

Guidelines for preparation of a Public Environmental Report

DUPLICATION OF THE EAST POINT EFFLUENT RISING MAIN AND EXTENSION OF THE EAST POINT OUTFALL

DARWIN, NT

-Power and Water Corporation-

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GLOSSARY

| | |
|-----------------|---|
| EA Act | NT <i>Environmental Assessment Act 1982</i> |
| EAAP | NT <i>Environmental Assessment Administrative Procedures 1984</i> |
| EHA Division | Environment, Heritage and the Arts Division of the Department of NRETAS |
| EMP | Environmental Management Plan |
| EPBC Act | Australian <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| ERM | Effluent Rising Main |
| NRETAS | NT Department of Natural Resources, Environment, the Arts and Sport |
| NT | Northern Territory |
| NT Minister | NT Minister for Natural Resources, Environment and Heritage |
| PER | Public Environmental Report |
| Power and Water | Power and Water Corporation |
| WDL | Waste Discharge Licence |
| WWTP | Waste water treatment plant |

Final PER Guidelines

Duplication of the East Point effluent rising main and extension of the East Point outfall, NT, Power and Water Corporation

February 2010

1 Introduction to the Guidelines

The Power and Water Corporation (Power and Water) has proposed to construct a duplicate rising main from Ludmilla waste water treatment plant to the East Point outfall, and to extend the existing East Point outfall further into Darwin Harbour. The Northern Territory (NT) Minister for Natural Resources, Environment and Heritage (NT Minister) has determined that this proposal requires formal assessment, under the NT *Environmental Assessment Act 1982* (EA Act), at the level of a Public Environmental Report (PER).

These Guidelines have been developed to assist Power and Water in preparing a PER for the East Point rising main and outfall extension project, in accordance with Clause 8 of the *NT Environmental Assessment Administrative Procedures 1984* of the EA Act.

Environmental management of Darwin Harbour is an important issue in light of projected growth and continuing development of the Darwin area.

Accordingly, issues of concern contributing to the decision to require formal environmental assessment, include:

- Erosion of sand waves near the proposed East Point outfall extension, and the fate of this sediment, in particular relation to neighbouring seagrass beds;
- Impacts on mangrove and coastal monsoon rainforest communities and an adjacent conservation area (zoned Conservation under the NT Planning Scheme) at East Point that could occur during proposed rising main works;
- Disturbance to acid sulphate soils during construction of the rising main and outfall;
- Impacts to marine flora and fauna and foraging habitat likely to be affected during construction and operation phases of the rising main and outfall; and
- Future and cumulative increases in nutrients, turbidity, fine sediment and heavy metals entering the marine environment of Darwin Harbour causing impacts to fauna and flora at both the pollution point source and Harbour-wide scale.

The proposal was referred to the Australian Government by Power and Water under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 5 October 2009. A delegate for the Australian Minister for the Environment, Heritage and the Arts determined on 2 November 2009 that the project is a *controlled action* under the EPBC Act. The reasons for the determination are that the proposed action has potential to significantly impact on listed threatened species and communities (sections 18 and 18A) and listed migratory species (sections 20 and 20A), protected under part 3 of the EPBC Act. The proposal will be assessed by the NT Department of Natural Resources, Environment, the Arts and Sport (NRETAS) under the bilateral agreement between the NT and Australian Governments. A PER under a

bilateral agreement also requires a Supplement Report by the proponent following the assessment of the PER.

Information about the proposal and its relevant impacts, as outlined in this document, is to be provided in the PER by Power and Water. This information must be sufficient to allow the Minister to make informed recommendations in the Assessment Report to the Responsible Minister or relevant consent authority in accordance with the EA Act.

2 General advice on the PER

2.1 General Content

For the purpose of these Guidelines, 'environment' is defined as it is in the EA Act, where 'environment' means all aspects of the surroundings of man including the physical, biological, economic, cultural and social aspects.

The PER should be a stand-alone document. It should contain sufficient information to avoid the need to search out previous or additional, unattached reports.

The PER should enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development. Information provided in the PER should be objective, clear, and succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the PER is to be written in a clear and concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible. Cross-referencing should be used to avoid unnecessary duplication of text.

