knowledge of the effects of atmospheric nitrogen (both as deposition material and gases/aerosols) and relates this to the receiving environment. DN commits to environmental monitoring and progressive review of emission reduction technologies. It is acknowledged by the WA Government and the proponent that there are limited data able to directly applied to arid-zone Pilbara conditions. (Previously advised) DN has consulted with CALM regarding potential effects on rock pools. DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock pools would also be limited by ephemeral nature of those pools.	There is no recognised evidence available to either confirm or refute claims that industrial emissions are damaging petroglyphs on the Burrup peninsula. The government is developing an assessment and monitoring program to close this knowledge gap. The current draft proposal is to examine (a) the microclimate around the petroglyphs to establish the nature of the interactions of the local climate and environment with the rock art (4 year program). (b) assessment of acid deposition using a 'total deposition' approach (2 year program).
4.5	11/6/02: Statement on page 69 that exposure to any level (of NO_x?) resulted in a depression of growth and yield, particularly acacias (present on Burrup) then statement that PRCL levels unlikely to generate adverse impacts on native vegetation. 8/7/02: As above [4.4].				The context of this statement is that DN's contribution could have only a relatively minor impact to the NO_x related effects upon Burrup vegetation, noting current and

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					projected loadings in the Pilbara airshed. Please note DN's willingness to contribute to a cooperative research and monitoring programme with the WA Government, as detailed above (4.4).
4.6	11/6/02: Where's the flora study for shed site 2? 8/7/02: If you get permission to use the Western Stevedores' site, please inform us asap as this will simplify this matter. EPA needs to make decision on 2nd option.	Draft copy provided on 11 June 2002. DN confirms that the Option 1 (western) site is the clear preferred location for the urea storage shed. Whilst the Board of the DPA has endorsed in principle the availability of this area for DN, this is yet to be confirmed.		*[It is noted that the EPA SU may need to approach the EPA Chairman to agree on an appropriate form of words for the Assessment Bulletin <u>if</u> Option 2 storage shed option cannot be withdrawn.*	
6	***Miscellaneous Questions***				
6.3	11/6/02: drift from seawater cooling tower is 0.01% - what is this in volume, kL/h? 8/7/02: What is this in volume?	The rate of loss to be achieved will be 0.01% of cooling water circulation rate which is around half that recommended by in the Australian Standard at 0.02%. This corresponds to 5kL/h.			
6.5	11/6/02: rest of consultation? CALM's comments? 8/7/02: Is this all the stakeholder comments? What about DIA, any feedback from Aboriginal groups, WRC (drainage?)? Although the Conservation Council does not seem to have provided a submission on the original CER, I think you would be well-advised to establish contact with them before the EPA Bulletin is published. Also with Robin Chapple if you have not already done so. Note Stephen Treloar's comment about wastewater discharge, "My intent here was to avoid neep tides (small tidal movements with less dispersion characteristics) and USE incoming/outgoing tides - especially spring ones, to give greater dispersion/make use of Mangrove N stripping capability. Obviously what we are basically recommending is that they use whatever strategy will best avoid any problems rather than just pumping out N containing waste, as its produced, with no regard to tidal factors".	Consultation with DIA and aboriginal groups is being managed by Wanati as a specialist consultant to DN. The (former) WRC was consulted directly through its Karratha office. URS has been liaising directly with the WACC and Robin Chapple for some time in relation to proposed industrial development on the Burrup, and are aware of their position with respect to Burrup industrial development DEP Karratha's comment is noted, and DN will take into account tidal factors where possible to ensure the best environmental outcome, noting that the predicted rate of assimilation of the N in wastewater is so rapid that tidal effects are considered of minimal consequence.		DN has consulted with all key stakeholders as identified in consultation with the DEP at the commencement of the work programme for the CER Supplement. The outcomes of these consultations were forwarded previously.	

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6.6	11/6/02: Management of pipeline risk is required. Outline of measures taken to prevent leaks, damage, accidents etc. 8/7/02: I have not looked at the draft EMP yet. In view of the changes to the plant layout it will be necessary for you to review your risk contours. Please liaise with MPR regarding this and let us have a copy of your revised contours. Also, if it is not too much trouble, could you use the REVISED SYNTROLEUM risk contours. I enclose information on the revised contours. We have realized that the contours used by Burrup Fertilisers were not the correct ones and this has perpetuated the error. (John has indicated that DN is not proposing to re-run risk contours with the new location of the ammonia storage tank. In this case a written professional opinion that the contours will still meet EPA criteria is requested and please also check with MPR regarding their requirements).	DN has authorised QEST to re-model the risk contours based with the new position of the ammonia tank. QEST has also obtained from DEP the revised, non-publicly available Syntroleum risk contours so as to manually review and assess the impact. QEST has verified that, based on a before/after comparative analysis of risk from the re-location of the ammonia tank, there is no visible difference in the risk profile of the project, and will not influence conformance with the relevant EPA risk criteria. An addendum report has been prepared and QEST will be meeting with MPR this week to ensure that they are satisfied that risk has been appropriately addressed. The addendum report is provided to the EPA SU for reference (as attached).	Intended measures for management of pipeline risk are outlined in CER Supplement and Draft EMP. Actual design and operations risk reduction and response procedures will be determined during detailed design stage and development of plant operating procedures.		
6.7	Urea emissions. I have not raised this before as your documentation has indicated that you are applying best practice technology. However Xuan has now questioned if the level of 35 mg/m^3 is best practice as some urea plants are meeting 5 mg/m^3, with the use of wet cyclones and bag filters. Could you please explain what pollution control measures you are proposing and whether it is possible to reduce urea emissions further with newer technology.			DN and KU have confirmed that, to their knowledge, there are no urea granulation plants being able to achieve 5 mg/m^3 urea dust emissions. The EFMA values for dust emission represent the Best Available Technology. The dust is downstream of the scrubber and double high performance demisters. These particles pass the scrubber and the demister as water-urea solution droplets. A closed air circuit faces the problem that the dust loaded air has to be re-heated and the respective heaters would plug with urea (note, air flow is	

