Upgrade of multi-user seawater supply and introduction of wastewater to ocean outfall, Burrup Peninsula, Change to Environmental Conditions

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Water Corporation

Section 46 Report and Recommendations of the Environmental Protection Authority

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1. Introduction and background

The Minister for the Environment and Heritage has requested the Environmental Protection Authority (EPA) to consider and provide advice under Section 46(3) of the Environmental Protection Act 1986 on the Water Corporation's proposal to upgrade the proposed multi-user seawater supply system on the Burrup Peninsula.

The Water Corporation submitted a proposal "Burrup Peninsula Desalinated Water and Seawater Supplies Project" in May 2001 (Water Corporation, 2001a) to service the requirements of new industrial developments on the Burrup Peninsula. The proposed scheme was designed to supply seawater and desalinated water to the Syntroleum Sweetwater Corporation (Syntroleum) gas to liquids plant, with additional capacity to supply one or possibly two other process plants. The EPA released its report (EPA, 2001) in May 2001 and approval was granted in June 2001 (Ministerial Statement 567) for a 6.5 megalitres per day (ML/d) thermal desalination plant to be located on Syntroleum's lease and for a seawater supply (100 ML/d) and brine discharge (77 ML/d) system.

The Water Corporation submitted a proposal in December 2001 (Water Corporation, 2001b) to construct a 4 ML/d thermal desalination plant on Burrup Fertilisers Pty Ltd (Burrup Fertilisers) lease. The proposal included the construction of approximately 1.6 kms of additional seawater supply and brine discharge pipelines from the Syntroleum supply pipeline to Burrup Fertilisers' lease. An increase in capacity of the overall seawater supply and brine discharge system was not required. The EPA considered that the existing Ministerial Conditions were adequate and that the proposal did not need to be formally assessed by the EPA.

Burrup Fertilisers was granted approval on 20 February 2002 to construct and operate an ammonia plant within the King Bay – Hearson Cove Industrial Area (Ministerial Statement 586). The EPA approved the discharge of a waste stream from Burrup Fertilisers into the Water Corporation's proposed brine disposal system.

The Water Corporation now proposes to upgrade its original proposal (Water Corporation, 2001a) to include the provision of water supply to other industrial process plants proposed for the Burrup Peninsula. The proponent estimates the total seawater demand and brine discharge of these plants to be 280 ML/d and 208 ML/d respectively. The proposal also allows for the disposal of industrial wastewater with the brine discharge. As the proposed increase in capacity of the seawater supply and brine discharge system is significant and includes the co-disposal of industrial wastewater with the brine discharge, the Minister for the Environment and Heritage requested the EPA to inquire into and report on the proposed changes.

Further details of the proposal are presented in Section 2 of this Report. Section 3 discusses the consultation undertaken by the proponent. Section 4 discusses environmental factors relevant to the proposal. The conditions and procedures to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 5. Section 6 presents the EPA's conclusions and Section 7, the EPA's Recommendations.

A list of people and organisations that made submissions is included in Appendix 1 and References are listed in Appendix 2. The environmental factors considered during the assessment are listed in Appendix 3. Environmental Condition Statement 567, published on 22 June 2001 is presented in Appendix 4. The recommended conditions and procedures and proponent's commitments are

provided in Appendix 5. The Water Corporation's responsibilities are outlined in Appendix 6. Burrup Fertilisers' proposed wastewater and brine discharge is characterised in Appendix 7.

2. The proposal

The Water Corporation proposes the following main changes to the proposal "Desalination and Seawater Supplies Project, Burrup Peninsula" (Water Corporation, 2001a):

- An increase in the capacity of the seawater supply system from 100 ML/d to 280 ML/d;
- An increase in the capacity of the brine discharge into King Bay from 77ML/d to 208 ML/d; and
- The inclusion of approved discharges of treated industrial and domestic wastewater into the brine discharge stream.

The system will essentially be unchanged, although a surge tank (2 ML) and break tank (2 ML) are now required to control the large increase in flow of the seawater supply and brine discharge. An increase in the size of all pumps, pipes and associated plant is required. The location of the seawater intake within the Mermaid Marine harbour and on-shore chlorination and filtration facilities remain unchanged. The outfall diffuser for the brine discharge will be installed between the shipping channels servicing the Woodside Supply Base and Mermaid Marine as originally proposed, but will be located approximately 75m further south and extend an additional 500m further west into deeper water. The proposed pipeline route and associated equipment is shown in Figure 1. The proposal does not include any additional infrastructure to manage wastewater disposal with the brine. Table 1 summarises the key project characteristics of the approved project and proposed modification. A detailed description of the proposal is provided in Section 2 of the SECTION 46 (Water Corporation, 2002).

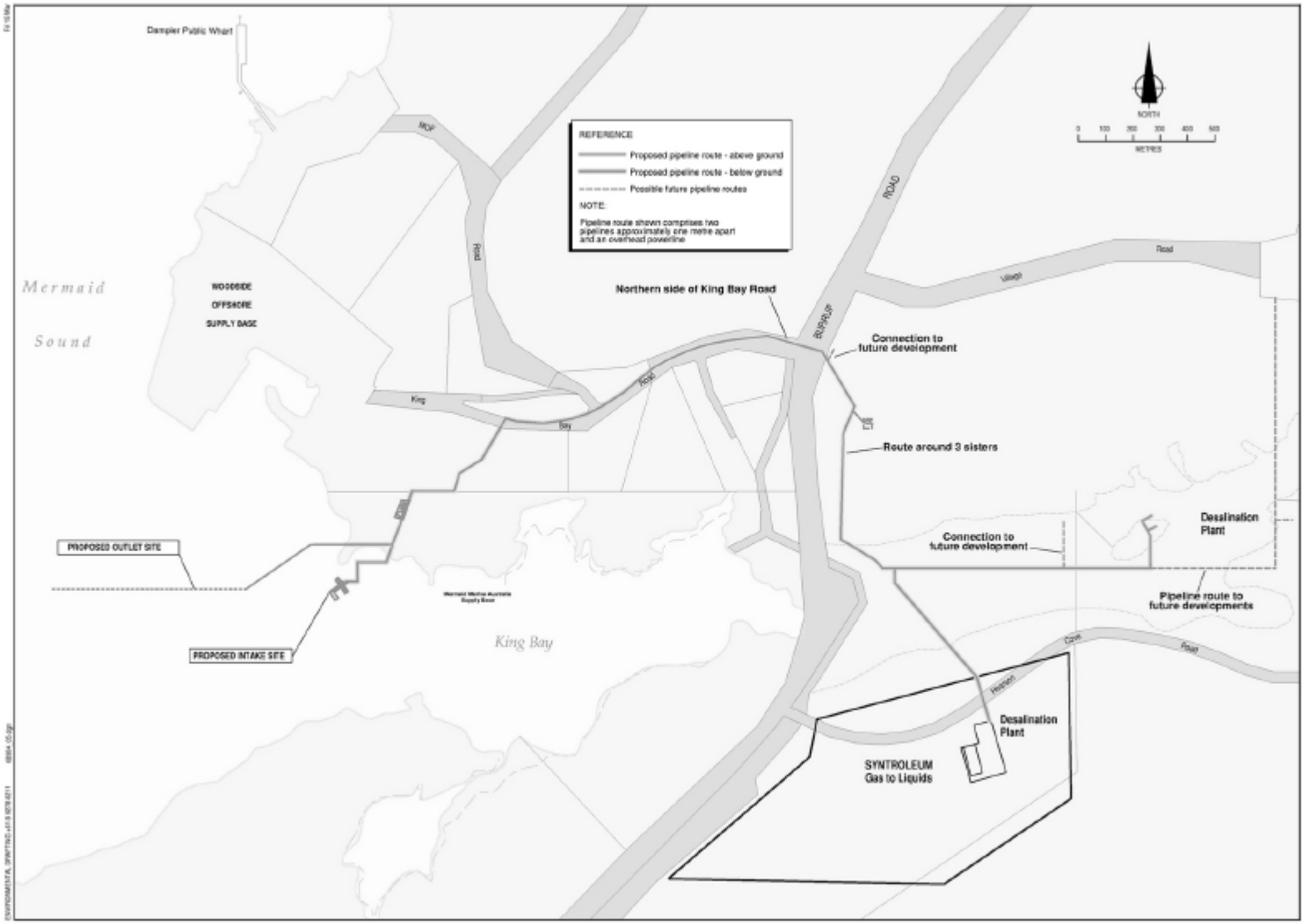

Figure 1: Pipeline Route (Source: Burns & Roe Worley)

Table 1: Summary of key proposed project modifications

Element	Description	
Project Purpose	To provide high purity water and seawater to proposed industries on the Burrup Peninsula.	No change
Project Life	25 + years	No change
Major Project Components	• Seawater supply pipelines (to 1.4m diameter) • 2 ML Seawater surge tank at the Three Sisters site • Brine discharge pipelines (to 1.1m diameter) • 2 ML brine break tank adjacent to Mermaid Marine, outfall pipe and diffuser array into King Bay • 33 kV power line • Thermal desalination plant, including cooling tower, seawater storage tank and desalinated water storage tank at the Syntroleum site • Thermal desalination plant , including seawater storage tank and desalinated water storage tank at the Burrup Fertilisers site • Potentially, future desalination plants and associated infrastructure at other developers sites	Larger diameter New Larger diameter New Changed voltage No change No change New
Plant Location	• Seawater intake pump system – within the Mermaid Marine harbour development • Seawater pipelines – within easements on the northern side of the mudflat north of Hearson Cove Road, eastern side of Burrup Road, northern side of King Bay Road and western side of the Mermaid Marine access road and property • Brine pipelines – adjacent to seawater pipelines • 33 kV power line – adjacent to seawater and brine pipelines • Syntroleum Desalination plant – within the Syntroleum lease area, adjacent to the process plant site, King Bay-Hearson Cove Industrial Area • Burrup Fertilisers Desalination plant – within the Burrup Fertilsers lease area, adjacent to the process plant site, King Bay-Hearson Cove Industrial Area • Brine outfall and diffuser – extending approximately 800 m from the end of the Mermaid Marine groyne to a point approximately midway between the Mermaid Marine and Woodside shipping channels at 4.0m CD.	No change No change No change No change No change No change Longer, more diffusers
Plant Operation	Continuous – 24 hours per day, 365 days per year	No change
Storage Capacities	• Seawater service tank (Three Sisters site) - 2ML • Brine break tank (adjacent Mermaid Marine) - 2 ML • Syntroleum desalination plant seawater storage tank – 2 ML • Syntroleum desalination plant distilled water storage tank – 4 ML • Burrup Fertilisers desalination plant seawater storage tank – 2 ML • Future tanks at other developers sites	New New No change No change No change
Inputs: - Seawater - Power Supply	Ultimately, 280 ML/d intake (including process cooling water) • Pump station – ultimately, approximately 3 MW, supplied from process plants • Syntroleum Desalination Plant – approximately 1.5 MW supplied from Syntroleum • Burrup Fertilisers Desalination Plant – approximately 3 MW supplied from Burrup Fertilisers • Potentially, other desalination plants at other developers sites	Larger flow Larger demand No change No change

Element	Description	
Discharges:		
- Brine	Ultimately, approximately 208 ML/d at up to 55,000 mg/L TDS	Larger flow
- Process wastewater	Burrup Fertilisers – 0.8 ML/d Potentially, similar quantities from other developers sites.	New New
- Domestic wastewater	Burrup Fertilisers – 0.04 ML/d Potentially, similar quantities from other developers sites.	New New
- Antiscalant	Syntroleum desalination plant - 100 kg/d Burrup Fertilisers desalination plant – 100 kg/d Potentially, similar quantities from other developers sites.	No change No change New
- Biocide	Nil; decomposed by addition of sodium metabisulphite.	No change
- Sulphamic Acid	Nil.	No change
- Temperature	Discharge less than 5^{o}C (less than 2^{o}C for 80% of the time) above ambient seawater temperature.	No change
- Heat Load	Ultimately, approximately 208 ML/d nominally within 2°C of the ambient seawater temperature	Increased
Noise: - Construction: - Operation:	Less than 30 dB(A) at the nearest permanent residence (Dampier) • Seawater intake system: Less than 70 dB(A) at 1m from pump well. • Syntroleum Desalination plant: Less than 30 dB(A) at the nearest permanent residence (Dampier). • Burrup Fertilisers Desalination plant: Less than 30 dB(A) at the nearest permanent residence (Dampier). • Future desalination plants at other developers sites are likely to be very similar in nature and sound level at Dampier will be less than 30 dB(A).	 No change No change No change
Construction Period	Approximately 20 months	No change
Construction Workforce	Peak 50	No change
Operational Workforce	Estimated 6	No change
Project Benefit	Provides a reliable, cost effective and environmentally sensitive water supply for industry development on the Burrup Peninsula	No change

3. Consultation

The proponent has consulted the following principal stakeholders about the proposed changes to the original proposal (Water Corporation, 2001a):

- Dampier Port Authority;
- Dampier Salt Pty Ltd;
- Karratha Districts Chamber of Commerce and Industry;
- Hamersley Iron Pty Ltd;
- Mermaid Marine;
- Department of Conservation and Land Management;
- Department of Environmental Protection – Karratha Branch;
- Shire of Roebourne;
- Ministry for Planning and Infrastructure;
- Office of Major Projects;
- The Conservation Council;
- North- West Telegraph; and
- ABC Radio.