Detailed technical information, studies or investigations necessary to support the main text should be included as appendices to the PER.

The level of analysis and detail in the PER should reflect the level of significance of the expected and potential impacts on the environment, as determined through adequate technical studies. Any and all unknown variables or assumptions made in the assessment must be clearly stated and discussed. The extent to which the limitation, if any, of available information may influence the conclusions of the environmental assessment should also be discussed.

The Guidelines will be considered current for a period of two years from the date the finalised PER Guidelines are issued to the proponent.

2.2 Format and style

The PER should comprise three elements, namely:

- The executive summary;
- The main text of the document; and

- Appendices containing detailed technical information and other information that can be made publicly available.

The structure of these Guidelines may be adopted as the format for the PER. This format need not be followed if the required information can be presented alternatively for better effect. However, each of the elements in these Guidelines must be addressed to meet NT Government regulatory requirements.

The Executive Summary must include a brief outline of the project and each chapter of the PER, allowing the reader to obtain a clear understanding of the proposed project, its environmental implications and management objectives. It must be written as a stand-alone document, able to be reproduced on request by interested parties who may not wish to read the PER as a whole.

The main text of the PER should include a list of abbreviations, a glossary of terms to define technical terms, acronyms and abbreviations, and colloquialisms.

The appendices must include:

- A copy of the final Guidelines;
- A list of persons and agencies consulted during the PER;
- Contact details for the proponent;
- Tabulated cross references between the PER and these Guidelines showing where sections have been addressed;
- The names of, and work done by, the parties involved in preparing the PER; and
- The expertise of the parties involved in work contributing to the PER.

The PER must be written so that any conclusions reached can be independently assessed. To this end, all sources must be appropriately referenced using the Harvard Standard. The reference list should include the address of any Internet “web” pages used as data sources. All referenced supporting documentation must be available upon request.

The PER should be produced on A4 size paper capable of being photocopied, with any maps and diagrams on A4 or A3 size and in colour if possible.

The proponent should consider the format and style of the document appropriate for publication on the Internet. The capacity of the website to store data and display the material may have some bearing on how the document is constructed.

2.3 Administration

Ten bound copies of the draft PER should be lodged with the Minister, care of the Environment, Heritage and the Arts (EHA) Division of NRETAS for distribution to NT Government advisory bodies.

The PER should be provided on CD/DVD in Adobe PDF format for placement on the NRETAS internet site (Executive Summary, Chapters and Appendices separate). Where possible, file sizes should be kept below ~2MB to minimise download times. Additionally, a Microsoft word copy of the PER and Supplement should be provided to NRETAS to facilitate production of the Assessment Report and Recommendations.

The PER is to be advertised for review and comment in the *Weekend Australian*, Saturday *NT News* and the *Darwin Sun*.

The PER should be made available for public review for a minimum period of 28 days. If the PER is submitted for exhibition between November 30 and January 14 of any calendar year an extended exhibition period will apply.

The PER should be exhibited at:

- Environment, Heritage and the Arts (EHA) Division (NRETAS), 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin;
- Department of Lands and Planning, Ground Floor, 38 Cavenagh St, Darwin;
- Northern Territory Library (NTL), Parliament House, Darwin;
- Casuarina Public Library (casuarinalibrary@darwin.nt.gov.au; Ph: 8930 0200);
- Palmerston City Library, Goyder Square, Palmerston (Contact maeva.fournigault@palmerston.nt.gov.au, Ph 8935 9991);
- Darwin City Council Library, Darwin Civic Centre, Harry Chan Ave;
- Charles Darwin University Library, CDU Casuarina Campus;
- The Environment Centre (Unit 3, 98 Woods St, Darwin;);
- Environment Hub, Rapid Creek (Shop 9 Rapid Creek Business Village, Pearce place, Millner);
- Member for Fannie Bay (Michael Gunner's) office, Parap Shopping Village, Parap;
- Australian Government Department of Environment, Water, Heritage and the Arts Library, John Gorton Building, Parkes, Canberra.