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				1,050,000 Nm^3/hr at 100% operation). HFT are the scrubber suppliers and are investigating the subject, but they do not have a solution available yet or in the near future. In the Incitec project, KU had the same discussion and eventually 50 mg/m^3 was accepted. References for HFT granulators built by KU: QAFCO 3: Design standard 35 mg/Nm^3 Incitec: Design standard 35 mg/Nm^3 Dust emission (for DN project) is 287 tpa at 35 mg/Nm^3. KU is prepared to guarantee a dust design standard of 35 mg/Nm^3, however they are expecting that actual performance will be even better, with an expected value of 25 mg/Nm^3. KU have built scrubbers of different suppliers including Joy or Koch for this duty. However, a scrubbing technology is being developed by Kimre (Kimre Inc. Phase Separation Technology, Miami, FL, USA) for other fertiliser plants and is now being applied to urea granulation offgas with promising results in the range of 10 to 20 mg/Nm^3. Tests in a pilot plant (150 mtpd) of Norsk Hydro with Kimre packages showed lower figures than with the traditional Joy scrubbers. First installation in an industrial size plant (1000 mtpd, Norsk Hydro Sluiskil, Holland) is ongoing and commissioning is	

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			DN will offer best practice and will endeavour to reduce emissions after further design work.	expected this year. Adequate operation experience has to be gained with this installation, before any lower guarantees would be considered. DN will offer best practice and will endeavour to reduce emissions after further design work.	
6.8	Could you also please provide some information an ammonium carbamate – its toxicity, odour and potential for release. Also are there any other odourous or toxic materials likely to be emitted in minor quantities under normal or upset conditions?	Ammonium Carbamate is an unstable intermediate product, which decomposes under ambient conditions into ammonia, water and carbon dioxide. It has the same hazardous classification as ammonia. Under normal operating conditions no ammonium carbamate is released. It may be released under upset conditions. Upset conditions in the urea plant are a very rare case and a release of ammonium carbamate happens about one time per year. UF-85 is used as a granulation additive in small concentrations (0.55 %wt in final product). UF-85 consist of 65%wt formaldehyde, 25%wt urea and 15%wt water and is a commodity.			
6.9	Presumably it is not possible to recycle H_2 as fuel somewhere in the process rather than to flare it? Could you provide the reasons for this please?	There are no H_2 containing gasses or any other gases flared during normal operation (ie. from start-up conditions only). The H_2 in the ammonia synthesis purge gas is separated to 86% by a membrane system and recycled to the process, while the remaining purge gas containing the remainder of the hydrogen is used as fuel in the primary reformer.			
6.10	The desalination plant is still listed as optional. Please clarify if this is included in the proposal or not. If it is included, has space been allowed for it in the utilities area of the plant?	This is confirmed, space is provided in the utilities area.			

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6.11	Please confirm that the ammonia plant will use Kruppe Udhe technology.	Yes. KU is part of the Dampier Nitrogen consortium. KU technology will be utilized, subject to the outcomes of the detailed engineering study anticipated in the fourth quarter of 2002.			
7	**Terrestrial Branch comments**				
7.1	There is an over emphasis on the limited review of Welker (2002) and recapitulation of older material up to and including the BLUMP (which has considerable inaccuracies about vegetation). The emphasis should be on the new detail revealed by recent work, which highlights that the Burrup is different from other parts of the Pilbara, and provides a context within the Burrup for proposals. An authoritative review of vegetation assessment is provided in Appendix H, but some of this is not in the main text. Particularly: Section 3.2.11.4. The setting of the environmental impact context is incomplete. Tables are presented, but they are only partially interpreted and placed in context. This is because *they are not accompanied by the sections from the consultant's review which outline the impact of the project and the cumulative effect of industry in the vicinity (namely 7.2, 7.3 & 7.4*). The cumulative impacts of industry on vegetation of midslope soils is an issue. Most vegetation is limited in extent because of the large number of vegetation types forming the mosaic on the peninsula. At present what seems the most significant vegetation is less impacted by avoiding rockpiles. However, the general difference of the vegetation of the Burrup from the adjacent hinterland, which also imparts significance, appears not to be given adequate emphasis. A useful source of information for this topic is the review in Appendix H (Astron 2002). It outlines some of the cumulative effects on vegetation, and the significance of the King Bay-Hearson Cove area in particular. A large portion of certain types of the peninsula's vegetation is affected.			The proponent undertook a detailed review of vegetation effects in relation to recent work undertaken by Trudgen and Welker, as instructed by the EPA. DN is willing to use other reports if the DEP can provide details of material which may be available. Comments noted. DN has undertaken the best possible assessment and adopted all available measures to minimise vegetation impacts, in accordance with EPA advice and endorsement at the briefing on 20th June 2002. The text was introduced (see p. 106) as a summary of a comprehensive analysis, and the reader was encouraged to refer to Appendix H, much of which extends beyond the scope of the DN assessment. The sub-consultant who undertook this review was consulted to ensure that they were satisfied with the contents of the summary text prior to finalisation of the environmental assessment.	The proponent acknowledges the comment that cumulative impacts of industry on vegetation of midslope soils is an important factor, and the general difference of the vegetation of the Burrup from the adjacent hinterland is noted (see Section 3.2.11.3 of the CER Supplement). It is noted that more work needs to be done at a strategic level to further consider the local and regional context of the salt flats of Hearson Cove. See commitment No. 2 (Table 4.1) to contribute towards a further regional survey of the samphire vegetation communities in the KB-HC valley.

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	It draws attention to: i) The combined effect on vegetation of King Bay – Hearson Cove industry being very high, due to the high incidence of bare areas (rock, mudflat or pre-disturbed). That is, there is limited vegetated area, much of which is impacted. The combined area is also significant compared to the amount in the Conservation area. ii) 10 of 11 vegetation types in the proposal area are threatened by combined industry, and 2 to a major extent by the proposal alone. Combined industry has yet to address the lack of local and regional context of the salt flats of Hearson Cove, and more work is needed.				
7.2	The second part of Appendix F has a short review of the effects of nutrients on vegetation (Campbell 2002) which outlines some clear principles that appear not to have come forward in the main text. These include: i) The continued use of World Health levels of N in the environment against an Australian background. This is inappropriate for the key reason that there are very low levels of nutrients in much of the Australian environment (Campbell 2002 clearly alludes to this); ii) The text does not acknowledge (3.2.3.6) that the review concludes that the most susceptible areas to immediate impacts will be the rockpools; iii) The text does not acknowledge that the review indicates that other major likely outcome of a change in nutrients is a change in plant community composition (to the advantage of invasive species); iv) The text does not acknowledge that the review indicates weeds are likely to be advantaged. (Here the control of weeds is advocated by the review, but this is unlikely to prevail in the long-term if the natural levels of nutrients have been changed).		Best available weed control measures, in combination with the adoption of BAT strategies to ensure that source emissions are minimized to the greatest extent practicable, will be used to mitigate potential effects of urea dust emissions.	As previously advised, DN has consulted with CALM regarding potential effects on rock pools. DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock pools would also be limited by ephemeral nature of those pools. DN commits to include monitoring of rock pools for first 12 months of operations to assess if any potential effects are evident. The CER Supplement acknowledges that weed growth may be promoted in the vicinity of the project lease, as a result of urea dust emissions. Best available weed control measures, in combination with the adoption of BAT strategies to ensure that source emissions are minimized to the greatest extent practicable, are the best means of mitigating potential effects in light of the current uncertainty.	