Consultation with stakeholders has occurred through meetings, pamphlets and newspaper briefings. Consultation meetings were held at Karratha on 4-5 February 2002. The stakeholder and community comments indicated general widespread support for the project. The proponent advised that several issues relating to service corridor issues were raised which were relayed to the Office of Major Projects who is overseeing the coordination of the services. Several concerns were also raised that related to general development within the King Bay – Hearson Cove Industrial Area, including the expected traffic increase on Burrup Road and the need to maintain access to Carrie Cove.

4. Relevant environmental factors

Section 46(3) of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on whether or not the proposed changes to conditions or procedures should be allowed. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that its inquiry into the proposed modification to the "Desalination and Seawater Supplies Project, Burrup Peninsula" (Water Corporation, 2001a) should address in detail the following relevant factors:

(a) Marine flora and fauna; and

(b) Visual amenity;

The above relevant factors were identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the S46 document and the submissions received, in conjunction with the proposal characteristics (including significance of the potential impacts), the adequacy of the proponent's response and commitments, and the effectiveness of current management (Table A of Appendix 3).

The environmental significance of the above issues of the proposal and their assessment are discussed in Sections 4.1 and 4.2 of this report. The description of each issue shows how it relates to the project. The assessment of each issue, combined with the consideration of the environmental factors relevant to it, is where the EPA considers if the proposal can be managed to meet its environmental objectives.

4.1 Marine flora and fauna

Description

Western Australia's coral reefs stretching from the North-West Cape to Perth have been ranked among the most diverse marine environments in the world. The coral reefs of the Dampier Archipelago are a significant feature of the Pilbara coastal marine environment (CALM, 1994). However, information available to date indicates that no coral communities or extensive sea grass beds exist within the confines of King Bay (Water Corporation, 2001a).

The proposal has the potential to impact on the marine flora and fauna during:

- Construction of the proposed seawater intake and brine outfall facilities; and
- Operation of the seawater supply and brine and wastewater discharge system.

Construction of inlet and outlet facilities

IRC Environment (IRC Environment, 2001) conducted a benthic mapping survey to document corals and benthic macrophytes in the vicinity of the location of the seawater inlet and brine discharge as initially proposed. The marine survey recorded that the seabed near the proposed area consisted of mud, sand and coarse shell fragments. Marine habitats and biota were found to be

relatively sparse and typical of habitats widely distributed in the Dampier region. None of the marine biota observed in the area were listed as especially protected, endangered, vulnerable or threatened under the *Commonwealth Environmental Protection and Biodiversity Conservation Act* or the *Western Australian Wildlife Protection Act*.

The Water Corporation has not conducted a marine survey to date in the proposed new location for the marine outfall. However, the Water Corporation has committed to undertake the survey prior to construction. It is anticipated that marine habitats and biota in vicinity of the new location for the pipeline outfall would be consistent with the findings of the previous survey. In addition the proposed location of the pipeline is between two shipping channels (Suicide Alley) and the proponent has advised that the area is already highly disturbed.

The proposed amendment will result in the disturbance of an additional hectare of the seabed due to the trenching and burial of the additional section of sub-sea pipeline and longer diffuser array. The total area of disturbance now being approximately 2 hectares or about 2% of the King Bay seabed. Based on the information provided to date, direct impacts are expected to be mostly restricted to infauna (animals inhabiting the sediments). The proponent will submit a dredging and spoil disposal plan prior to construction and has committed to employ "best practice" dredging techniques to minimise the environmental impacts. The impacts from construction of the offshore pipeline are described in detail in Section 6.2 of the proponent's EPS document (Water Corporation, 2001a).

Operation of the seawater supply and brine discharge system

A hydrodynamic assessment was undertaken by Worley (Worley, 2001) for the initial proposal (70 ML/d brine discharge). Modelling predicted that the ANZECC (1992) Guidelines for protection of aquatic ecosystems would not be met for salinity within a 40m radius of the outfall (i.e. a 25 dilutions mixing zone). Modelling also predicted that within 7m and 110m of the outfall the temperature elevation above ambient would be less than 2^0 C and 0.25^0 C respectively.

The Environmental Fluid Dynamics Code (EFDC) model was used to simulate the hydrodynamics of the upgraded scheme (208 ML/d brine and wastewater discharge). It demonstrated that a substantially larger mixing zone (0.6 km^2 or 1 km x 0.6 km) is now required to meet the guidelines for aquatic ecosystems for salinity. The results of the modelling are described in Section 4 of the proponent's document (Water Corporation, 2002). The impacts of the salinity and temperature on the natural system, and the dispersion characteristics of a conservative dye tracer were examined for a 14 day winter period. The key findings of the model are as follows:

- The salinity variation as a result of the discharge is not greater than 5% above the ambient level more than 1% of the time anywhere within King Bay apart from within the proposed mixing zone;

- The maximum stratification due to the high salinity release is approximately 1ppt within the Mermaid Marine and Woodside dredged channels and basins. This is the same level of stratification that was predicted to occur due to the discharge from the 100 ML/d scheme;

- The temperature elevation is predicted to be less than 0.25^0 C less than 40m from the outfall, although the 14 port diffuser now extends for 260m. Natural seawater temperature variation of around 2°C in a tidal cycle was measured in the outfall location during the summer of 2000 – 2001 (Water Corporation, 2001a); and

- It is expected that within the mixing zone for salinity (0.6 km^2), a contaminant dilution of at least 25 times will be achieved at the seabed level for more than 95% of the time.

The two coral communities known to occur just outside King Bay (Phillip Point and Parker Point) are both located approximately 700m from the proposed outfall.

The original proposal included one thermal desalination plant on Syntroleum's lease. An additional thermal desalination plant has been approved on Burrup Fertilisers' lease and the current proposal potentially allows for additional desalination plants to be located on other industrial leases. In addition to elevated salt concentrations and temperature levels, discharges from thermal desalination plants may have the following types of potentially adverse constituents and qualities:

- Turbidity levels above those of receiving waters;
- Oxygen levels below those of receiving waters;
- Chemicals from pre-treatment of feedwater (including biocides and antiscalants);
- Chemicals used in flushing pipelines;
- Concentration of organics and metals in the feedwater through the desalination process; and
- Metals picked up by brine in contact with plant components and pipelines.

The proponent has advised that each desalination plant requires approximately 100kg/d of antiscalant (sodium salt of a polycarboxylic acid) and low concentrations of biocides (typically chlorine). Initial acute toxicity tests indicate that some carboxylic acid antiscalants may not be harmful to the marine biota at the anticipated does rate (typically less than 2 mg/L in the brine discharge), but additional information is required on the toxicity and fate consequence of the discharge. The residual biocide will be continuously monitored and de-chlorinated by the addition of sodium metabisulphite to produce ions naturally present in seawater. The Water Corporation will monitor these chemical additives and other environmental parameters at the outfall as part of their overall Environmental Management Program.

Wastewater Discharge

The Water Corporation proposes to utilise the brine discharge system for the disposal of treated industrial and domestic wastewater from industries in the King Bay – Hearson Cove Industrial Area. The Water Corporation has outlined its responsibilities in managing the multi-user brine and wastewater discharge system as shown in Appendix 6.

The Water Corporation as owners and managers of the brine and wastewater discharge system will monitor and report on the individual effluent streams entering, and the combined discharge leaving, the system. It has committed to implement an Environmental Management Program that includes appropriate monitoring and reporting, encompassing water, sediment and biota, for the wastewater system and the ambient environment. The Water Corporation has committed to impose contractual obligations on system users with respect to the flow and composition of their discharge into the multi-user discharge system. It will independently sample and analyse the individual discharges on a regular basis to validate the accuracy of the data provided by system users.

Only industries that have received the appropriate environmental approval would be permitted to discharge their wastewater into the brine discharge system. The wastewater discharged from each industrial premises would be subject to specific Ministerial Conditions and/or licence conditions. Industries will be required to monitor their combined brine and wastewater discharge prior to entry into the Water Corporation discharge system to ensure compliance with Ministerial and licence conditions. The Water Corporation will develop an investigation/management plan in consultation with the EPA/DEP and industry in order to provide an appropriate response should monitoring identify unacceptable impacts on the environment or if agreed criteria are not met.

To date the only proposal within the King Bay – Hearson Cove Industrial Area to receive Ministerial Approval for wastewater discharge is Burrup Fertilisers' ammonia plant. This proposal included a wastewater and brine discharge to the Water Corporation's proposed system. The discharge stream proposed by Burrup Fertilisers is characterised in Appendix 7 and is considered to represent best practice. It is expected that this treated wastewater and brine combined will meet the ANZECC & ARMCANZ (2000) 99% species protection criteria for toxicants on entry into the brine discharge system.

Dampier Salt Option

Dampier Salt operates a large salt production facility approximately 9 kms south west of King Bay. It produces salt primarily for industrial use by the solar evaporation of seawater. The annual average seawater intake being approximately 410 ML/d.

During the preliminary design phase for the Burrup Peninsula Desalinated Water and Seawater Supply project, Dampier Salt expressed reservations about accepting brine from the scheme based on the relatively small flow rate (77 ML/d) and high capital and operating cost of transport to the evaporation ponds. However, with the significantly larger volume of brine available in the revised proposal for multiple industrial projects, the proponent has advised that Dampier Salt has indicated an interest in utilising the brine from the cooling tower circuits and desalination plants. Reservations have been expressed about chemical additives (antiscalants, biocides, etc) used in the processes. Dampier Salt has reserved judgment on the potential for accepting domestic wastewater or process wastewater into the salt process without detailed examination of the nature and concentration of contaminants. Management of the salt farm is a complex operation, with the process typically taking approximately 2 years from seawater inlet to crystalline salt shipment. Nutrients in the seawater are managed within the brine ponds by careful cultivation of brine shrimp and milkfish.

The Water Corporation has advised that Dampier Salt has estimated a feasibility study for acceptance of the brine and wastewater will take up to two years. The study will include the economics of the transfer scheme as well as operational implications for Dampier Salt.

Agency and public comments

CALM considers that the option of disposal to Dampier Salt is the preferred option and is prepared to assess this component once the study has been completed. CALM supports the proposal of providing common user facilities to all plants on the Burrup Peninsula. However, it has raised a number of concerns as follows:

- the seawater supply and brine discharge pipelines as proposed, may restrict the ability to provide further services to and from each industrial site. It considers that the Water Corporation and Office of Major Projects should advise the measures that are being taken to ensure that there will be adequate room in the service corridors for future services to each site;

- the outfall diffuser array may be damaged by shipping or construction activities in the proposed location (Suicide Alley) and that damage to this facility may lead to unacceptable levels of pollution. An appropriate body should review protection measures proposed to ensure damage will not occur;

- there appears to be minimal assessment of the benthic fauna in the outfall mixing zone, or review of the relevant results. The WA Museum's recent surveys indicate that molluscs and echinoderms have highly patchy distributions. CALM recommends that the Water Corporation provides CALM and the WA Museum with the results of the marine survey and consults with the Museum on the significance of the site; and

- toxicity testing should be undertaken to determine the impacts on local fauna including echinoderms and sponges that inhabit the area.

The Water Corporation has been consulting with CALM to address these matters.

Assessment

The area considered for assessment of this factor is the marine environment of King Bay and Mermaid Sound.

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. It considers that the surrounding waters of the Dampier Archipelago are of high environmental value, with areas designated as nature reserves and the establishment of a marine conservation reserve is being considered.

The EPA supports the proposal of providing common user facilities to new industrial plants on the Burrup Peninsula. The EPA considers the utilisation of the warm brine discharge as a "feed stock" for Dampier Salt to be a sustainable option should it prove to be feasible in the future. It would have been helpful for waste minimisation and re-use to have been fully explored earlier so that it could be considered as part of this assessment. However, the EPA notes that the proponent has committed to complete a comprehensive feasibility study of this option in the near future and that the brine and wastewater system will be designed to allow retro-fitting in the future should any brine re-use option be found to be feasible. The EPA also considers that there maybe the opportunity for other wastewater minimisation/re-use options between industries in the King Bay Hearson Cove Industrial Area. The EPA encourages the Water Corporation to meet with system users on an ongoing basis to

explore opportunities to minimise potential environmental impacts within King Bay and possibly achieve operational savings.