The action officer is Bryan Baker from the EHA Division of NRETAS, phone (08) 8924 4047, facsimile (08) 8924 4053 or email: bryan.baker@nt.gov.au.

3 General Information

The PER should have a chapter that provides general information such as the background and context of the action, including:

- The title of the project;
- The full name and postal address of the designated proponent;
- A description of the proposal's location in the region and its proximity to landmark features, regional community centres, and sensitive environments such as major waterways, significant groundwater resources, conservation and recreational reserves;
- A clear outline of the objective of the action;
- Legislative background for the proposal, including the relevant NT legislation that applies to the project;
- The background to the development of the action;
- How the action relates to any other proposals or actions (of which the proponent should reasonably be aware) that have been or are being taken, or that have been approved in the region affected by the action;
- The current status of the action; and
- The consequences of not proceeding with the action.

4 Description of the proposal

To assist in determining the environmental impacts associated with the proposal, a section should be provided that describes the project in sufficient detail to allow an understanding of all stages of the proposal, including infrastructure design and engineering, construction, operation and management. Emphasis should be given to those components with the most potential for significant short and long term environmental impacts. Also describe the existing operations in relation to the proposed development.

4.1 General

The PER should contain details on:

- An explanation of the objectives, benefits and justification for the action: including a description of the current situation (maximum operational and discharge capacities), characteristics of waste before and after discharge (and include raw data on previous sampling activities), establish baseline monitoring on existing water quality and incorporate into Harbour-wide modelling of water quality;
- Level of treatment of sewage (e.g. primary, secondary, tertiary), and characteristics of the waste to be discharged;
- Harbour-wide water quality monitoring regime during construction and operation phases. Monitoring in the construction zone should commence prior to construction;

- Discuss how the modelling will be undertaken, and limitations, assumptions, calibration etc. Identify (preferably quantification if possible) some of the main uncertainties associated with the modelling and scenarios.
- Established link between hydrodynamics, sediment, flocculation, and nutrient dynamics within Darwin Harbour at current and future discharge scenarios based on empirical evidence;
- A discussion on the potential to upgrade sewage treatment processes;
- Consultation with recognised experts on EPBC listed threatened and migratory species, and other species, that are likely to be affected by the proposed actions; experts should be able to provide advice on scope/ timing/ and methodology for surveys to determine presence of relevant species, and identify breeding and foraging habitat;
- Description of EPBC listed threatened and migratory species should include its regional status, and results from surveys/studies should outline breeding and foraging habitat, population size and distribution within and proximity to Darwin Harbour (and include maps);
- An overall layout of the proposed project, including final location and siting of works and facilities if known, or preferred option;
- Schedule or timeline for all relevant aspects of the proposal;
- A communication plan for the development, which may include a strategy for communicating with the public and community groups who are likely to have an interest in or be affected by the proposal; The PER should also indicate how any need for particular infrastructure/services might negatively impact on other stakeholders needs for those same infrastructure/ services (e.g. use of key roads);
- Design layout and standards, including drainage, roads, buildings, process descriptions, outfall alignments, discharge points etc;
- Design limitations imposed by site characteristics (including adjacent land use);
- Tenure/s under which the proposal would be held, any planning issues, and any Native Title issues;
- Relevant National and Northern Territory legislation, standards, codes of conduct and guidelines;
- How the project might be managed in the context of a future strategic framework for the management of Darwin Harbour (as developed by the Darwin Harbour Advisory Committee);
- Methods for storage, handling, containment and emergency management of chemicals and other hazardous substances (including fuel) that may pollute soil or water during construction or operation;
- Expected lifetime of the proposal;

- Rehabilitation objectives for the site beyond the intended use; and
- Any potential direct or indirect economic impacts caused by the project should be included;
- Identify the cumulative impacts of future discharge volumes.

4.2 Construction phase

The construction method of the rising main duplication and East Point outfall should be described in detail. The Notice of Intent (of 18 September 2009) provided several options for design, methods of installation, and locations of the outfall, as well as design and material options for the rising main. The PER should detail the final options for these and a justification of their selection, including identification of preferred options. Include a description of the Larrakeyah outfall closure plan. Note that the Department of Health and Families should be notified of any overflows that occur during construction.