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7.3	Combined emissions are a major issue for the combined industry which clearly need to be managed and modelled jointly. A) A very significant feature of the climate of the Burrup is persistent ambient, maritime, moisture, which attenuates the arid environment. It is a key point of difference with the hinterland, which otherwise shares the same likelihood of cyclonic rain. That dew is a key phenomenon is indicated by regional maps in Gentilli (1971), the general observations of Burbidge (1944) and Suijendorp (1965) on the near-coastal zone, and the evident dew in the mornings at Dampier (pers. obs.). It is this phenomenon, combined with condensation surfaces provided by the major rock outcrops (Geological Survey of Western Australia 1979), that are likely to be key to the biota of the peninsula. Emerging issues for the combined industry are: i. Synergies between NO_X and SO_X in dew, rainfall and soil; ii. How NO_X & SO_X will ultimately alter the different soils (including any buffering capacity of the soils and how long it might resist impact); iii. How NO_X & SO_X will affect mineralization from rocks; iv. Which of N, S & P will be most influential (P is most likely to be limiting); v. In the event of a plant failure the combined influence of Burrup Fertilisers and the Ammonia plant needs to be considered; These all require very thorough review, and clarification of knowledge deficit and risk. B) The Methanex PER provides information on total N deposition that shows the impacts will be significant on short-term time scales at an ecological level. Combining the data of Methanex (2002) and Casson (1994) it is evident that the surface soil pool of nutrients is likely to double under emission loads within 25 years (see the following table). Note well that the value for industry is based on a conservative value of deposition of 5% of emission, so it is very likely that the pool will be exceeded in less than 25 years. C) Clearly there is an urgent need to model the wind/humidity/dew/air inversions etc for the Peninsula and plan the height, direction and timing of emissions so				Comments noted. DN agrees with the DEP's comment that cumulative emissions need to considered and managed in a cooperative manner (see Commitment No. 25 in Table 4.1). Comments noted. DN agrees with the DEP's comment that cumulative emissions need to considered and managed in a cooperative manner (see Commitment No. 25 in Table 4.1).

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	that they will be widely dispersed, rather than have them settle and accumulate in situ.				
7.4	*Fauna* This fauna review presents no information additional to the original CER and does not include reference to significant recent studies or reviews of the fauna on the Burrup Peninsula. In particular two reports commissioned in 2001 titled "The Identity of Planigale on Burrup Peninsula" and "The Lerista muelleri Complex on the Burrup Peninsula" and references contained within these would have been useful in a fauna assessment of the project area. These reports and references should be reviewed and considered in the completed fauna survey. The proponent should review recent literature and relate the information to likely fauna impacts on their site and cumulative impacts from industrial developments particularly in the King Bay-Hearson Cove area as well as the Burrup Peninsula as a whole to demonstrate that there will be no significant losses to regional biodiversity. As the fauna survey has not been completed, it should be demonstrated prior to the finalization of the assessment that fauna impacts will not represent a "fatal flaw" for the development of the site.		DN will ensure further site-specific surveys to investigate the occurrence of Priority Fauna species to be conducted prior to construction in consultation with CALM, scheduled to occur concurrently with the wet-season flora survey.	Please refer to the updated biological assessment review (Appendix H, and summarized in CER Supplement), and Appendix I (ENZER land snail survey). These reports, in addition to further consultation with CALM and other key stakeholders, represent an update of the information provided in the 1998 CER. Disturbance of fauna habitats has been minimised by avoiding the significant rocky areas towards the northern end of the Project lease. Please note DN's commitment to ensure further site-specific surveys to investigate the occurrence of Priority Fauna species to be conducted prior to construction in consultation with CALM, scheduled to occur concurrently with the wet-season flora survey. This will enable areas to be identified within the Project area to be avoided during both construction and operation phases of the Project. DN will also prepare and implement a Fauna Management Plan which will identify procedures, monitoring requirements, workforce training and responsibilities to minimise disturbance of significant terrestrial fauna. *[commitment, already listed in Table 4.1]*	

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8	**Marine Branch comments**				
8.1	CWT & pipelines – fiberglass reinforced and non-corrosive materials. The proponent is to be commended for incorporating this element into the design.			Support noted.	
8.2	PRCL have agreed to meet the TDS (salinity) and temperature constraints ' under normal operating conditions'. What does this mean? The proponent should state for what percentage of time (eg 98 %) 'normal operating conditions' can be expected. The proponent should explain what the effluent characteristics are likely to be under departures from normal operating conditions.	Normal operating conditions with respect to salinity constraints will apply for 90% of the operating days for the first year and 98% of the following years. During up set conditions of the cooling tower and/or the desalination plant it may happen that the salinity will exceed the limits for a few hours. It is of paramount importance for the operator to come back to normal values as soon as possible, as the plant cannot be operated for long with high salinity. The constraint of the return temperature not exceeding the sea water temperature by more than 2°C means linking two parameters, which actually can not be linked to each other: The sea water temperature depends on long term (seasonal) changes in the sea. The brine return temperature depends on the wet bulb temperature of the ambient air and therefore fluctuates quite a lot on a short term (hourly basis). E.g. on a hot day in the winter time the sea water temperature is low, but the wet bulb temperature and therefore the return temperature is high. At that moment the return temperature may exceed the sea water temp. by more than 2°C for a few hours. Note, this still complies with the Water Corporation common user discharge requirements that require brine discharge temperature to be less than 2^{o}C above inlet seawater temperature for 80% of the time.			