As the proposed brine and wastewater discharge maybe long-term, the EPA believes that a precautionary approach must be taken with respect to setting discharge limits for toxicants and chemical stressors to provide a high level of certainty that the surrounding waters of Mermaid Sound are protected.

Construction Impacts

The EPA notes that marine biota and habitats in King Bay are relatively sparse as a result of the natural turbidity of the bay and that some areas are already degraded due to dredging activities. It has previously concluded that the environmental impacts resulting from the construction of a 500m subsea pipeline within King Bay would not be significant as only local infauna will be affected (EPA, 2001). The EPA considers that any additional impacts resulting from construction of the additional section of pipeline is unlikely to be significant, but requires the Water Corporation to provide an assessment of the benthic fauna in the vicinity of the area to be impacted, prior to construction. The EPA considers that the construction management strategy previously proposed by the Water Corporation, along with the existing Ministerial Conditions will also be satisfactory for the proposed extension.

Operation Impacts

The EPA notes that the proposed increase in capacity of the brine and wastewater discharge will result in the ANZECC (1992) guideline for salinity being met at the edge of a mixing zone of 0.6 km^2 rather than the original mixing zone of 0.01 km^2. The EPA considers that any environmental impacts on the marine flora and fauna due to this increase to be acceptable for the chemical stressor, salinity. The EPA notes that modelling has predicted that the temperature elevation at 40m from the outfall is expected to be no more than 0.25^0C. The EPA considers that the impact from the additional heat load as a result of an increase in capacity of the discharge would be acceptable, given that the nearest known coral communities are approximately 700m from the proposed outfall. However, the EPA considers there is a need to formally develop temperature and salinity criteria for the Dampier Archipelago.

The EPA considers that even if the Water Corporation proposal, when fully implemented, met the ANZECC & ARMCANZ (2000) 99% species protection level for toxicants at the edge of the proposed mixing zone for salinity (0.6 km^2) it could potentially permit unacceptably high loads of metals and other toxicants. The EPA accepts that it is difficult to determine an appropriate mixing zone for toxicants at this stage due to the lack of suitable data on the naturally occurring concentrations of contaminants in seawater and uncertainty associated with the types and concentrations of contaminants generated by other potential system users. However, the EPA expects the mixing zone for toxicants to be defined once the brine and wastewater system is operational and to be revised as additional industries connect into the system and our understanding of the consequences of these types of discharge to the King Bay area improves through the results of environmental monitoring programs. In the absence of data on the likely fate and consequence of potentially significant loads of contaminants to King Bay, the EPA considers that any mixing zone for toxicants would need to be significantly smaller than for salinity and that during the environmental approvals process each industry should demonstrate waste avoidance/minimisation strategies and meet "best practice". As a guide the edge of the previously approved mixing zone (0.01 km^2) can be

used as the 99% species protection level for toxicants to assist the Water Corporation in its management of the outfall.

Management Strategy

The EPA endorses the proposed management strategy by the Water Corporation that only industries that have received the appropriate environmental approval (Ministerial conditions and or licence conditions) by the EPA and/or DEP would be permitted to discharge their wastewater into the brine discharge system. Through the environmental approval process, individual system users will be required to:

- demonstrate "best practice" and waste minimisation principles;
- demonstrate that the cumulative impacts on the marine environment are acceptable; and
- monitor the constituents of the wastewater and brine prior to entry to the Water Corporation discharge system.

The EPA is satisfied that the Water Corporation will implement a monitoring program/plan to effectively monitor and report on both non-compliance and potential impacts on the marine environment by the brine and wastewater discharge. If monitoring identifies that guideline trigger values are exceeded outside the relevant defined mixing zone, the EPA expects the Water Corporation to undertake further site specific investigations to assess the potential risk. If the potential risk is high, a coordinated management response will be required by the Water Corporation, the DEP and system users to reduce contaminant inputs to the ambient environment and achieve the environmental quality objectives within an agreed timeframe. The EPA expects the Water Corporation to outline an effective management response as part of its Environmental Management Plan.

Summary

Having particular regard to the:

(a) environmental quality objectives for King Bay and Mermaid Sound being met outside an approved mixing zone;

(b) commitments made by the proponent, particularly regarding the continued investigation of the reuse options; and

(c) proposed management strategy including the requirement for system users to gain environmental approval for the discharge of their effluent into the brine and wastewater discharge system;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for marine flora and fauna.

4.2 Visual Amenity

Description

In the original proposal the section of seawater supply and brine discharge pipelines within the King Bay – Hearson Cove valley were to be buried as shown in Figure 2.1 of the proponents EPS (Water Corporation, 2001a). However, preliminary drilling results from within the service corridors indicates that it may not be practicable to bury the seawater supply pipeline (up to1.4m diameter) and brine and wastewater discharge pipeline (up to 1.1m diameter). A large proportion of the holes could not be drilled to 1m and it is expected that blasting would be required in order to bury the pipelines. There is also concern that burying the pipelines in the east-west corridor south of Burrup Fertilisers' lease could form a drainage barrier across the northern section of the mudflats.

Although the King Bay – Hearson Cove valley has been designated for industry, above ground pipelines will further reduce the visual amenity of the area, particularly when viewed fom the Hearson Beach Road. The Water Corporation has committed to paint the pipelines in colours that blend in with the environment.

Assessment

The area considered for assessment of this factor is the King Bay – Hearson Cove Industrial Area.

The EPA's environmental objective for this factor is to ensure that the proponent considers aesthetic values, and that measures are put in place to reduce the visual impacts of the developments on the surrounding country side as low as reasonably practicable.

The EPA notes that initial tests indicate that burying the pipelines in the tidal mudflats of the King Bay – Hearson Cove valley may not be practicable. The EPA considers that above ground pipelines painted to blend in with the environment would be acceptable. Although less aesthetically pleasing, the installation of above ground pipelines is expected to result in less disturbance to the environment and the natural landform of the Burrup Peninsula, including potential impacts from restrictions to the flow of subsurface water.

Summary

Having particular regard to the King Bay – Hearson Cove valley being set aside for industry it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for visual impacts.

5. Conditions and commitments

Section 46(3) of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on whether or not the proposed changes to conditions or procedures should be allowed. 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.

5.1 Recommended commitments

The Water Corporation has made changes to commitments to reflect discussions with the DEP which have been part of the assessment process. The proponent's commitments as set out in the Section 46 document (Water Corporation, 2002) and subsequently modified, as shown in Appendix 5, should be made enforceable conditions.

5.2 Recommended commitments

Having considered the proponent's commitments and the information provided in this report, the EPA recommends that the following conditions be imposed if the proposal by the Water Corporation is approved for implementation:

(a) The existing Ministerial Conditions applied to the project (Ministerial Statement 567 published on 22 June 2001), be subject to modifications necessary to:

- implement the revised consolidated environmental management commitments of 19 March 2002.

The amended conditions and amended Consolidated Commitments statement are presented in Appendix 5.

6. Conclusions

The EPA has considered the proposal by the Water Corporation to upgrade the multi-user seawater supply and introduce wastewater to the ocean outfall and has concluded that it can be managed to meet the EPA's objectives for the relevant environmental factors.

The EPA considers the utilisation of the warm brine discharge as a "feedstock" for Dampier Salt a more sustainable option should it prove to be feasible in the future. However, the EPA concludes that the environmental impacts on King Bay and the surrounding water as a result of the proposed increase in the capacity of the seawater supply (280 ML/d) and brine discharge (208 ML/d) will be acceptable, given the commitment made by the Water Corporation to implement an Environmental Management Program that includes appropriate monitoring and reporting, encompassing water, sediment and biota, for the outfall and the ambient environment. The EPA also considers that it is

acceptable to incorporate industrial and domestic wastewater into the Water Corporation's discharge system from industries that have received environmental approval.

In addition to the above, the EPA considers that conditions attaching to the environmental approval should be updated. It has therefore reported also on the updating of conditions.

7. Recommendations

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

1. That the Minister notes that this report is pursuant to Section 46(3) of *the Environmental Protection Act 1986* and thus is limited to consideration of proposed changes to the original conditions.

2. The Minister notes that the proposed change is to increase the capacity of the seawater supply and brine discharge system to service the requirements of new industrial process plants proposed for the Burrup Peninsula. The proposed change also allows for the disposal of industrial and domestic wastewater with the brine discharge.

3. The EPA recommends that the Minister considers the report on the relevant environmental factors as set out in Section 4.

4. That the Minister notes that the EPA has concluded that the modified proposal can be managed to meet the EPA's objectives, and thus not impose an unacceptable impact on the environmental provided there is satisfactory implementation by the proponent of the amended conditions, including the proponent's commitments, as set out in Section 5.

5. The Minister imposes the amended conditions, commitments and procedures recommended in Appendix 5 of this report.

Appendix 1

List of Submitters

State/Local Government

The Department of Conservation and Land Management

Appendix 2

References

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Appendix 3

Summary of Preliminary Factors

Table A SUMMARY OF PRELIMINARY ENVIRONMENTAL FACTORS

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
BIOPHYSICAL IMPACTS				
Terrestrial Flora	To ensure that, where possible, impacts upon regionally significant flora and vegetation communities are avoided and to ensure the abundance, diversity, geographical distribution and productivity of vegetation communities are protected.	Clearing of flora and vegetation during pipeline construction. Spread of weeds	Development of construction plan(s) to include: • identification, marking and relocation of significant flora and vegetation, • minimising area cleared • control of weeds • rehabilitation of construction and laydown areas	No significant or lasting impact on regionally significant flora and vegetation communities
Declared Rare and Priority Flora	To protect Declared Rare and Priority flora, consistent with the provisions of the *Wildlife Conservation Act 1950*, and to ensure the abundance, diversity, geographical distribution and productivity of vegetation communities are protected.	Inadvertent destruction of Declared Rare Flora and Priority flora	Flora survey to clearly identify rare or priority flora specimens within construction areas. Construction plan to identify avoidance or relocation of identified specimens.	No impacts on Declared Rare Flora and Priority flora.
Terrestrial Fauna	To ensure that, where possible, impacts upon regionally significant fauna and habitat are avoided and that the abundance, species diversity and geographical distribution of terrestrial fauna are maintained.	Possible destruction of some habitat.	Fauna habitat survey to clearly identify significant habitats within construction areas. Construction plan to identify avoidance or relocation of identified habitat.	No significant or lasting impacts on regionally significant fauna and habitat

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
Specifically Protected (Threatened) Fauna	To protect Specifically Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act 1950*.	Inadvertent destruction of habitat of Specifically Protected (Threatened) Fauna	Fauna habitat survey to clearly identify significant habitats within construction areas. Construction plan to identify avoidance or relocation of identified habitat.	No impacts on Specifically Protected (Threatened) Fauna and their habitats
Marine Flora	Maintain the ecological function, abundance, species diversity and geographic distribution of marine flora (seagrass and macro-algae).	No seagrass or macro-algae communities occur within the construction area. Brine discharge may impact upon communities within 40m of the diffusers.	Design to achieve brine dilution to within 5% of ambient salinity within 40m of diffusers. Develop program for monitoring operation of diffusers.	No significant impacts on marine flora (seagrass and macro-algae)
Mangroves	Maintain the ecological function, abundance, species diversity and geographic distribution of mangrove communities and their associated ecosystems.	Intake and outfall are distant from mangroves– no expected impact	Develop program for monitoring operation of diffusers.	No impacts on mangroves
Marine Fauna	Maintain the abundance, species diversity and geographic distribution of marine fauna.	Some marine fauna may be destroyed during the dredging and construction process for the outfall.	Development of construction plan for outfall and diffusers to address: • minimising area of dredging • monitoring and control of turbidity Continuous on-line monitoring of brine discharge turbidity	No significant impacts on marine fauna.

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
Coral reefs	Maintain and protect the abundance, species diversity, geographic distribution and productivity of coral reefs.	Although corals are not present within the King Bay area, nearby communities may be subject to increased suspended sediment loadings during dredging	Development of construction plan for outfall and diffusers to address: • minimising area of dredging • monitoring and control of turbidity Continuous on-line monitoring of brine discharge turbidity	No impact on nearby coral communities
Specifically Protected (Threatened) Fauna	To protect Specifically Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act 1950*.	Inadvertent destruction of habitat of Specifically Protected (Threatened) Fauna	Marine habitat survey to clearly identify significant habitats within construction areas. Construction plan to identify avoidance or relocation of identified habitat.	No impacts on Specifically Protected (Threatened) Fauna and their habitats
Intertidal and subtidal zone	Maintain the abundance, diversity and geographic distribution of marine flora and fauna within the intertidal and subtidal zone.	Minor disturbance during construction. No disturbance during operation	No specific management plan required.	No detrimental impacts on the intertidal and subtidal zone or locally significant marine flora and fauna communities.