Details should be provided on the following:

- Construction program (timing and duration);
- Final (or preferred) designs and materials of the rising main and outfall;
- Final (or preferred) method of installation of the outfall;
- Quantity, methods and location for disposal of dredge material;
- Justification for the location of the outfall and any modelling used to justify its location;
- An assessment of heritage objects potentially occurring within the disturbance corridor for the outfall (a side scan sonar is recommended for sea floor surveys);
- Discuss how pipe line construction techniques will ensure efficacy and longevity of proposed rising main materials;
- Cross sectional diagrams showing
- Discuss how odours will be managed during construction e.g. if mangrove soils are disturbed;
- Construction wastes and disposal methods;
- Describe in detail vegetation types, their extent, location, methods of vegetation clearing, site preparatory works, and earthmoving. Describe where location of compounds, lay-down and turn around areas will be located so as to avoid unnecessary impacts on sensitive vegetation such as mangrove, monsoon rainforest and riparian vegetation.
- Detailed soil conservation and rehabilitation measures, for example, of access tracks used during the construction phase, of cleared land (an

Erosion and Sediment Control Plan should be developed and included in the PER);

- A Weed Management Plan should be developed to ensure that weeds (such as potentially mission grass, gamba grass, coffee bush and lantana) are controlled during construction and rehabilitation stages.
- Construction workforce numbers expected;
- Methods used to prevent and control biting insect populations that might occur due to construction works.

4.3 Operation phase

A description should be provided of:

- The effluent treatment process prior to discharge and whether existing treatment capacity is sufficient to deal with additional effluent from Larrakeyah;
- Characteristics of waste before and after discharge, including volume, nutrients, weight, and chemical composition (i.e. heavy metals);
- Nutrient loads at both the Ludmilla and Larrakeyah sites, and combined nutrient loads predicted when Ludmilla treats all sewage;
- Likely fate of suspended solids (transport and sedimentation of flocculent and macerated material);
- How nutrient loads compare with Darwin Harbour water quality objectives, and if nutrient loads will be improved through current capital works;
- Expected volumes of discharged effluent following the upgrade and absolute capacity of proposed upgrades and how this fits with future population growth;
- Future potential for expansion and diversions from other treatment plants or sewerage network;
- Maintenance requirements and operations;
- An assessment of the durability and efficacy of pipeline material in a marine/mangrove/acid sulphate environment;
- Ongoing measures proposed to minimise the potential for mosquito breeding on site and any off site locations that may be affected by the proposal.

5 Alternatives

Alternatives to the proposal must be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and rejecting others, including a comparative analysis of expected benefits and costs.

Alternatives to be discussed must include:

- Not proceeding with the proposal;
- Alternatives to discharging such as recycling water (effluent reuse);
- Alternative pipeline materials and installation options;
- Alternative outfall locations and configurations;
- Alternative dredge methods considered and dredge spoil disposal locations;
- Environmental management techniques; and
- Alternative environmental management techniques for moderate or higher risk impacts.

6 Risk Assessment

6.1 Risk assessment approach

Understanding environmental risk and uncertainty is a major element of the National Strategy for Ecologically Sustainable Development. The PER should be undertaken with specific emphasis on identification, analysis and treatment of risks through a whole-of-project risk assessment. Through this process, the PER will:

- Acknowledge and discuss the full range of risks presented by the proposed action including those of special concern to the public;
- Quantify (where possible) and rank risks so that the reasons for proposed management responses are clear;
- Acknowledge levels of uncertainty about estimates of risk and the effectiveness of risk controls;
- Extend risk assessment to problems in realising benefits; and
- Discuss the residual risks and their consequences expected to be borne by the community, providing better understanding of equity issues.

Statements about levels of uncertainty should accompany all aspects of the risk assessment. Steps taken to reduce uncertainty or precautions taken to compensate for uncertainty should also be identified and their effect/s demonstrated.

Information provided should permit the reader to understand the likelihood of the risk, its potential severity, and any uncertainty about the effectiveness of controls. If levels of uncertainty do not permit robust quantification of risk, then this should be clearly acknowledged.