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8.3	Table 3.22 and 3.23. The proponent is asked to confirm that these tables characterise the full combined effluent (including all streams) exiting the plant to the WC main brine return line.	Effluent characteristics will be as shown in Table 3.22 and 3.23 with the exception of nitrogen levels. Nitrogen discharge will be 43 kg/day and alternatives to reduce this discharge will be investigated during the design phase of the project.			
8.4	Appendix F, Section 6.1 provides annual nitrogen load estimates of 15,700 kg N/a (maximum) and 7,300 kg N/a (target) for process wastewater, and 73 kg N/a for domestic wastewater. I am unable to reconcile these quantities with the estimates provided in Table 3.22, namely 345-3,450 kg N/a, and 1.46 – 2.92 kg N/a, respectively. The proponent is requested to resolve this apparent discrepancy, also noting the concerns expressed by the DEP in respect of nutrient loadings (see comments on Appendix F).	The annual nitrogen load estimate of 15,700 kg/a (max) used for the cumulative N assessment is consistent with the current proposed discharge level of 43kg/d, as described in the CER Supplement. The value of 7,300 kg/a (target) corresponds to the reported target of 20 kg/d (to be confirmed during detailed design), however since release of the CER Supplement DN are not pursuing this 20kg/d target level, but instead are evaluating two options which may provide greater reductions. The proponent acknowledges that Table 3.22 reports anticipated N contribution as 345-3,450 kg/a. This range corresponds to the potential target levels of 1-10 kg/d that are yet to be confirmed as viable in this application, but are being further investigated by DN. This entry in Table 3.22 should specify 15,700 kg N/a (target 345-3,450 kg/a), as described in the text on page 86.			
8.5	*Catalysts and other process chemicals* The PER has described various aspects of the process, including various chemicals that are used. These include catalysts based on Cobalt, Molybdenum, Zinc, Nickel, Chromium, Copper, Palladium. Other substances used include Piperazine, Amerel 1500. The proponent should address the risk of these contaminants contaminating the marine environment.	There is nil risk to the marine environment. Catalysts are not used in the water cycles of the project design.			

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8.6	*Treatment Chemicals* The proponent proposes using biocides and anti-scalants in the seawater cooling system. As an environmental justification for the use of these biocides the LC50 values for one fish species has been presented. These data refer to the ACUTE toxicity of the products to a single fish species that is probably not found in the north-west of Australia. No information has been given on the chronic toxicity of these products to a range of locally occurring species at different trophic levels. Neither has any information been given as to the loading or fate of these products (or their derivatives after use) in the environment. The proponent is requested to supply the above requested information.	The LC50 values of biocides were provided in line with typical toxicity data, information on specific north-west fish species is not available. Such LC50 data is derived from commercially available MSDS and compared with ANZECC guidelines. A copy of these MSDS is available on request.	If proposed treatment chemicals promise an unacceptable impact or risk to the environment, then DN will agree a plan with the DEP to mitigate or more completely research this impact. This plan may include a consideration of alternative treatment chemicals and/or a toxicological study on local marine fauna.	The assessment has been undertaken to the greatest extent practicable with the available knowledge. If independent experts confirm that the use of these treatment chemicals at the proposed concentrations represent a reasonable risk, the proponent will undertake a toxicological study on local marine fauna.	To be addressed in conjunction with other prospective industries as part of the Government-Industry Taskforce, there may be the potential for a cooperative toxicological study on local marine fauna.
8.7	In Table 3.24, the term dosing rate with units ppm is very confusing. Please explain adequately what this is.	1-10 ppm means an additive will be added to achieve a concentration of 1-10 ppm in the seawater cooling system.			
8.8	With respect to the use of chlorine, it is said that it will be chemically reduced to a non-toxic form prior to being discharged from the PRCL plant. What will those non-toxic forms be? *(sodium sulphate and sodium chloride)* What are the risks that residual chlorine will be discharged? What control/monitoring/contingency measures will be taken to ensure that there is no residual chlorine discharged from the PRCL plant? (Chlorine monitor(s) will be in place).	Will use sodium metabisulphite to reduce the 'free' chlorine. Monitoring details will be confirmed with the DEP as part of the final EMP. No ANZECC criteria relates to these additives or their active constituents.			
8.9	*Boiler Feedwater Conditioning* The proponent states (p86) that the use of ammonia for conditioning is preferred over the use of phosphates ….. 'to minimize the discharge of phosphates to the environment'. Yet the proponent has not provided any discussion as to whether the marine environment is phosphorus limited or nitrogen limited. In the absence of this information, the above statement appears to be totally arbitrary. Please address.	Noted. DN is aware of the recent data presented by Pearce et al. which suggest that at certain times of the year there may be potential for phosphorus to act as the limiting nutrient. DN is aware that the alternative technology is using phosphates, rather than ammonia. This is preferred by Agrium, however KU as the technology provider has advised that this may present inherent problems. DN will investigate both options during detailed engineering design, and consult with DEP Marine Branch prior to works approval.	DN will further evaluate both dosing systems (ammonia- and phosphate-based) during detailed engineering design, and consult with DEP Marine Branch prior to works approval.		