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
Seabed	Development should not have a significant impact on existing coastal processes, including offshore sediment movement.	Disturbance during construction (dredging). Rock cover over outfall will create an artificial micro-environment in the King Bay area Possible change in sediment transport due to large seawater intake volume.	Detailed circulation and sediment transport modelling for representative tidal and wave conditions has been undertaken. An assessment of the potential impacts on the hydrodynamic and sediment transport regimes likely to occur in King Bay after development has been completed. It was concluded that no notable changes to the circulation and morphological processes within King Bay are likely to occur as a result of the seawater intake and brine outfall. This includes negligible impact on the overall water quality and flushing, minimal changes to the sediment transport regime and circulation and no change to the existing tidal range within the Bay. The sub-sea pipeline will be rock covered. The pipe cover will be as near as possible to existing sea bed level and contours. Continuous on-line monitoring of flow rate, temperature, conductivity and turbidity of both intake and brine discharge	No significant impact on the seabed. No detrimental impacts on existing coastal processes
Sea level	To ensure that development does not increase the potential impact on the environment from storm surge.	There will be no impact on the sea level, tides or storm surge level	No management required	No unacceptable environmental impact
Landform	To establish stable, sustainable landform consistent with surroundings.	The pipelines running from the Mermaid Marie facility to the Syntroleum site will not cause any alterations to the landform	Construction plan to identify: • control of levels • erosion control	No landform degradation will occur

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
POLLUTION MANAGEMENT				
Particulates / Dust	To ensure that dust levels generated by the proposal do not adversely impact upon the welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards.	Potential dust creation during construction. No operational activities will create dust.	Construction plan to identify appropriate dust monitoring and dust suppression.	Possible small, short term dust problems

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
Groundwater quality and Marine water and sediment quality	Maintain or improve the quality of groundwater and marine water to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with EPA (1993) and NHMRC guidelines where relevant. Maintain or improve marine water and sediment quality consistent with EQO's and EQC's defined in the Southern Metropolitan Coastal Waters Study (DEP, 1996b).	Turbidity created during construction activities for the brine outfall Brine discharge will create a zone of elevated salinity around the diffusers Leakage of seawater from the pipeline through pipeline fittings (eg air release valves) or pipeline failures. Catastrophic failure of pipeline causing large, sudden release of seawater.	Development of construction plan for outfall and diffusers to address: • minimising area of dredging • monitoring and control of turbidity Design to achieve brine dilution to within 5% of ambient salinity within 40m of diffusers. Initial sampling program to confirm performance of the diffusers to design. On-going regular visual inspection of outfall. Develop comprehensive inspection and maintenance program for pipelines and fittings. Seawater leaks from pipeline fittings will be collected and pumped back into the line. Any scour seawater will be collected and pumped back into the pipeline and not allowed to flow onto the ground. Continuous on-line flow monitoring of pipeline inlet and outlet to identify major leaks. Anti-scalant and biocide dosing will be controlled to prevent over dosing Oil, fuel, chemicals or other potential pollutants will be stored and transferred in bunded areas. Develop and maintain contingency plans to address spills. All wastes will be contained in bins, drums or in bunded areas where necessary and disposed of off-site in an acceptable manner.	Negligible impact on Groundwater and Marine water and sediment quality.

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
Soil contamination	To ensure that no construction or operational practices can lead to soil contamination	Leakage of seawater from the pipeline through pipeline fittings (eg air release valves) or pipeline failures. Catastrophic failure of pipeline causing large, sudden release of seawater.	Develop comprehensive inspection and maintenance program for pipelines and fittings. Seawater leaks from pipeline fittings will be collected in permanent sumps and recovered with portable pumping equipment Any scour seawater will be collected and pumped back into the pipeline and not allowed to flow onto the ground. Continuous on-line flow monitoring of pipeline inlet and outlet to identify major leaks. Develop and maintain contingency plans to address spills.	No soil contamination within pipeline easements
Haze	To ensure that emissions do not cause increased levels of haze.	Burning of wastes on-site may cause unacceptable levels of haze.	No burning of wastes will occur on-site.	No impact on atmospheric (haze) conditions
Noise	Protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.	Operation of the pipelines will not create any noise	Construction plan to identify potential noise emitting activities and ensure compliance with Environmental Protection (Noise) Regulations 1997.	Potential small impact during construction.

Environmental Factors	EPA Management Objective	Potential Impact	Proposed Management of Relevant Environmental Factors	Predicted Outcomes
SOCIAL SURROUNDINGS				
Visual Amenity	To ensure visual amenity of the area adjacent to the project is not unduly affected by the proposal.	Construction activities may reduce the visual amenity of the area	Development of construction plan(s) to include: • minimising area cleared • rehabilitation of construction and laydown areas	No long-term reduction in visual amenity
Aboriginal culture and heritage	To ensure that the proposal complies with the requirements of the Aboriginal Heritage Act 1972 and that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.	The completed scheme will not cause any reduction in aboriginal culture and heritage	Archaeological survey to clearly identify sites of cultural significance within construction areas. Construction plan to identify avoidance or relocation of identified sites. Existing easements and road reserves used for pipeline alignment preferentially.	No disruption to Aboriginal culture and heritage.

Appendix 4

Previous Statement of Conditions for this Proposal

Statement No. 567

Statement No

000567

MINISTER FOR THE ENVIRONMENT AND HERITAGE;
WATER RESOURCES

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

DESALINATED WATER AND SEAWATER SUPPLIES PROJECT BURRUP PENINSULA, SHIRE OF ROEBOURNE

Proposal: The construction of a seawater supply and desalination system to service the requirements of new industrial developments on the Burrup Peninsula, Shire of Roebourne, as documented in schedule 1 of this statement.

Proponent: Water Corporation

Proponent Address: 629 Newcastle Street, Leederville WA 6007

Assessment Number: 1378

Report of the Environmental Protection Authority: Bulletin 1024

The proposal to which the above report of the Environmental Protection Authority relates may be implemented subject to the following conditions and procedures:

Procedural conditions

1 **Implementation**

1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.

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, those changes may be effected.

Published on

22 JUN 2001

2 Proponent Commitments

2-1 The proponent shall implement the consolidated 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 conditions and procedures in this statement.

3 Proponent

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 in respect of the proposal.

3-2 Any request for the exercise of that power of the Minister referred to in condition 3-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.

3-3 The proponent shall notify the Department of Environmental Protection of any change of proponent contact name and address within 30 days of such change.

4 Commencement

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.

4-2 Where the proposal has not been substantially commenced within five years of the date of this statement, the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment and Heritage will determine any question as to whether the proposal has been substantially commenced.

4-3 The proponent shall make application to the Minister for the Environment and Heritage for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement at least six months prior to the expiration of the five year period referred to in conditions 4-1 and 4-2.

4-4 Where the proponent demonstrates to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years for the substantial commencement of the proposal.

5 Compliance Audit

5-1 The proponent shall submit periodic Compliance Reports, in accordance with an audit program prepared in consultation between the proponent and the Department of Environmental Protection.

5-2 Unless otherwise specified, the Chief Executive Officer of the Department of Environmental Protection is responsible for assessing compliance with the conditions, procedures and commitments contained in this statement and for issuing formal, written advice that the requirements have been met.

5-3 Where compliance with any condition, procedure or commitment is in dispute, the matter will be determined by the Minister for the Environment and Heritage.

Environmental conditions

6 Environmental Management System

6-1 In order to manage the environmental impacts of the project, and to fulfil the requirements of the conditions and procedures in this statement, prior to ground-disturbing activity, the proponent shall demonstrate to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection that there is in place an environmental management system which includes the following elements:

1 An environmental policy and corporate commitment to it;

2 Mechanisms and processes to ensure:

(1) planning to meet environmental requirements;

(2) implementation and operation of actions to meet environmental requirements;

(3) measurement and evaluation of environmental performance; and

3 Review and improvement of environmental outcomes.

6-2 The proponent shall implement the environmental management system referred to in condition 6-1.

7 Decommissioning Plans

7-1 Prior to construction, the proponent shall prepare a Preliminary Decommissioning Plan which provides the framework to ensure that the site is left in a suitable condition, with no liability to the State, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

The Preliminary Decommissioning Plan shall address:

1 rationale for the siting and design of plant and infrastructure and conceptual plans for its / their removal or, if appropriate, retention;

2 conceptual rehabilitation plans for all disturbed areas and a process to agree on the end land use(s), and

3 management of noxious materials to avoid the creation of contaminated areas.

7-2 At least six months prior to the anticipated date of decommissioning, or at a time agreed with the Department of Environmental Protection, the proponent shall prepare a Final Decommissioning Plan designed to ensure that the site is left in a suitable condition, with an liability to the State, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

The Final Decommissioning Plan shall address:

1 removal or, if appropriate, retention of plant and infrastructure;

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 to relevant statutory authorities.

7-3 The proponent shall implement the Final Decommissioning Plan required by condition 7-2 until such time as the Minister for the Environment and Heritage determines that decommissioning is complete.

7-4 The proponent shall make the Final Decommissioning Plan required by condition 7-2 publicly available, to the requirements of the Environmental Protection Authority.

8 Work Practices

8-1 Prior to commencement of construction, the proponent shall prepare 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 Environmental Protection Authority on advice of the Department of Environmental Protection and the Department of Minerals and Energy.

8-2 The proponent shall ensure that all plant and pipeline construction and operation complies with the prescription referred to in condition 8-1.

9 Performance Review

9-1 Each five years following the commencement of construction, the proponent shall submit a Performance Review Report to the Department of Environmental Protection:

- to document the outcomes, beneficial or otherwise;
- to review the success of goals, objectives and targets; and
- to evaluate the environmental performance over the five years;

relevant to the following:

1 environmental objectives reported on in Environmental Protection Authority Bulletin 1014;

2 proponent's consolidated environmental management commitments documented in schedule 2 of this statement and those arising from the fulfilment of conditions and procedures in this statement;

3 environmental management system environmental performance targets;

4 environmental management programs and plans; and/or

5 environmental performance indicators;

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection

Note: The Environmental Protection Authority may recommend changes and actions to the Minister for the Environment and Heritage following consideration of the Performance Review Report

Judy Edwards

DR JUDY EDWARDS MLA
MINISTER FOR THE ENVIRONMENT AND HERITAGE

22 JUN 2001

Schedule 1

The Proposal (1378)

The proposal is to construct and operate a seawater supply and desalination system to service the requirements of new industrial developments on the Burrup Peninsula, approximately 1,500 kilometres north of Perth (See Figure 1 following Table 1). The desalination plant and associated equipment will occupy an area of approximately 0.6 hectares and is to be located within the confines of the proposed Syntroleum natural gas to synthetic hydrocarbons plant. The pipeline route and location of the seawater inlet and brine outlet are shown in Figure 2. The general arrangement of the desalination plant is shown in Figure 3.

The desalination plant requires a maximum of 38.1 megalitres per day of seawater to produce 6.5 megalitres per day of high quality process water. The maximum extraction rate of seawater will be 100 megalitres per day, resulting in a brine stream of 77 megalitres per day. The surplus supply of seawater (62 megalitres per day) will be available for other industrial projects.

The main proposal characteristics are summarised in Table 1.

Table 1 - Key Proposal Characteristics (Assessment No. 1378)

Element	Description
Project Purpose	To provide high quality water to the Syntroleum project and seawater for cooling purposes to other proposed industries on the Burrup Peninsula.
Project Life	25 – years.
Major Project Components	• Seawater intake pump system. • Nominal 6.5 megalitre/day thermal desalination plant. • Brine cooling tower and water storage facilities. • Seawater supply pipeline (approximately 4.6 kilometres long). • Brine discharge pipeline (approximately 4.6 kilometres long) • Brine outfall and diffusers.
Project Location	Seawater intake pump system – within the Mermaid Marine harbour development Desalination plant and cooling tower - within the Syntroleum site, King Bay-Hearson Cove Industrial Area Pipelines – within easements on the eastern side of Burrup Road, northern side of King Bay Road and western side of the Mermaid Marine access road and property Brine outfall and diffuser – extending approximately 500 metres from the Mermaid Marine groyne to a point midway between the Mermaid Marine and Woodside shipping channels at 2.5 metres CD (chart datum)
Plant Operation	Continuous – up to 24 hours per day, 365 days per year.
Plant Storage Capacities	Approximately 2 megalitres (1.5 hours) seawater storage. Approximately 4 megalitres (15 hours) distilled water storage.
Inputs: - Seawater - Power Supply	 Initially - Approximately 15 megalitres/day (winter) to approximately 38 megalitres/day (summer). Finally - up to 100 megalitres/day. Approximately 1MW to 1.5MW, supplied from Syntroleum.
Discharges: - Brine - Antiscalant - Biocide - Sulphamic Acid	 Initially – up to 38 megalitres/day at 52,500 milligrams/litre total dissolved solids. Typically at 2°C above ambient seawater temperature. Final - up to 77 megalitres/day at 55,500 milligrams/litre total dissolved solids. Typically at 2°C above ambient seawater temperature. Approximately 100 kilograms/day. Normally, nil; decomposed by addition of sodium metabisulphite. Nil to discharge.
Noise: - Construction: - Operation:	 Less than 30 dB(A) at the nearest permanent residence (Dampier) Seawater intake system: Less than 70 dB(A) at 1 metre from pump well. Desalination plant: Less than 30 dB(A) at the nearest permanent residence (Dampier).
Construction Period	Approximately 15 months.
Construction Workforce	Peak 50 persons.
Operational Workforce	Estimated 6 persons.