The risk assessment should be based on international best practice. Processes for risk management are formalised in Standards Australia / Standards New Zealand (e.g. AS/NZS ISO 31000:2009; HB 436:2004; HB 158:2006).

7 Key risks

The major risks below have been identified through analysis by the Northern Territory Government of the Notice of Intent for the East Point rising main and outfall project. It is possible that further risks will be identified in the environmental impact assessment process. The three major risks identified here are:

1. Disturbance to marine and terrestrial soils and sediments:
 - Disturbance of acid sulphate soils during construction of the rising main;
 - Erosion of benthic sand waves and the fate of disturbed sediment during construction of the outfall.
2. Water quality issues during operation including potential for:
 - Flocculation of effluent at the outfall opening and the dispersal, persistence and accretion of nutrients;
 - Impacts on listed migratory species and listed threatened species and communities, and;
 - Impacts on sensitive marine benthic habitats, including corals and seagrass beds supporting local ecosystems, and fisheries.
3. Natural disasters.

7.1 Disturbance to marine and terrestrial soils and sediments

7.1.1 Acid Sulphate Soils

Outcome

The proponent will ensure that management of potential acid sulphate soils during construction of the effluent rising main (pipeline from Ludmilla WWTP to East Point outfall) is sufficient to minimise leachate formation and not impact the marine and terrestrial environment.

Context

It is known that there is potential for acid sulphate soils to occur in the rising main corridor. Disturbance of acid sulphate soils can lead to:

- Exposure of metal sulphides to oxygen by drainage and excavation of potentially acid sulphate soils, generating sulphuric acid;
- Generation of sulphuric acid, which can result in mobilisation of heavy metals adversely impacting aquatic communities; and
- Acidic runoff and leaching, which may destabilise engineering works.

Information Requirements

- Discuss the soil/sediment types within the project footprint including actual and potential acid sulphate soils and existing levels of erosion and other disturbances;
- Provide details of any limiting properties of soil and substrate types and land units in the project footprint including consideration of acid generation;
- Provide details on acid sulphate soil management measures (both an Acid Sulphate Soil Management Plan and an Erosion and Sediment Control Plan in separate documents should be developed to demonstrate understanding of the risks of soil disturbance during construction); and
- Provide details on water quality protection particularly with respect to acid sulphate soil excavation and disposal.

7.1.2 Dredging and sedimentation during construction of the East Point outfall

Outcome

The proponent will demonstrate that management and mitigation measures proposed for dredging activities during the construction phase of the East Point outfall can reduce the risks to sensitive marine habitats and species to a low level.

Context

Dredging may be required to install the East Point outfall pipeline. Dredging activities and any associated disturbance to large sand waves may impact on the marine environment due to:

- Release of contaminants, reducing water quality;
- Increased turbidity, impacting on light-dependent, habitat forming species (e.g., seagrasses, corals); and

- Dumping of dredge spoil and sedimentation physically smothering benthic communities.

An assessment of the impact from dredging a channel for the discharge pipe across sand waves needs to be assessed. Not only sediment transport issues but also an assessment of the short and long-term impacts on the integrity of the sand waves. For example, in sand dune environments access is restricted through dedicated paths. Access outside these pathways can greatly change the dune structure and ultimately lead to dune erosion. Sand waves are comparable to sand dunes and any physical disturbance can lead to the erosion of the sand wave and completely change the physical structure on which biodiversity is dependent on.

The presence of vessels during construction or operation may also pose a risk to introductions of marine pests. The environmental risks associated with the potential introduction or translocation of aquatic pests, including how any vessel involved in the project during the construction or operation stages (including dredging vessels) will meet minimal national standards (best practice management biofouling guidelines are available at <http://www.marinepests.gov.au/non-trading-vessels>).