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8.10	The proponent states (p86) that blowdown is required at a rate of 12 m^3/hr carrying a concentration of 150 ppm ammonia (43 kg/d). In terms of N load, this cannot be reconciled with the N load provided in Table 3.22. The proponent is requested to resolve this apparent discrepancy, also noting the concerns expressed by the DEP in respect of nutrient loadings (see comments on Appendix F).	As previously confirmed, N load will be 43 kg/d and alternatives to reduce this discharge will be investigated during the design phase of the project (refer to Response 8.3).			
8.11	The proponent refers to the potential for stimulation of macroalgae on rocky shores, and yet there seems to have been no consideration of potential nutrient effect on coral communities which inhabit these rocky shores.	The WAWC outfall dispersion modeling indicates that any increase in nutrient concentration at the adjacent rocky shores would be very low. At such low levels the impacts on corals are indeterminate. Potential impacts were considered in Section 3.1 of Appendix F.			
8.12	Cumulative Impact Assessment. It needs to be emphasized that the EPA had two paramount principles in its Section 46 report of march 2002. These were: · Waste minimization and best practice · Cumulative impacts on environment to be acceptable.			Noted and endorsed by the proponent.	
8.13	The DEP notes the proponent's commitment that ' Liquid effluent and stormwater runoff will be managed to maintain or improve the quality of surface and marine waters'. The monitoring referred to (p89) is inadequately described and inadequate in its scope. · What does 'periodically' mean? · What levels of analytical reporting are required? · Sampling, handling, analysis, data analysis procedures, and reporting in digital format? · Need for periodic screening analysis of effluent, to determine if there is unsuspected contamination directly from the PRCL plant, or indirectly from external to the plant (eg atmospheric deposition from other industries). · How will the PRCL industry monitoring commitments dovetail with the monitoring to be carried out by the Water Corporation as part of its overall environmental management responsibilities for the seawater supply/brine return facility. The DEP preferred position is that, at the point of total effluent discharge from PRCL into the WC brine return	The correct context of this statement is that the proponent acknowledges the intent of the EPA's standard management objective in relation to discharge water quality, based on the guidance provided by the ANZECC guidelines. In addition, discharges to the WAWC brine return facility will comply with appropriate criteria for acceptance.	It was not the intention of the CER Supplement to identify all monitoring details. This is to be addressed in finalizing the EMP in consultation with the WAWC and the DEP. Monitoring commitments will be implemented so as to complement the WAWC's management responsibilities for the seawater supply/return facility. The 99% species protection criteria will be met, as listed in	Agreed. The 99% species protection criteria for toxicants	

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	facility, the effluent quality should meet the 99 % species protection levels or twice the filtered value of unpolluted seawater (ie regional background level), whichever is the greater. This allows for the natural toxicant levels in seawater and concentration of toxicants in the brine due to evaporation.		Table 3.23 of the CER Supplement.	will be met.	
8.14	*Stormwater* The PER (p 88) proposes that potentially contaminated stormwater will be directed to the retention pond for retention, testing and treatment 'as necessary'. The DEP has a range of concerns in this respect: · The testing is proposed is for sediment load, salinity, pH and 'other relevant parameters'. The proponent needs to state explicitly what the other relevant parameters are. These should include nitrogen and phosphorus and selected other contaminants, based on a knowledge of the chemicals used in the plant as feed materials, catalysts, treatment chemicals, etc. · The test criteria at which treatment of the stormwater would be activated have not been stated, and should be developed as part of the environmental management plan. · The proponent needs to be able to characterize more fully the quality of site runoff, and needs to commit to manage this runoff so that it will not result in water quality degradation. The stormwater management plan (and site plan) needs to be more carefully designed, with a view to minimizing stormwater contamination, promoting recycling and reuse, addressing the above dot points. The assumption is made in the PER that it is possible to delineate areas of the site which will only generate 'clean' stormwater from those areas of the site which will generate 'potentially contaminated' stormwater. No explanation of how this differentiation will be made has been presented. Also, no consideration seems to have been given to the fact that the Burrup Peninsula is increasingly becoming the site of a large industrial complex. Because of this, there is potential for contaminant atmospheric deposition from other industries to impinge on the Plenty River site, creating the potential for stormwater drainage to be contaminated. (While this issue is of concern with respect to marine impacts, the need for stormwater	The proponent has responded to this question in detail previously. Please refer to Comment No. 2.2 for details on the appropriate design and management of stormwater.	Noted. DN believes it has addressed stormwater management considerations to the greatest extent appropriate for environmental assessment (see also Response 2.2). The details of proposed measures will be confirmed in the finalisation of the EMP and final detailed design.		

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	retention needs to be balanced with the size of ponds and the clearing of vegetation. The proponent should also consider this impact – comment from A Barter.)				
8.15	*APPENDIX F* *Analysis of Nitrogen Contributions* The Table on page 16 does nothing to suggest that the nitrogen loads to Mermaid Sound are insignificant. On a per squ km basis they are comparable to the Cairns and Tully tropical systems; on a per cub km basis they are in excess of Cairns and Tully. The Table of N inputs to Perth's coastal waters is not transferable, because it is a temperate, not a tropical marine system. Of all the estimated N inputs to the marine environment from PRCL, discharge of process wastewater via the WAWC outlet is by far the greatest contributor. This point discharge occurs in the inner, more poorly flushed part of the Dampier Archipelago. PRCL constitutes the greatest direct, point source discharge of N to the marine environment (via the WC outfall). Based on estimates presented in the supplementary PER, the PRCL direct N input to Mermaid Sound are far in excess of the other proposed industries. The estimates of dry airborne deposition of N are order of magnitude estimates only, however they do indicate the urgent need for dry deposition rates to be studied more carefully in a cumulative sense for all of the industries on the Burrup. The environmental implications of the substantial estimates of airborne deposition of N as urea particulates and airborne gases (NOx and NH_3) to Nickol Bay has not been discussed in detail. Results of hydrodynamic modeling of particle trajectories showed surprisingly long residence times in Nickol Bay, and on this basis Pearce et al (in press) have suggested that Nickol Bay may be a relatively enclosed system. It is therefore appropriate that the company should provide a cumulative assessment of nutrient inputs to Nickol Bay, and their potential environmental effects. The EPA has emphasized that all industries proposing to establish on the Burrup are to make best practice and waste minimization a primary goal. PRCL should review and amend its effluent and emissions treatment processes to substantially reduce its N loads to both the marine and atmospheric environments.			Noted. The purpose of Section 9 of Appendix F is to place the industrial inputs of Mermaid Sound into perspective. Due to current gaps in understanding (as identified in the table on page 16 of this assessment), it is not possible to make the comparisons drawn by the Marine Branch. The inclusion of Perth data (along with that from Darwin) in the table on page 18 allows comparisons with areas with which readers are more likely to be familiar. It is noted that the daily N loads cited in this table do not include industrial, riverine, groundwater or atmospheric inputs for either Perth or Darwin.	