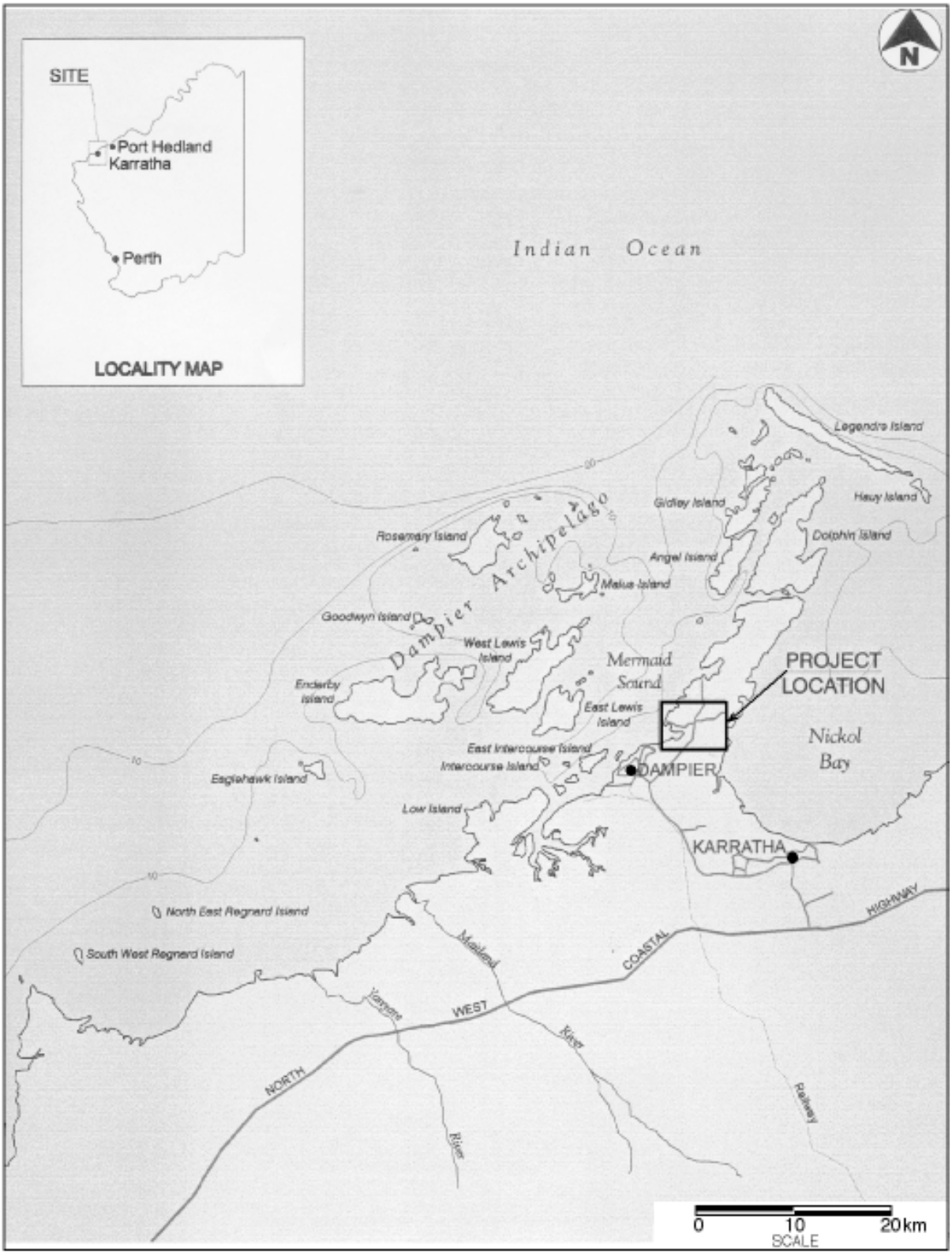

Figure 1. Project Location - Regional Map (Source: Figure 1.2 HLA - Envirosciences, 1999a).

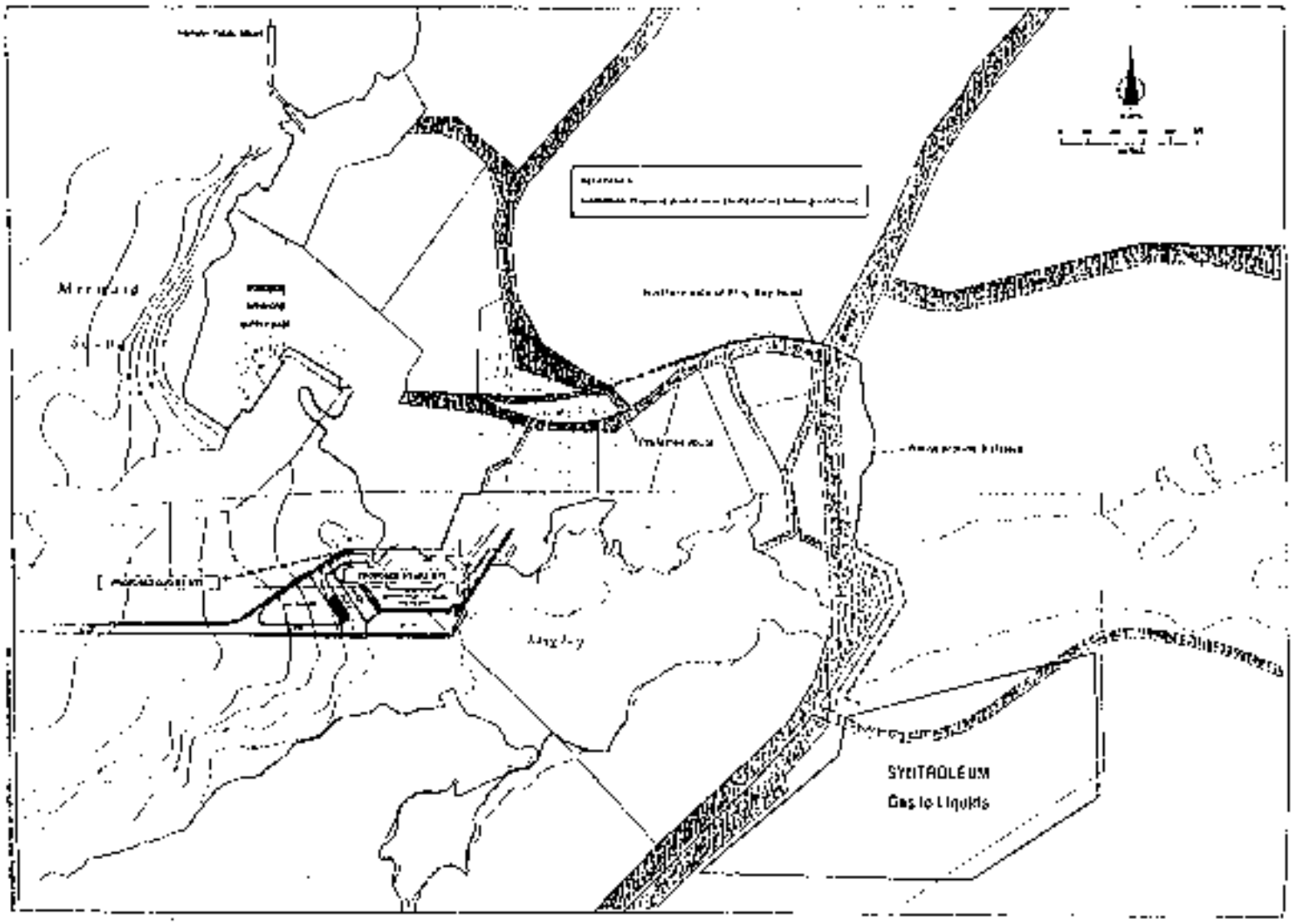

Figure 2: Pipeline route (Source: Burns & Roe Worley, April 2001)

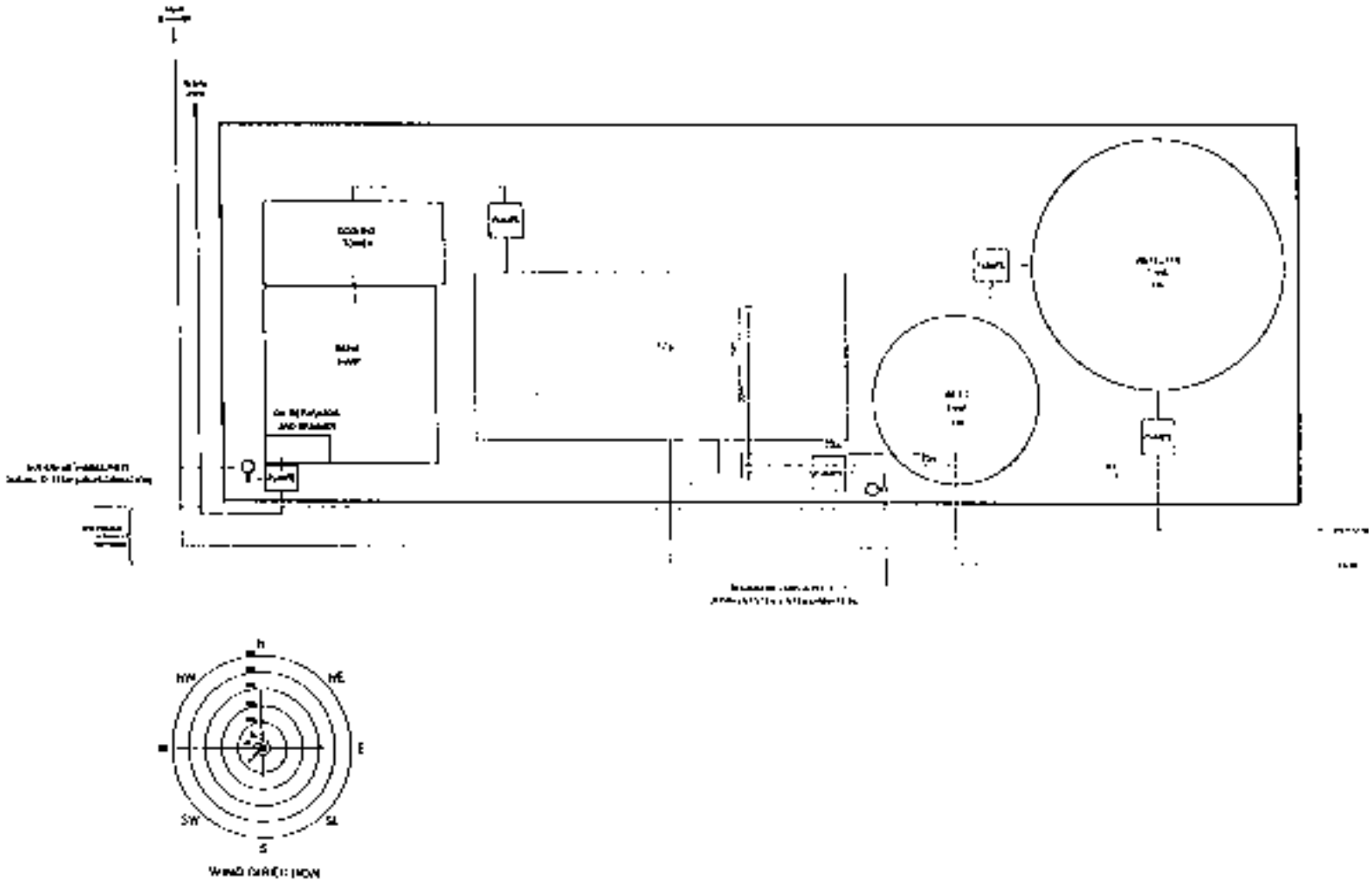

Figure 3: Desalination plant general arrangement (Source: Burns & Roe Worley, April 2001)

Schedule 2

Proponent's Revised Consolidated Environmental Management Commitments

4 May 2001

DESALINATED WATER AND SEAWATER SUPPLIES PROJECT, BURRUP PENINSULA

(Assessment No. 1378)