Information Requirements

- Define the expected area of impact of the proposed dredging operation (based upon sediment transport modelling);
- Discuss the construction and location of the East Point outfall and how it may impact or disturb seabed sand waves, in particular on dredging of sand waves and the possibility of erosion of the sand waves and sediment transport and movement;
- Discuss the physical characteristics of the sediment to be dredged;
- Discuss potential changes to local water quality due to release of contaminants, nutrients and sediments from the proposed dredging operation. A water quality monitoring program should be established prior to and during dredging to demonstrate that dredging will not have an impact;
- Provide detailed benthic habitat mapping within and around the expected (modelled) area of significant sediment deposition and/or significantly compromised water quality;
- Discuss the types of potential and expected impacts on marine species and habitats within the modelled impact zones; and
- Provide a detailed dredging management plan to address the key environmental risks from dredging.
- Development of a specific Introduced Marine Species Management Plan. The management plan should include (but not necessarily be limited to):

- Identification of vectors for the potential introduction of non-native marine species during the expansion works (including ballast water and biofouling);
- Requirement for assessment of the risks presented by individual vessels involved in the proposed operations. Such assessments should consider vessel type, niche areas, previous areas of operation, maintenance history etc.;
- Identification of required risk mitigation measures where individual vessels are considered to pose an unacceptable risk of introducing non-native species to Territory waters;
- A Response plan in the event that an aquatic pest is introduced during the proposed works.

7.2 Water quality during operation of the East Point Outfall

Power and Water has committed to improvements in water quality in discharges from sewage treatment plants (Power and Water Environment Report 2007 and Power and Water Annual Report 2009). Environmental impacts caused by the proposal to treat additional effluent from the Larrakeyah sewerage catchment are concerned with ongoing water quality. As acknowledged by Power and Water in the 2007 Environment Report, the introduction of water quality objectives for Darwin Harbour by NRETAS is likely to impact on future water quality targets required for wastewater discharge.

Waste Discharge Licences (WDL) under the *Water Act* are required to discharge effluent. Future WDL applications to NRETAS will require a risk assessment for water quality and it is recommended that this be developed and included in the PER.

There is also concern that exposure to pollutants will cause impacts to marine wildlife, especially on long-lived species that may accumulate pollutants. Hence many of the issues listed here for presentation in the PER relate to how Power and Water will deal with water quality improvement and how they will demonstrate that risks associated with water quality can be mitigated. The PER should describe how water quality will be improved through the upgrade at the Ludmilla WWTP and how future increases in volumes of effluent will be managed. Water quality objectives should be considered for wildlife and human recreation standards and Power and Water should demonstrate how modelling results compare with water quality objectives.

7.2.1 Outfall mixing zone

Outcome

The outfall mixing zone or dilution zone will not cause long term impacts to marine environments due to poor dispersal.

Context

The East Point outfall will discharge treated waste water. Poor treatment or dilution of the effluent may result in pollution of the marine environment with nutrient-rich or toxic-laden waste. The location of the outfall in the marine environment is critical if impacts in the mixing zone are highly localised and long-term (due to poor flushing) or widespread and short-lived. Currents and geomorphology in the harbour need to be modelled to determine where the mixing zone is best placed to reduce the risk of long term impacts.

Comprehensive water quality monitoring of the characteristics of the water at the discharge point should be done in order to validate the mixing zone.

Information Requirements

- Describe the dilution and mixing zone characteristics where effluent (including flocculent) will enter the marine environment and describe the results of hydrodynamic modelling;
- Describe the predicted extent that treated sewage may drift in currents beyond the mixing zone and if local beaches or recreation areas would be impacted by effluent.

7.2.2 Impacts on species and ecosystems

Outcome

The operation of the East Point outfall will be managed to ensure significant impacts to the marine environment, including impacts to matters of National Environmental Significance, do not occur. In risk terms, the proponent shall demonstrate that the likelihood of significant impact on adjacent East Point Aquatic Life Reserve, or sensitive marine habitats and species outside this zone, will be low.

Context

Monitoring water quality parameters so that risks associated with pollution or pollution events can be managed will be an important step in mitigating risks. Both Darwin Harbour and Ludmilla Creek should be monitored to differentiate background pollution from outflows from the waste water treatment plant (WWTP). NRETAS considers that there are facets of urban runoff that can be differentiated from inputs from WWTPs. Detailed discussion on the inputs into Darwin Harbour that can be attributed directly to the WWTP should be provided.