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	Work is also urgently required to develop a better understanding of what constitutes an environmentally safe load of nutrients to the Mermaid Sound and Nickol Bay. That understanding presently does not exist.				Comment noted.
8.16	*Phosphorus Inputs* Pearce et al. (submitted) have presented data which suggest that in inshore areas of Mermaid Sound the N:P ratio may, at certain times of the year exceed the Redfield ratio. Under these conditions there may be potential for phosphorus to act as the limiting nutrient. This suggests that a similar review of cumulative phosphorus inputs should be carried out for Mermaid Sound and Nickol Bay.				Comment noted.
8.17	*Effects of Atmospheric Deposition on Vegetation* In the section 'Potential Effects [of air contamination] on Biophysical Attributes, there has been no reference to impacts on mangroves. The effect of urea to be able to 'burn' leaf tissue or impact mangroves in other ways does not seem to have been addressed, although this issue has been previously raised by the DEP. (Your answer is noted, however there is no supporting evidence to conclude that the urea deposition on mangroves or other vegetation leaves is at a level that would not cause an effect. In this circumstance it is expected that the proponent will not only monitor but will define a threshold effect and a trigger level for management action –see following paragraphs – A Barter).	As part of the preparation of the CER Supplement, the proponent liaised with the Queensland EPA to seek advice regarding potential effects of urea dust on mangroves, based on operation of the Incitec plant at Gibson Island. It was confirmed that, in over 30 years operational experience, scalding effects on mangroves has never been raised as an issue for concern for fringing mangrove habitats nearby that plant, which has traditionally emitted much larger volumes of urea dust than the BAT levels anticipated from the DN project. It is acknowledged that dust may cause scalding of mangrove leaves if present in sufficient quantity, however, any detectable impact is considered extremely unlikely, given the distance between the plant and the mangroves. No experiments have been conducted by the Proponent. A programme to monitor such effects will be established prior to plant operation as part of finalising the EMP. Establishment of appropriate early warning triggers will be discussed further with the DEP.			

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8.18	Returning to vegetation in general, including mangroves. The subsection 'Urea Deposition' concerns itself with potential N fertilization on vegetation. However, it only considers the contribution from urea deposition, and does not consider the cumulative fertilizer potential including contributions from wet and dry deposition of NOx, which appears to be able to contribute significantly.		Commitments have been made to monitor for potential effects of N-containing compounds, which may be able to integrated with the cooperative KB-HC industry group, and adopt practicable measures to minimise emissions during detailed design	The proponent initiated two independent reviews to determine the current state of knowledge regarding urea deposition effects. Both reviews concluded that the modelled urea deposition rates are well below those rates which have been correlated to N deposition loads witnessed to have polluted European ecosystems, and less than those used in field fertilizer trials on native vegetation. However, no data exist regarding the effects on vegetation of N deposition at this range within the Burrup setting. Commitments have been made to monitor for potential effects of N-containing compounds, which may be able to integrated with the cooperative KB-HC industry group, and adopt practicable measures to minimise emissions during detailed design	
8.19	PRCL (p68) has committed (?) to undertake vegetation (?) monitoring for 'secondary impacts'. The issue of establishing early warning indicators and triggers for management has not been addressed. The issue of what management commitments will be given to mitigate effects if these trigger values are exceeded has not been addressed. The proponent needs to propose the triggers and commit to management actions, should these triggers be exceeded.		DN will liaise with the DEP and other prospective industries to ensure the establishment of an appropriate monitoring programme for secondary effects on vegetation from atmospheric emissions on the Burrup. DN is tracking evolving technologies which will ensure that, in response to ongoing monitoring of potential effects, the best available techniques may be applied to ensure emissions are kept to best practicable levels.		
8.20	The absence of information (p68) on the impacts of atmospheric deposition on Pilbara vegetation in general, and mangroves in particular is acknowledged by the proponent.				Noted.

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8.21	What are the environmental implications of a spill of ammonia or urea on marine life Has the increased risk of siting the proposed urea storage shed close to shore been evaluated.	DN has raised the base level of the storage shed to accommodate a 1-in-300 year event. This is to be further addressed through the DPA's proposed Port Environmental Management Plan		An assessment of the potential risks associated with spillages of urea and ammonia are addressed in Section 3.2.8.2 and 3.2.8.3 of the CER Supplement respectively.	
9	**Australian Greenhouse Office comments**				
9.1	The AGO have provided some comments to Environment Australia on PRCL's ammonia/urea plant on the Burrup Peninsula. They note that the proponent has used a different methodology to estimate emissions and while this approach seems to be appropriate, further details on the emissions estimation should be provided to enable the AGO to confirm the inventory of greenhouse gas emissions.			(As previously advised, p. 75) The values presented in the GHG assessment are based on design data and vendor information from Krupp Uhde. DN and Krupp Udhe reviewed the relevant workbooks published by the Australian Greenhouse Office. The revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories was also reviewed to consider the methodologies described. Upon reviewing the above methodologies, it was determined that the calculations undertaken by KU represent very accurate estimates through directly simulating the combustion in the reformer as well as the CO_2 generation in the process and its subsequent separation. This is further supported by the following considerations: · the ammonia urea plant is self-contained with respect to energy, deriving all its power and steam energy from the one source of gas and not requiring imported power; · Krupp Udhe's process mass balance and energy balance models are accurate and have been used in the design of similar plants; · the mass balance uses the analysis of the actual natural gas feedstock available from the NWS and not a	

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				typical natural gas; and · these models are used for the design of the plant components and for estimating operating costs for contractual purposes. As a result, the data provided represents an accurate estimate using specific design data and simulations, rather than the methodologies defined in the workbooks which are significantly more generic in nature.	
9.2	The AGO noted the listing of the "no regrets" measures that have been included in the proposed design of the plant. They seek details on the greenhouse gas and fuel savings from these measures, as well as information on equipment efficiencies and other technical details.		DN is committed to join the voluntary *Greenhouse Challenge* Programme in cooperation with the AGO. As part of establishing a detailed Cooperative Agreement prior to plant commissioning, DN will then be in a position to determine precisely what efficiency measures will be set as targets for minimizing GHG's. This information is not currently available.		
9.3	The AGO also seeks similar advice on PRCL's list of possible "beyond no regrets" measures. The AGO also requests a listing of other mitigation measures which it considered but did not implement in the plant design, along with an accompanying explanation supported by sufficient technical details and an estimation of greenhouse gas emissions savings forgone.		As part of the *Greenhouse Challenge* Cooperative Arrangement with the AGO, DN will conduct detailed investigations of possible 'beyond no regrets' measures and their respective GHG gains.	The plant has been designed to maximize the Project's energy efficiency and DN will work with the AGO to continue to investigate ways of further improving this through the operations phase. As part of the *Greenhouse Challenge* Cooperative Arrangement with the AGO, DN will conduct detailed investigations of possible 'beyond no regrets' measures and their respective GHG gains.	