WATER CORPORATION

Proponent's Consolidated Environmental Management Commitments

Desalinated Water & Seawater Supplies Project, Burrup Peninsula (Assessment No. 1578)

No.	Topic	Action	Objective	Timing	Advice
1	Terrestrial Flora	1) Prepare a weed management plan. 2) Implement the weed management plan	To prevent the introduction of new weeds. To control existing weeds	Pre-construction Construction	CALM Agwest (for noxious weeds)
2	Terrestrial Flora	Conduct a detailed vegetation survey along the pipeline route, in the appropriate season.	To identify and protect sensitive flora.	Pre-construction	CALM
3	Terrestrial Flora	1) Prepare a flora and vegetation plan. • to quantify area of vegetation to be disturbed and the values that would be lost. 2) Implement the flora and vegetation plan	To protect rare, priority and endangered flora. To protect significant vegetation assemblages	Pre-construction Construction	CALM
4	Terrestrial Flora	1) Prepare a rehabilitation management plan for the construction and laydown areas: • to monitor vegetation assemblages. 2) Implement the rehabilitation management plan.	To measure and report on rehabilitation success	Construction Annually for 5 years, then biannually for a further 10 years	CALM
5	Terrestrial Fauna	Construct suitable fauna passages beneath the above-ground sections of the pipelines.	To protect significant fauna habitats and their access To protect rare and endangered fauna	Construction	CALM

6	Marine Flora and Fauna	1) Prepare a dredging and spoil disposal plan that incorporates the best practically available dredging construction methods and techniques: • to minimise generation of turbidity, • to minimise redistribution of contaminants, • to minimise visual impacts, and • to ensure seawater oxygen levels are not depleted 2) Implement the dredging and spoil disposal plan.	To protect benthic flora and fauna To minimise the extent of disturbance of benthic flora and fauna	Pre-construction Construction
7	Marine Flora and Fauna	1) Prepare a brine discharge quality plan to monitor and control emissions: • Continuous on-line monitoring will include flow rate, temperature, conductivity, oxidation-reduction potential and turbidity. • Appropriate additional monitoring will be conducted to control discharge levels of any process additives and other environmental contaminants (such as heavy metals) as required by the DEP. • Brine discharge temperature to be less than 2° C above the inlet seawater temperature for 80% of the time and not exceeding a maximum limit of 5° C above, unless otherwise agreed with the DEP. • The concentration of oxidising biocide in the brine discharge to be less than 0.1 mg/L. • The concentration of antiscalant in the brine discharge to be less than 2 mg/L, unless otherwise agreed with the DEP. • The proponent will design and operate the plant to minimize thermal loads to the marine environment as low as reasonably practicable 2) Implement the brine discharge quality plan. 3) If monitoring identifies unacceptable impacts, modifications will be made to mitigate adverse effects.	To protect benthic flora and fauna	Pre-construction/commissioning Operation On going

8	Marine Flora and Fauna	1) Conduct a research program to determine the chronic toxicity of antiscalants on appropriate marine biota. 2) Implement the findings	To protect sessile flora and fauna	Pre-commissioning Operation	
9	Marine Flora and Fauna	Chemical additives described in the Environmental Protection Statement will not be changed without prior approval.	To protect sessile flora and fauna	On-going	
10	Marine Flora and Fauna	1) Prepare a plan to monitor contaminants in the seawater, sediment and biota. 2) Implement the plan. 3) If monitoring identifies unacceptable impacts, modifications will be made to mitigate adverse effects.	To establish baseline data for the concentrations of heavy metals, process chemicals and other relevant contaminants To identify long term effects on biota To protect sessile flora and fauna	Pre-commissioning Operation On-going	
11	Marine Flora and Fauna	1) Prepare a water quality monitoring plan that includes the monitoring of caged "sentinel" organisms around the brine outfall. 2) Implement the water quality monitoring plan 3) If monitoring identifies unacceptable impacts, modifications will be made to mitigate adverse effects.	To establish baseline data. To identify effects on biota To protect marine flora and fauna To protect mangrove communities	Pre-construction For a minimum of 18 months after commissioning. On-going	
12	Marine Flora and Fauna	1) Prepare a coral management plan to ensure no adverse impacts on coral communities particularly the nearest corals to the discharge diffuser. The plan will include intensive monitoring of temperature at the intake and outfall, at appropriate locations between the outfall and the nearest coral community and at appropriate reference locations, over the months of December to April, following commissioning of the plant. 2) Implement the plan 3) If monitoring identifies unacceptable impacts from the project, modifications will be made to mitigate adverse effects. Unacceptability of impacts will be in consultation with the DFP.	To protect local coral communities. To verify the dispersion modelling results To interpret the results of any coral monitoring program	Pre-commissioning Operation On-going	DAFM

13	Visual Amenity	1) Prepare a visual amenity plan that includes: • Mounding of excess soil and rock to form a visual screen where practicable; • Painting pipelines in colours that blend with the environment; and • No construction of a pipeline maintenance access road, unless otherwise agreed with the DEP. 2) Implement the plan	To provide a visual screen of the pipelines from Bunup Road To prevent unacceptable visual impacts.	Pre-construction Construction	
14	Aboriginal Heritage	1) Prepare an Aboriginal heritage plan to • identify all sites of cultural significance; • provide guidelines for avoidance of and behaviour around sites; and • provide guidelines if artifacts are found. 2) Implement the Aboriginal heritage plan.	To minimise disturbance to sites of cultural significance.	Pre-construction Construction	
15	Risk	Plant design and operation to be compliant with Syntroleum's Safety Management System and Emergency Plan.	To ensure safe operation in proximity to a major facility.	Design compliance - pre-construction. Operation compliance - prior to operation of Syntroleum plant.	DMR

*The difference between the 24 hour average seawater intake temperature and the brine discharge temperature.

Abbreviations
Agwest = Agriculture Western Australia
CALM = Department of Conservation and Land Management
DEP = Department of Environmental Protection
DME = Department of Minerals and Energy

Appendix 5

Recommended Environmental Statement to Amend Conditions

Statement No.

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

DESALINATED WATER AND SEAWATER SUPPLIES PROJECT
BURRUP PENINSULA, SHIRE OF ROEBOURNE

Proponent: Water Corporation

Proponent Address: 629 Newcastle Street, Leederville WA 6007

Assessment Number: 1419

Previous Assessment Number: 1378

Previous Statement Number: Statement No.567 (published on 22 June 2001).

Report of the Environmental Protection Authority: Bulletin 1044

Previous Report of the Environmental Protection Authority: Bulletin 1014

The implementation of this proposal to which the above reports of the Environmental Protection Authority relate is subject to the conditions and procedures contained in Ministerial Statement No. 567 (22 June 2001), as amended by the following:

Condition 2-1 (Proponent Commitments) of Statement No. 567 is deleted and the following condition is inserted:

2 Proponent Commitments

2-1 The proponent shall implement the revised consolidated environmental management commitments of 19 March 2002 as documented in schedule 2 of this statement.

Note: The attached schedule 1 is inserted in place schedule 1 of 22 June 2001.

Published on

Schedule 1
(Revised)

The Proposal (Assessment No. 1419)

The proposal is to construct and operate a seawater supply and desalination system to service the requirements of new industrial developments on the Burrup Peninsula, approximately 1,300 kilometres north of Perth (Figure 1).

The proponent proposes to:

- Provide a seawater supply system with a capacity of approximately 280 megalitres per day;
- Provide a brine discharge into King Bay with a capacity of approximately 208 megalitres per day;
- Accept the discharge of treated industrial and domestic wastewater into the brine discharge stream from facilities that have environmental approval; and
- Construct and operate desalination plants on the Syntroleum Sweetwater Pty Ltd lease, the Burrup Fertilisers Pty Ltd lease and potentially other sites.

The pipeline route and location of the seawater inlet and brine outlet are shown in Figure 2 (attached). The main characteristics of the modified project are summarised in Table 1 below.

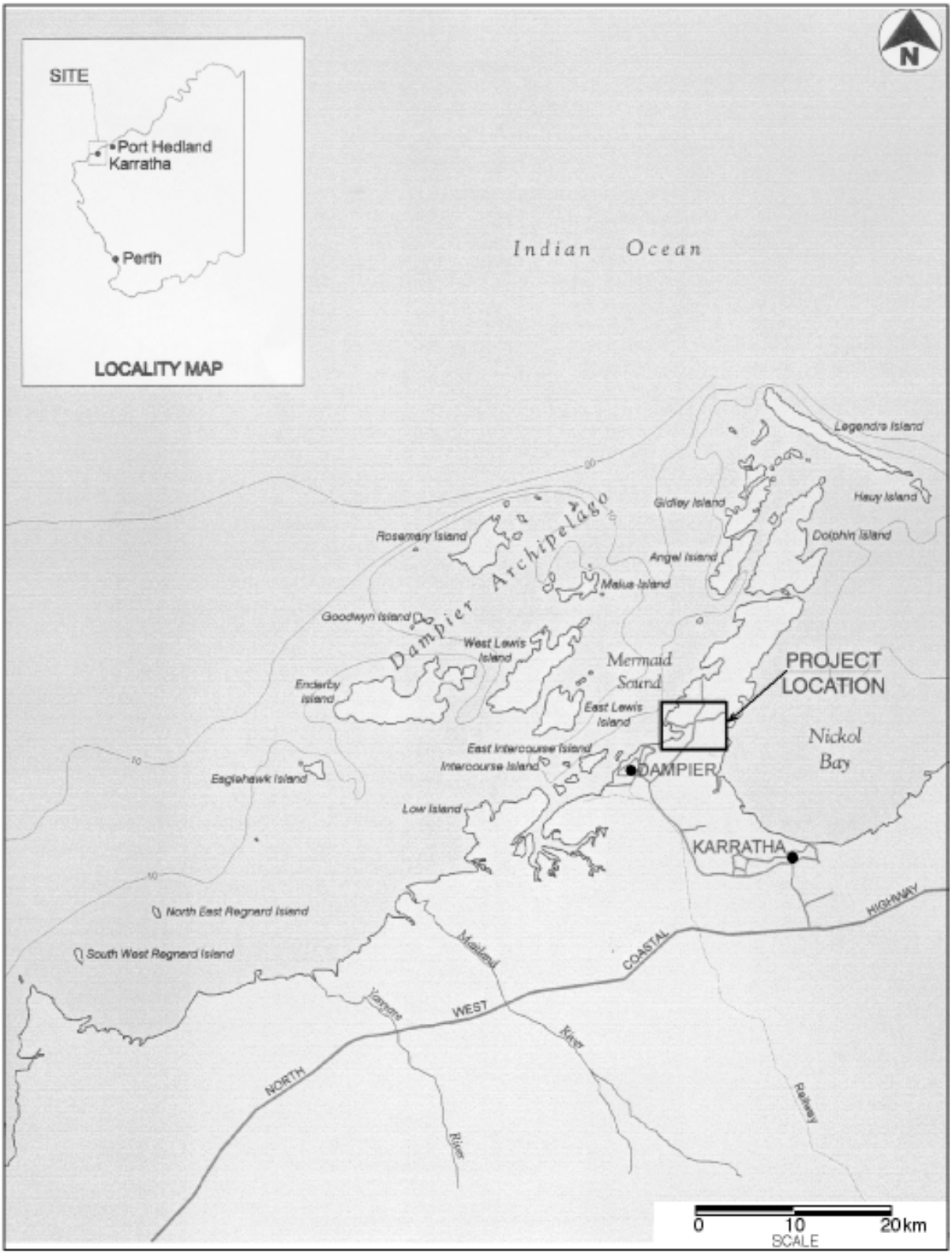

Figure 1. Project Location - Regional Map (Source: Figure 1.2 HLA - Envirosciences, 1999a).