Overflow events may also discharge untreated effluent from the Ludmilla WWTP into Ludmilla Creek. Darwin Harbour should also be monitored because of the potential for poor flushing of water from the harbour. Darwin

Harbour Water Quality Objectives should be used as a benchmark for meeting water quality standards.

Sediment monitoring is also requested as the Darwin Harbour Water Quality Objectives focus on surface water quality and provide trigger values for some nutrients and physico-chemical parameters, but there is no assessment criteria for sediment.

National guidance for sediment assessment is set out in section 3.5 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC 2000) published by the National Water Quality Management Strategy. There are no ANZECC 2000 criteria for nutrients including ammonia. However it is well recognised that nutrient build up in sediments can result in environmental harm directly to benthic communities (from toxicants in whole sediment) and indirectly to the ecosystem via remobilisation of toxicants from the sediment. It is for this reason that NRETAS will be requiring the development of appropriate assessment trigger values for discharges from the discharge zones.

Operation of the outfall will be managed under a Waste Discharge Licence (WDL) issued under the *Water Act*. This is the appropriate vehicle for monitoring and management of the discharge effluent. It is therefore anticipated that sediment monitoring and assessment will be included as a condition of the WDL. Should the monitoring show the need to develop sediment assessment criteria then toxicity tests may need to be undertaken. Sediment toxicity testing while in its infancy in the Northern Territory is available for whole sediment assessment and sediment elutriate testing. The primary purpose of the toxicity testing will be to set and develop site specific sediment criteria for nutrients in the receiving environment, to be applied at an agreed compliance point that will not result in environmental harm.

Information Requirements

- Describe the water quality of treated effluent that is expected following the upgrades at Ludmilla WWTP and diversion of sewerage from Larrakeyah. Describe what indicators will be used to demonstrate improvement (e.g. performance of waste discharges, environmental monitoring, trade waste agreements);
- Describe any monitoring that is proposed to be undertaken on water quality affecting the marine environment from discharges of effluent from the Ludmilla WWTP and what pollutants will be monitored and how future increases will be dealt with;
- Discuss how the Power and Water Corporation 2004 Trade Waste Management System – Trade Waste Acceptance Guidelines for listed wastes are contemporary with current acceptable discharge levels.

- Discuss any compliance activities or public educational programs to ensure a high level of compliance with Trade Waste entering the Ludmilla sewerage network. Discuss what incentives or disincentives are used to divert wastes from entering the sewerage system and into land based waste receptacles;
- Describe what pollutants (Trade Wastes listed in the Power and Water Trade Waste Management System or listed wastes under the *Waste Management and Pollution Control Act*) are anticipated to enter the sewage system as future growth in light industry expands within the Ludmilla WWTP sewerage catchment. Identify which industries discharge which pollutants or Trade Wastes;
- Describe if any pre-treatment ponds will be used to extract noxious trade wastes from effluent prior to standard treatment techniques or if any effluent improvement programs will be introduced in the NT;
- Describe if any ocean sediment monitoring or toxicity testing will be undertaken and what sensitive indicator species will be used for the latter;
- Discuss the impacts, both potential and expected, on Darwin Harbour marine species (particularly in relation to coastal dolphins) and habitats from wastewater discharged through the East Point outfall. As a minimum, consideration is required of potential for impacts due to toxicity, fine sediment, turbidity, heavy metals and excessive proliferation of plant or animal species, e.g. algal proliferation, due to nutrient enrichment (nitrogen/ phosphorus);
- Define the expected area of potential impact on sensitive marine species, from wastewater discharged through the East Point outfall;
- Provide detailed benthic habitat mapping within and around the expected area of potential impacts on sensitive marine species;
- Discuss proposed measures to manage and mitigate any identified potential impacts on sensitive threatened and migratory species, with particular focus on management of potential impacts upon (key habitats utilised by) listed threatened species, (measures should also include pest control) and an assessment of the expected or predicted effectiveness of the mitigation measures;
- Demonstrate that equipment failure will not cause harm by excess discharge to the environment;
- Provide predictions of overflow events (frequency and volume) to Ludmilla Creek during the wet season and nutrient loads into Ludmilla Creek during overflow conditions in the wet, and if these will be reduced with the additional capacity of the installation of the rising main.