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9.4	The AGO notes that the proponent will be preparing a greenhouse gas emissions management plan and seeks information on how this plan will be prepared and implemented, as well as details on the plan.		A Greenhouse Gas Emissions Management Plan will be prepared with the AGO and DEP as part of finalizing the EMP during detailed engineering design. This will involve DN optimizing the Project's GHG efficiency and confirming the inventory as part of detailed engineering phase, and then working with the AGO and DEP to develop a set of agreed objectives, targets and performance measures to ensure greenhouse emissions are minimized as far as practicable over the life of the project.		
9.5	The AGO will provide Environment Australia with comments on the proponent's contention that emissions from the urea post production, should not accrue either to Australia or the proponent.			Noted. The proponent has received the AGO's comments in writing, which has been forwarded to the EPA SU.	
10	**CALM Comments**				
10.1	*Infrastructure* Infrastructure corridors on the Burrup are very limited. Pipelines need to be built to the maximum appropriate size to allow for expansion as well as use by other projects. There is no indication from the proponent that they are aware that infrastructure corridor space is limited.	DN is willing to consider cooperative arrangements with other prospective industries where practicable so as to ensure that infrastructure corridor space is efficiently utilised. This is an issue which needs to be strategically coordinated by the OMP.			
10.2	In Table 1.1 it indicates two pipelines which are of concern to us. They are: i) Natural gas pipeline 200mm diameter, 4.2-4.8 Mpag pressure. At section 1.5 it indicates this will be a dedicated pipeline. At section 2.3.1 it indicates the pipeline will be shared. There is no information on agreements with other companies to share the same quality gas and same pipeline pressure. It also indicates there will be an interconnection into the existing Dampier-Bunbury gas pipeline for emergencies. If this is possible then it raises the issue of whether the proponent could use the existing Dampier-Bunbury pipeline all the time.	The gas supplier has determined that a separate pipeline is required. DN has no part in determining this requirement.			

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	The pipeline size and pressure do not meet the recommendations in the Burrup Services Corridor – Development Plan, February 2000 by the DRD.				
10.3	ii) Methanol pipeline It appears likely that a methanol plant will be built on the Burrup in the near future. Two plants are currently proposed. The need for a methanol pipeline to transfer methanol from the port to the plant site is questioned. There is no indication the company is prepared to work with Government to minimise infrastructure requirements in the longer term or to share infrastructure with other existing and future projects. *Recommendation.* - Detailed plans are required at a scale of 1:5000 detailing the location and size of all pipelines and powerlines. These plans must be developed with the Office of Major Projects and detail the measures that will be taken to minimise impacts on future development in these corridors. - The recommendations and guidelines outlined in the report 'Burrup Services Corridor – Development Plan' Feb 2001 by the DRD should be implemented. - Approval for the methanol pipeline be conditional that if a methanol plant is built on the Burrup then the methanol pipeline is not to be built.	See response to Comment 10.1 above. DN will develop detailed plans with the Office of Major Projects as recommended, during detailed engineering design. DN will work with OMP, who has the responsibility for managing the infrastructure corridors.	DN will examine potential for use of locally produced methanol should a methanol plant be developed in the King Bay/Hearson Cove area. This will then remove the need for the methanol pipeline.		
10.4	*1.5.1 Urea Storage* We agree with PRCL that the preferred stockpile site is Option 1. This minimizes impacts on native vegetation and significant flora. This section also indicates the urea shed in option 2 has been shifted to avoid the MPR services corridor. This Department is not aware of any proposed services corridor at this location.	The MPR's Burrup West service corridor, referred to in this section, is shown in Figure 1.3 of the CER Supplement.		Noted and agreed by DN.	

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10.5	*2.3.1 Materials Transport.* It states the ammonia export pipeline will have a temperature of -30^{o}C. It is unclear if the outside temperature of the pipeline will be a hazard to wildlife. If a hazard is likely then this will require management.	(Previously advised) The pipeline (incorporating export and vapour return systems) will be double-skinned with 100 mm of insulation between the inner and outer skins. External skin temperature will therefore be dependent upon ambient air temperature and solar insolation, and highly unlikely to represent a hazard to wildlife.			
10.6	*3.2.1.4 Risk Management* Fire fighting facilities. Fire is part of the surrounding environment and periodic fires are inevitable, whether planned or unplanned. There are concerns over the potential for secondary impacts by extending plant operational and management demands in relation to fire into fire management in the surrounding natural environment outside the lease. This Department's view is that when a fire occurs on the land around the plant, the people responsible for managing fires in the surrounding areas remain free to make decisions regarding whether or not to let the fire burn. There are concerns that there will be pressure put on fire managers to put the fire out from the plant staff as it may be adversely impacting on production. Recommendation: - A commitment is given by the proponent that there will be no demands made on managers of adjacent lands to extinguish any wildfires, in circumstances other than when they pose a significant direct threat to the plant; - In designing the plant layout, the document 'Planning for Bushfire Protection' Dec 2001, FESA & WA Planning Commission be consulted and incorporated.		(Previously advised) DN is willing to adopt these recommendations, provided it is controlled and in accordance with fire regulations and protection of life and property. These measures will be incorporated into the final EMP based on further consultation with CALM.		