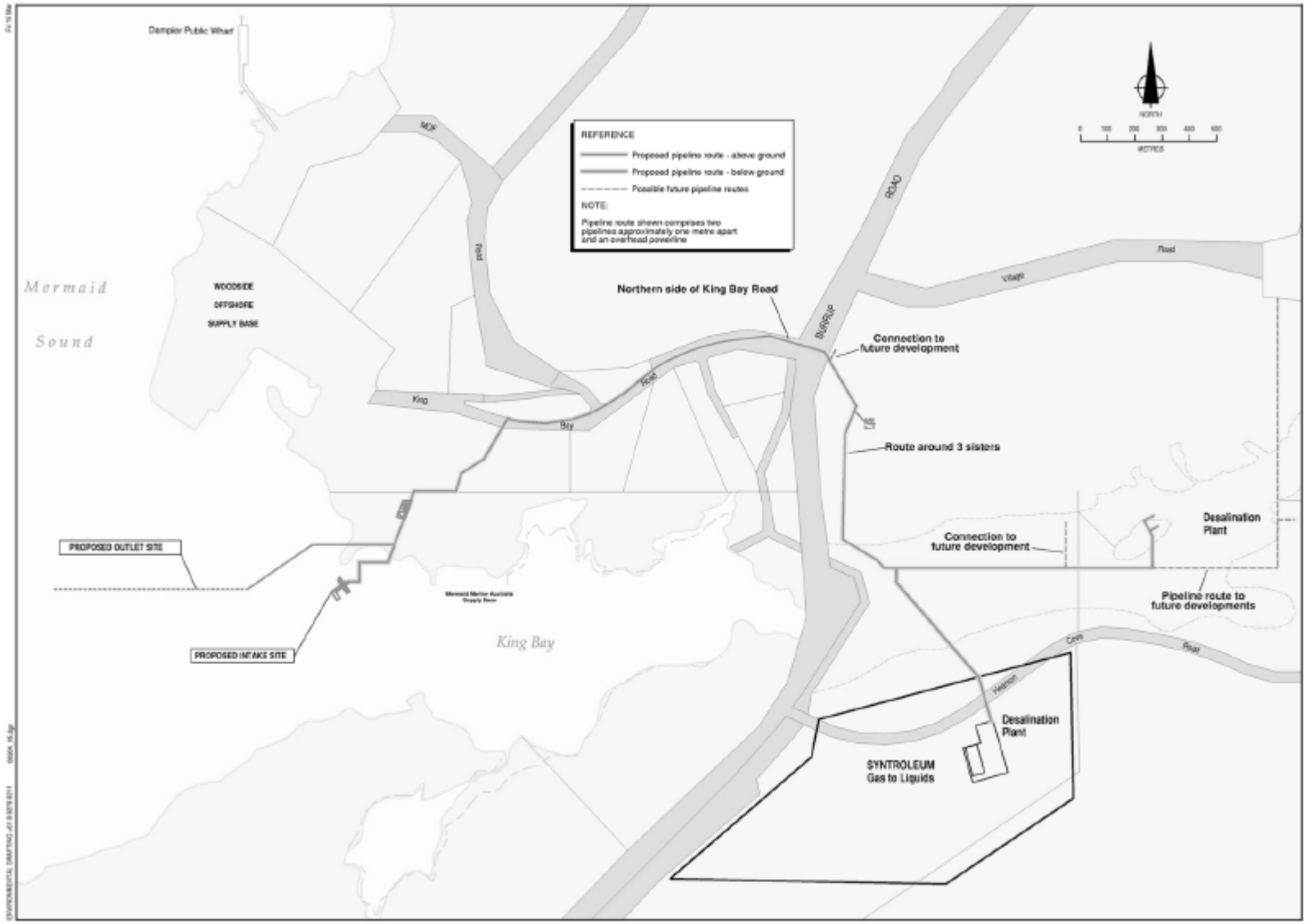

Figure 2: Pipeline Route (Source: Burns & Roe Worley)

Table 1: Summary of key proposed characteristics (Assessment No. 1419)

Element	Description
Project Purpose	To provide high purity water and seawater to industries on the Burrup Peninsula.
Project Life	25 + years
Major Project Components	• Seawater supply pipelines (to 1.4m diameter) • 2 ML Seawater surge tank at the Three Sisters site • Brine discharge pipelines (to 1.1m diameter) • 2 ML brine break tank adjacent to Mermaid Marine, outfall pipe and diffuser array into King Bay • 33 kV power line • Thermal desalination plant, including cooling tower, seawater storage tank and desalinated water storage tank at the Syntroleum site • Thermal desalination plant , including seawater storage tank and desalinated water storage tank at the Burrup Fertilisers site • Potentially, future desalination plants and associated infrastructure at other developers sites
Plant Location	• Seawater intake pump system – within the Mermaid Marine harbour development • Seawater pipelines – within easements on the northern side of the mudflat north of Hearson Cove Road, eastern side of Burrup Road, northern side of King Bay Road and western side of the Mermaid Marine access road and property • Brine pipelines – adjacent to seawater pipelines • 33 kV power line – adjacent to seawater and brine pipelines • Syntroleum Desalination plant – within the Syntroleum lease area, adjacent to the process plant site, King Bay-Hearson Cove Industrial Area • Burrup Fertilisers Desalination plant – within the Burrup Fertilsers lease area, adjacent to the process plant site, King Bay-Hearson Cove Industrial Area • Brine outfall and diffuser – extending approximately 800 m from the end of the Mermaid Marine groyne to a point approximately midway between the Mermaid Marine and Woodside shipping channels at 4.0m CD.
Plant Operation	Continuous – 24 hours per day, 365 days per year
Storage Capacities	• Seawater service tank (Three Sisters site) - 2ML • Brine break tank (adjacent Mermaid Marine) - 2 ML • Syntroleum desalination plant seawater storage tank – 2 ML • Syntroleum desalination plant distilled water storage tank – 4 ML • Burrup Fertilisers desalination plant seawater storage tank – 2 ML • Future tanks at other developers sites
Inputs: - Seawater - Power Supply	Ultimately, 280 ML/d intake (including process cooling water) • Pump station – ultimately, approximately 3 MW, supplied from process plants • Syntroleum Desalination Plant – approximately 1.5 MW supplied from Syntroleum • Burrup Fertilisers Desalination Plant – approximately 3 MW supplied from Burrup Fertilisers • Potentially, other desalination plants at other developers sites

Element	Description
Discharges: - Brine - Process wastewater - Domestic wastewater - Antiscalant - Biocide - Sulphamic Acid - Temperature - Heat Load	 Ultimately, approximately 208 ML/d at up to 55,000 mg/L TDS Burrup Fertilisers – 0.8 ML/d Potentially, similar quantities from other developers sites. Burrup Fertilisers – 0.04 ML/d Potentially, similar quantities from other developers sites. Syntroleum desalination plant - 100 kg/d Burrup Fertilisers desalination plant – 100 kg/d Potentially, similar quantities from other developers sites. Nil; decomposed by addition of sodium metabisulphite. Nil. Discharge less than 5°C (less than 2°C for 80% of the time) above ambient seawater temperature. Ultimately, approximately 208 ML/d nominally within 2°C of the ambient seawater temperature
Noise: - Construction: - Operation:	 Less than 30 dB(A) at the nearest permanent residence (Dampier) • Seawater intake system: Less than 70 dB(A) at 1m from pump well. • Syntroleum Desalination plant: Less than 30 dB(A) at the nearest permanent residence (Dampier). • Burrup Fertilisers Desalination plant: Less than 30 dB(A) at the nearest permanent residence (Dampier). • Future desalination plants at other developers sites are likely to be very similar in nature and sound level at Dampier will be less than 30 dB(A).
Construction Period	Approximately 20 months
Construction Workforce	Peak 50
Operational Workforce	Estimated 6
Project Benefit	Provides a reliable, cost effective and environmentally sensitive water supply for industry development on the Burrup Peninsula

Schedule 2

Proponent's Revised Consolidated Environmental Management Commitments

19 March 2002

DESALINATED WATER AND SEAWATER SUPPLIES PROJECT BURRUP PENINSULA, SHIRE OF ROEBOURNE (Assessment No. 1419)

WATER CORPORATION

SUMMARY OF MANAGEMENT COMMITMENTS (Assessment No. 1419)

No	Topic	Action	Objective	Timing	Advice
1	Terrestrial Flora	1) Prepare a weed management plan. 2) Implement the plan.	To prevent the introduction of new weeds. To control existing weeds.	Pre-construction Construction	CALM AgWA (for noxious weeds)
2	Terrestrial Flora	Conduct a detailed vegetation survey along the pipeline route (including the Three Sisters surge tank), in the appropriate season.	To identify and protect sensitive flora.	Pre-construction	CALM
3	Terrestrial Flora	1) Prepare a flora and vegetation plan: • to quantify area of vegetation to be disturbed and the values that would be lost. • to set measures to protect significant flora and vegetation 2) Implement the plan.	To protect significant, rare and endangered flora. To protect significant vegetation assemblages.	Pre-construction Construction	CALM
4	Terrestrial Flora	1) Prepare a rehabilitation management plan for the construction and laydown areas: • to rehabilitate disturbed areas • to monitor vegetation assemblages 2) Implement the plan.	To measure and report on rehabilitation success.	Construction Annually for 5 years, then biannually for a further 10 years.	CALM
5	Terrestrial Fauna	Construct suitable fauna passages beneath the above ground sections of the pipelines.	To protect significant fauna habitats and their access. To protect rare and endangered fauna.	Construction	CALM
6	Marine Environmental Values	Brine and wastewater effluent will only be accepted from industrial process plants: 1) for which licence and/or Ministerial Conditions (Part IV and V of the EP Act) have been issued; 2) that have provided appropriate toxicity and environmental fate data for all components of the effluent to the satisfaction of the DEP/EPA; and 3) which only utilise DEP/EPA approved process additives (eg antiscalants, corrosion inhibitors etc).	To minimise impacts on the marine environment	 On-going On-going	DEP/EPA CALM

No	Topic	Action	Objective	Timing	Advice
7	Marine Environmental Values	Continue to review options for recycling and reuse of brine and/or wastewater effluent (including the Dampier Salt option). The infrastructure will be designed and constructed such that future reuse / recycling opportunities can be accommodated.	To minimise impacts on the marine and general environment	On-going	OMP DEP/EPA
8	Marine Environmental Values	1) Prepare an Environmental Management Plan in consultation with the system users and the DEP/EPA. The plan will encompass: • requirements for monitoring (of effluent, seawater, sediments and biota); • requirements for independent data verification, evaluation and reporting; and • mechanisms for joint management of the system by the proponent and system users. 2) Implement the plan.	To minimise impacts on the value of the marine environment	Pre-commissioning On-going	DEP/EPA CALM
9	Marine Flora and Fauna	Conduct a survey of the seabed to identify the marine habitats and benthic flora and fauna around the revised diffuser location.	To protect benthic flora and fauna.	Pre-construction	CALM WA Museum
10	Marine Flora and Fauna	1) Prepare a dredging and spoil disposal plan that incorporates the best practically available dredging construction methods and techniques: • to minimise generation of turbidity; • to minimise redistribution of contaminants; • to minimise visual impacts; and • to ensure seawater oxygen levels are not depleted. 2) Implement the plan.	To protect and minimise the extent of disturbance of benthic flora and fauna.	Pre-construction Construction	DPA DEP/EPA CALM
11	Marine Flora and Fauna	In accordance with the Environmental Management Plan monitor emissions at the outfall break tank: • Continuous on-line monitoring will include at least flow rate, temperature, pH, conductivity, oxidation-reduction	To protect sessile flora and fauna.	Pre-commissioning	DEP/EPA

No	Topic	Action	Objective	Timing	Advice
		potential, ammonia and turbidity. • Other contaminants that can be reasonably and reliably monitored by on-line instrumentation will also be monitored. • Appropriate additional monitoring will be conducted to quantify discharge levels of dissolved oxygen, nutrients, process additives and other environmental contaminants (such as heavy metals) in consultation with the DEP/EPA.			
12	Marine Flora and Fauna	1) Brine emissions from Water Corporation desalination facilities shall be controlled to the following: • Effluent discharge temperature to be less than 2^0 C* above the inlet seawater temperature for 80% of the time and not exceeding a maximum limit of 5^0 C above, unless otherwise agreed with the DEP. • The concentration of oxidising biocide in the effluent discharge to be less than 0.1 mg/L. • The concentration of antiscalant in the effluent discharge to be less than 2 mg/L, unless otherwise agreed with the DEP. 2) The proponent, in conjunction with system users, will manage the total effluent discharge to meet the above criteria.	To protect sessile flora and fauna.	Operation	DEP/EPA
13	Marine Flora and Fauna	In accordance with the Environmental Management Plan monitor contaminants in the seawater, sediment and biota, that includes the monitoring of caged "sentinel" organisms around the brine outfall.	To establish baseline data for the concentrations of heavy metals, process chemicals and other relevant contaminants. To identify long term effects on biota. To protect sessile flora and fauna.	Pre-commissioning On-going	DEP/EPA CALM

No	Topic	Action	Objective	Timing	Advice
14	Marine Flora and Fauna	In accordance with the Environmental Management Plan, monitor seawater temperature at: • the intake and outfall; • appropriate locations between the outfall and the nearest coral community; and • appropriate reference locations.	To ensure no adverse impacts on coral communities particularly the nearest corals to the discharge diffuser. To verify the dispersion modelling results. To interpret the results of any coral monitoring program.	On-going. (December to April, following commissioning of each additional plant).	DEP/EPA CALM
15	Visual Amenity	1) Prepare a Visual Amenity Plan that includes: • Mounding of excess soil and rock to form a visual screen where practicable; • Painting pipelines in colours that blend with the environment; and • No construction of a pipeline maintenance access road, unless otherwise agreed with the DEP. 2) Implement the plan.	To provide a visual screen of the pipelines from Burrup Road. To prevent unacceptable visual impacts.	Pre-construction Construction	DEP/EPA
16	Aboriginal Heritage	1) Prepare an Aboriginal Heritage Plan to: • identify all sites of cultural significance; • provide guidelines for avoidance of and behaviour around sites; and • provide guidelines if artifacts are found. 2) Implement the plan.	To minimise disturbance to sites of cultural significance.	Pre-construction Construction	DIA
17	Risk	Desalination plant design and operation to be compliant with the Safety Report and Emergency Plan of the process plant (as required by the Worksafe National Standard for the Control of Major Hazard Facilities).	To ensure safe operation in proximity to a major hazard facility.	Design compliance - pre-construction. Operation compliance – prior to operation of the plant.	MPR

*The difference between the 24 hour average seawater intake temperature and the brine discharge temperature.