7.2.3 Impacts on recreation areas

Outcome

That human health is not impacted from recreational use of waters affected by effluent discharges.

Context

Although Darwin Harbour water quality may be improved overall when the Larrakeyah outfall is closed, there will be additional effluent treated at the Ludmilla waste water treatment plant and discharged through the extended outfall, and hence there may be a localised impact around Ludmilla Creek from overflows and the East Point area through discharges. Mangrove-lined creeks and coastal areas are both used recreationally for fishing, bush tucker collection, boating, diving and swimming. The National and Medical Health Research Council Guidelines for Managing Risks in Recreational Water 2008 should be used to demonstrate how risks will remain low as increased discharges occur through effluent diversion and population growth. Monitoring of recreational water at beaches for enterococci, and other human pathogens associated with effluent would ensure public health risks could be ascertained and managed.

Information requirements

- A recreational water monitoring plan for beaches in the vicinity of the outfall. Monitoring should take place at Mindil Beach, and any others identified by modelling of ocean tides and currents. It is noted there has been difficulty in establishing a defined mixing zone from the existing outfall in order to successfully monitor water quality. A detailed sampling and monitoring regime is available from www.environment.nsw.gov.au/beach/monitoringtest.htm. Results of the testing should be publicly available, as they are in other jurisdictions.
- Once the defined mixing zone for the outfall has been established a communication protocol for the public should be established to ensure recreational divers and fishermen are aware of the outfall location.

7.3 Natural disasters

Cyclones and storm surge, seismic activity and projected climate change related sea level rise must be incorporated into risk assessment models to inform engineering and planning controls. Failure of the infrastructure could have severe consequences on the ecological integrity of Darwin Harbour.

8 Proposed Project Environmental Management

Specific safeguards and controls, which are proposed to be employed to minimise or remedy environmental impacts identified in previous sections, are to be included in an Environmental Management Plan (EMP) or similar plan.

The EMP should be strategic, describing a framework for environmental management of the proposal and the property; however, as much detail as is practicable should be provided to enable adequate assessment of the proposed activity during the public exhibition phase. Where possible, specific management practices and procedures should be included in the EMP.

Where practicable, the EMP should include:

- The proposed management structure of the operation and its relationship to the environmental management of the site;
- Management targets and objectives for relevant environmental factors;
- The proposed measures to minimise adverse impacts and maximise opportunities, including environmental protection outcomes;
- Performance indicators by which all anticipated and potential impacts can be measured;
- Proposed monitoring programs to allow early detection of adverse impacts, particularly in relation to each aspect/environmental risks/concerns/factors identified in the PER, the EMP should discuss the appropriate indicators and trigger values, which will then inform the type of monitoring required, frequency of monitoring and what actions are triggered at certain trigger values.
- A summary table listing the undertakings and commitments made in the PER, including clear timelines for key commitments and performance indicators, with cross-references to the text of the PER; and
- Provision for the periodic review of the EMP itself.

Reference should be made to relevant legislation, guidelines and standards, and proposed arrangements for necessary approvals and permits should be noted. Proposed reporting procedures on the implementation of the plan, independent auditing or self-auditing and reporting of accidents and incidents should also be included. The agencies responsible for overseeing implementation of the EMP should be identified.

The EMP would continue to be developed and refined following the conclusion of the assessment process, taking into consideration the proposed timing of development activities, final project design, comments on the PER and incorporating the Assessment Report recommendations and conclusions.

9 Public involvement and consultation

The PER has an important role in informing the public about this proposal. It is essential that the proponent demonstrate how any public concerns were identified, and will influence the design and delivery of the proposal. Public involvement and the role of government organisations should be clearly identified.

Methods for community consultation and response should be outlined. The outcomes of any surveys, public meetings and liaison with interested groups should be discussed, including any changes made to the proposal as a result of consultation. Details of any ongoing liaison should also be discussed.

An outline of negotiations and discussions with local government and relevant Northern Territory Government Agencies should be provided.