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10.7	*3.2.9.2 Light overspill* The company indicates it is aware of the potential impacts of light spill on surrounding environments. We are not familiar with Australian Standard AS 4282 Control of Obtrusive Effects of Outdoor Lighting. It is proposed to use this standard to minimise light spill. This Department is concerned that this may not be the best that can be done to eliminate light spill, and that a higher level of light spill control may be possible. *Recommendation:* The above standard should be used as a guide, but consideration should be given to improving on this standard where possible to eliminate light spill.	DN has already committed to keeping light overspill to a minimum, using AS 4282 as a guide, consistent with site safety and security requirements.	DN is committed to keeping light overspill to a minimum, using AS 4282 as a guide, consistent with site safety and security requirements.		
10.8	*3.2.11.4 Conservation significance of vegetation on PRCL lease* This section indicates that there are a number of very restricted vegetation units that will be significantly impacted by this development. These vegetation units are potentially Threatened Ecological Communities and following evaluation may be proposed to be nominated for listing as such. The electronic data required to allow this assessment to take place have not yet been received. *Recommendation* If the proposal is approved a condition should be imposed requiring that developments may only proceed after a thorough investigation of the conservation status of vegetation associations present on site and where rare or threatened ecological communities can be protected to the satisfaction of this Department.			The proponent has addressed vegetation impacts to the greatest extent possible, as presented at the EPA Briefing on 20 June 2002. All possible measures have been taken by DN so as to ensure that the two communities, of highest conservation significance, will be essentially undisturbed (eg. through relocation of ammonia storage tank, realignment of northern access road and power transmission lines, and selection of stormwater pond in previously disturbed areas).	
10.9	*Fig 1.2 General Site Location Plan* This indicates an access road to the north on to Village Road. The road is justified in section 2.3.3 by the statement 'this will provide alternative egress points in the event of emergency'. There are other alternative access routes that could be developed that would have less environmental impact. *Recommendation* The access to Village Road be rejected and alternatives with less environmental impact pursued.	DN has altered the proposed alignment of the emergency access road from Village Road, from that shown in Figure 1.2, in order to further minimise impacts on regionally significant vegetation. This emergency access road is required from a public risk perspective. Alternative road access alignments are being considered by Main Roads and OMP, as described in Section 2.3.3 of the CER Supplement. Whilst acknowledging that it does not have primary responsibility to make this decision,	Whilst acknowledging that it does not have primary responsibility to make this decision, DN will liaise with Main Roads and OMP in order to		

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		DN will liaise with these agencies in order to promote the option with the best environmental outcome.	promote the option for alternative road access alignments with the best environmental outcome.		
10.10	*Appendix F. Effects on Vegetation of Predicted Urea deposition rates* This report has been unable to determine the impacts of the ammonium deposition rates will have on the small calcareous freshwater pools found on the Burrup. *Recommendation* Further work is required to determine the impacts of emissions on these pools.	As previously advised, DN has consulted with CALM regarding potential effects on rock pools. DN assesses that any deposition would be of extremely low intensity and most likely mobilized and evacuated during 'first flush' events; potential for accumulation in rock pools would also be limited by ephemeral nature of those pools. DN commits to establishing a monitoring programme for rock pools in consultation with the DEP.	DN commits to establishing a monitoring programme for rock pools in consultation with the DEP.		
11	**Air Quality Branch Comments** (received 10 July 2002, and clarified with Air Quality Branch 11 July 2002)				
11.1	[Request for re-modelling of AUSPLUME to be undertaken] The presented maximum hours in the report were actually the annual ninth highest hour. The ninth highest hour has been used in some circumstances but is not appropriate for the current proposal. This is especially true given that the Pilbara Air Quality Modelling report shows that AUSPLUME significantly under predicted observed concentrations for Dampier.	The air quality assessment adopted the standard widely-used industry approach to use the 99.9 percentile to overcome the need to place reliance on a single predicted value (that is, to allow for potential over-predictions due to extreme meteorological conditions input to the model), as stated in the Ausplume Gaussian Plume Dispersion Model Technical User Manual (EPAV, 1999). However, the proponent acknowledges the recent advice from the DEP Air Quality Branch (July '02) which suggests that the model may under-predict observed ground level concentrations at Dampier at the 99.9 percentile level. In response to this advice, the proponent has volunteered to re-model glc's based on using the maximum predicted value, which will be provided shortly. *[see URS Memorandum tabled 'Remodelling of NO_X emissions on the Burrup*			

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		Peninsula' dated 15/7/02]			
11.2	10/7/'02: Stack heights and emissions for Syntroleum are wrong. I am still waiting for Syntroleum to get back to me regarding the correct stack dimensions. 11/7/'02: [Current emission estimates for Syntroleum used by DN are actually higher than those revised and anticipated to be received. Current cumulative emission estimates are likely to represent a conservative over-estimate, and not a critical factor in the assessment– A. Blockley, pers. comm.]	The proponent confirms that the Syntroleum emission rates used in the assessment were correct at the time of the modelling, and had sought verification of the emission estimates by the Air Quality Branch prior to commencing Ausplume & TAPM modelling in January. DN was not informed of the change in Syntroleum emission estimates, from the publicly available data in the PER, until one week prior to the EPA briefing on the 20th June 2002, after the air quality assessment was published. As the revised Syntroleum emission data could not be made available in time for inclusion in the revised modelling presented in the memo currently being prepared, the emission data has been left unchanged. As noted by A. Blockley, Syntroleum has decreased its NOx emissions and increased its stack heights, hence the data used in the DN assessment is conservative.			
11.3	Building wake effects were not incorporated for all industries.		(See also response to Comment No. 1.1). The air quality assessment took into account potential building wake effects for the two proposed industries for which detailed site-specific building details were available (ie. PRCL and GTL). The specific locations of adjacent buildings on other proposed projects are not readily available, and compiling and entering this data as input files for all existing and proposed industries on the Burrup represents a massive task well beyond the scope of the current assessment. DN is prepared to facilitate a 'whole-of-		DN is prepared to facilitate a 'whole-of-industry' approach in addressing cumulative atmospheric modelling in a standardised manner as part of the KB-HC Industry Group, and will support Government initiatives as previously advised.

	EPA SU Comment	Category of Response [1]			
Ref		**1** (specific technical information requiring clarification or supplementary advice)	**2** (matters to be addressed through commitments)	**3** (matters which have been addressed to the greatest extent by the proponent, and requires EPA deliberation)	**4** (cumulative impacts to be addressed under 'Other Advice' section of assessment bulletin)
			industry' approach in addressing cumulative atmospheric modelling in a standardised manner as part of the KB-HC Industry Group, and will support Government initiatives as previously advised. Building wake effects will be taken into account by DN during detailed design (see Comment No. 1.1).		
11.4	Methanex emissions were not included and Hamersley emissions were quite different from those used elsewhere.	As previously advised (p. 58 of CER Supplement), Methanex's emissions were not publicly available in time to be included in the modelling assessment. Hamersley Iron's emissions were revised slightly based on subsequent confirmation with HI environmental advisers (December 2001) prior to commencement of modelling.			
11.5	NO_2/NO_x conversion used a combination of Jansen and CSIRO techniques. We believe this to be inconsistent and makes it difficult to compare results.	DN believes that the NO_2/NO_x conversion used in the air quality assessment when modelling the DN emissions in isolation represents the most rigorous technique. Nonetheless, for ease of comparison with other modelling results, the simplified CSIRO approach has been accommodated in the re-modelling.			