AgWA = Department of Agriculture Western Australia
CALM = Department of Conservation and Land Management
DEP = Department of Environmental Protection
EPA = Environmental Protection Authority
DIA = Department of Indigenous Affairs
OMP = Office of Major Projects
MPR = Department of Mineral and Petroleum Resources

Appendix 6

The Water Corporation's Responsibilities in Managing the Multi-user

Brine and Wastewater Discharge System

Project
Management
Branch

DEPARTMENT OF
ENVIRONMENTAL PROTECTION
RECORDS SECTION
11 MAR 2002
FILE NO 615/02
NAME

7 March 2002

Ms K Nguyen
Manager Industrial Development Branch
Department of Environment and Water Catchment Protection
Westralia Square
141 St George's Terrace
PERTH WA 6000

FAX: 9222 7155 (2 pages including this page)

Dear Ms Nguyen

PROPOSAL FOR COMMON USER WASTE WATER DISPOSAL SYSTEM ON THE BURRUP PENINSULA

Following recent discussions with the DEWCP, the Water Corporation has modified the model by which waste water discharges into the King Bay marine environment are controlled and monitored. The revised principles of responsibility are as follows:

1. Individual proponents will be responsible for evaluating and implementing waste avoidance and minimisation principles to avoid or minimise contaminant and nutrient loads at source. Individual proponents will be responsible for describing and evaluating the environmental consequences of their proposal if it were to be implemented, explicitly taking into account other existing and approved discharges and activities. The DEWCP will be responsible for assessing the environmental impacts of industrial and domestic waste water streams from each development based on the information provided by proponents, incorporating the results of environmental monitoring programs in the area. The DEWCP will apply appropriate licence and/or Ministerial conditions to each development, defining the criteria for permissible activities of industrial and domestic waste water into the Water Corporation pipeline for discharge into King Bay.

2. The Water Corporation will only accept waste water streams from developers that are suitably licensed by the DEWCP. As a feasible measure and for commercial purposes, the Water Corporation will not accept waste water streams that will result in violation of the ANZECC guideline trigger values for the protection of 95% of species at the edge of an approved initial mixing zone[1].

[1] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC &ARMCANZ 2000

3 The Water Corporation's waste water outfall is subject to Ministerial conditions that are relevant to the discharge of brine concentrate, wash waters, heat and chemical additives including biocides and antiscalants.

4 The Water Corporation will monitor the quality of the waste water streams and marine environment near the ocean outlet (near field and far field) and appropriate reference sites. These data would be reported to DEWCP on a routine basis. All developments will self-monitor waste water discharge in compliance with their licence requirements. The monitoring data provided by each industry and by the Water Corporation would be used by DEWCP to assess non-compliance of licence conditions. The marine data would be used to measure compliance with Environmental Quality Standards to assess overall environmental performance. Data analysis would then feed back into the DEWCP review of licence conditions and suggested changes to Ministerial conditions where necessary.

5 Proponents desiring to discharge their plants' effluents into the Water Corporation's ocean waste pipeline will be required to:

a Meet waste avoidance and minimisation principles in respect to the mixing constituents and nutrient loads at source. This is to be achieved separately, through the EPA/DEWCP process.

b Meet DEWCP and other regulatory requirements.

c Provide contingency planting, in consultation with Water Corporation and other users of the scheme, to reduce loads further, if marine monitoring data (water, sediments and biota) show unacceptable impacts, in the opinion of the DEWCP, or that agreed criteria are not met.

The above commitments will be incorporated into commercial arrangements between the Water Corporation and the various users of the waste water disposal system, to facilitate management of the system and to provide mechanisms to monitor and control discharge of pollutant species.

With this revised model, the DEWCP has full responsibility for determining the criteria for acceptability for discharge of waste water streams into the marine environment and for implementing appropriate regulatory mechanisms. This revision does not affect the Water Corporation's previous commitments to monitoring of the waste water streams and the marine environment.

Yours sincerely

Graham Treadder
Project Manager

Appendix 7

Burrup Fertilisers' Proposed Discharge Criteria

SINCLAIR KNIGHT MERZ

Sinclair Knight Merz Pty Limited
ACN 001 024 095
ABN 37 001 024 095
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263 Adelaide Terrace
PO Box H615
Perth WA
Australia 6001
Telephone: +61 8 9268 4400
Facsimile: +61 8 9268 4499

Water Corporation
629 Newcastle Street
LEEDERVILLE WA 6007

29 November 2001
L01jslax.Doc
WV1890.007

Attention: Graham Tresidder

Dear Graham

Burrup Ammonia Plant - Proposed Wastewater Discharges

Following our facsimiles dated 23 and 27 November 2001 and recent discussions with the Department of Environmental Protection, Burrup Fertilisers Pty Ltd wish to confirm and finalise with the Water Corporation the proposed wastewater discharges based upon the preliminary design of the plant and in light of recent commitments.

To ensure that discharges of ammonia and methanol to the marine environment are minimised, Burrup Fertilisers will ensure that during normal operations process condensate, the largest source of ammonia and methanol, and the Reformer Jacket Blowdown will be sent to the Polisher Unit for recovery of methanol and ammonia.

The Polisher Unit will be equipped with a stream stripper to remove ammonia and methanol to concentration of 50 ppm for ammonia and 10 ppm for methanol based upon KBR preliminary design, the Proponent's experience from other operating plants and conditions stipulated by the Indian government for these plants. Polished water will be recycled to the ammonia process and will not be discharged.

Under upset or abnormal conditions, the plant will shutdown and the water stream contained in the Polisher Unit will be sent to storage and will be contained until start-up. Following start up the stored water will be sent back to the Polisher Unit for treatment then recycled back into the ammonia process. Hence, Burrup Fertilisers will ensure that during detailed engineering design process condensate and reformer jacket blowdown will be treated and recycled and will not be discharged to the Water Corporation's brine return line, therefore minimising emissions as low as reasonably practicable.

As a precaution and allowing for the occurrence of a short-term leak of waste streams containing methanol and ammonia, a concentration of 10 ppm for each substance will be assumed to be discharged within a total volume of $100m^3/yr$, representing two release events per year of $50\ m^3$.

Offices across Australia, New Zealand, South East Asia, The Pacific, The Americas and Europe

Further to the above, please consider for your modelling that Package Boiler Blowdown and Reformer Steam Drum Boiler Blowdown will not be discharged as both these streams are sent to the Demineraliser for treatment. The Demineraliser will produce Neutralised Demineraliser Regenerant Wastewater that will be discharged to Water Corporation's brine return line.

Further to the issues of ammonia and methanol, the plant will discharge trace metals in the cooling tower blowdown that occur in water naturally in background concentrations. Data indicating background concentrations of metals in seawater for tropical and turbid waters is absent and as such the expected discharge of metals can not be estimated. This will be estimated following Water Corporation's proposed monitoring for King Bay. The ammonia plant will be using corrosion inhibitors to minimise the release of metals of metals in waste streams and the deterioration of pipework. For these reasons, levels of metals in waste streams will be negligible.

The treatment of domestic wastewater will be undertaken to secondary standard by a suitable packaged wastewater treatment plant sized to suit the loads generated from a workforce of about 50 employees. A large number of propriety plants are available but they generally consist of three process compartments as follows:

- Tankage where primary sedimentation occurs;
- Tankage where biological activity and breakdown occurs; and
- Tankage where clarification of solids occur.

Additives, including chlorine, bromine and other biocides in cooling tower blowdown will be removed through chemical treatment and precipitation proposed by the Vendor Treatment Package. Treatment will aim to reduce levels of chlorine, bromine and biocides to non-detectable levels.

Please also consider Burrup Fertilisers' commitments in regard to wastewater discharges:

- **Commitment:** Design wastewater treatment facilities to treat process liquid waste streams to Water Corporation and DEP acceptance criteria, prior to discharge into the saline water outlet pipeline.
- **Commitment:** Treat liquid waste streams to reduce concentrations of TDS, chlorine, biocides, ammonia, methanol, phosphorus and nitrogen as low as reasonably practicable.
- **Commitment:** Ensure that process condensate, the largest source of ammonia and methanol, will be sent to the Polisher Unit for recovery of methanol and ammonia rather than being discharged as a waste stream.

As stated in the Public Environmental Review document, all treated wastewater discharged into Water Corporation's brine return line will be continuously monitored for flow rate and accumulated flow, temperature, conductivity, oxidation-reduction potential and turbidity. Other regular monitoring, on a basis of about every 3 to 6 hours, will be undertaken for other parameters contained in waste streams. Treated domestic wastewater will also be monitored to confirm its suitability for disposal, with monitored parameters including TSS, pH, BOD, N, P and faecal contaminants.

Contingency plans will also be developed as part of the Operation Environmental Management Plan to ensure that waste streams meet concentrations and remain within the requirements of the Water Corporation.

Considering the above and the Proponent's commitments **Table 1 (Attachment)** summarises the proposed discharges of the ammonia plant.

I trust that the concentrations and commitments made by Burrup Fertilisers are to the satisfaction of the Water Corporation whereby the Corporation will feel confident in accepting Burrup Fertiliser's waste streams. Burrup Fertilisers is of the understanding that if during Water Corporation's approval process there is a need to reduce concentrations in waste streams, Burrup Fertilisers will commit to meeting the Water Corporation's requirements.
Following detailed engineering more specific information regarding the methods of treatment and waste stream concentrations will be made available.

If you have any further queries please contact me.

Yours sincerely

Jenny Lazorov
Environmental Scientist

Phone 9268 9626
Fax 9268 4598
E-mail: jlazorov@skm.com.au

cc. Burrup Fertilisers Pty Ltd – Vikas Rambal
Department of Environmental Protection – Graham Storey
Water Corporation – Andrew Bath

Attachment

Table 1 – Proposed wastewater discharges from the ammonia plant

Parameter	Waste Stream	Flow Rate	Concentration in source waste stream	Concentration at end of pipe*
Cadmium Chromium Copper Iron Lead Mercury Nickel Tin Zinc (plus other metals naturally occurring in seawater)	Cooling Tower Blowdown	1,005 m^3/hr	Negligible Background	Negligible Background
Ammonia (as N)	Reformer Jacket Water Blowdown	Normally 0 m^3/hr. Normal discharge of 100 m^3/yr as a result of two leaks per year	Nominal concentration of 10ppm	Normally negligible concentration & load. 12.0 µg/L Load ~1 kg/yr
Phosphorus (total)	Neutralised Demineraliser Regenerant Wastewater	38 m^3/hr	Trace	Trace
	Domestic Wastewater	200 L/day per person[2]	10 ppm[3]	2.5 µg/L Load ~36.5 kg/yr
Total Nitrogen	Domestic Wastewater	200 L/day per person[2]	20 ppm[3]	5 µg/L Load ~73 kg/yr
Methanol	Reformer Jacket Water Blowdown	Normally 0 m^3/hr. Normal discharge of 100 m^3/yr as a result of leak	Nominal concentration of 10ppm	Normally negligible concentration & load. 12.9 µg/L Load ~1 kg/yr
E-Coli	Domestic Wastewater	200 L/day per person[2]	2.5 million cfu/100mL[4]	0.054 cfu/100mL

* Assuming dilution with cooling tower (23.93 ML/day) and desalination plant blowdown (9.072 ML/day), neutralised demineraliser regenerant wastewater (0.8 ML/day), Air compressor intercoolers wastewater (0.396 ML/day) and domestic wastewater (0.04 ML/day). Volumes based on preliminary design only and subject to change following detailed engineering

[1] As agreed with Department of Environmental Protection

[2] Typical effluent quality following secondary treatment. Subject to change following detailed engineering

[4] Typical concentration following secondary treatment. Raw wastewater typically contains in the order of 50 million cfu/100mL.