APPENDIX A

Responses to the Draft PER

PowerWater

Appendix A Responses to the Draft PER

A.1 Comments Register

Comment	Respondents Questions, Concerns, Comments or Suggestions	SPER Section
Respondent: Matt Darcy, Department of Natural Resources, Environment, the Arts and Sport		
1 (NRETAS)	*These comments on the Effluent Rising Main PER should be addressed in the Supplement along with other comments from government agencies and public submissions.* *Background* *The current PER is to install a duplicate rising main through East Point to a terminal manhole where the East Point outfall (EPO) commences. The PER includes some details of related actions, such as the diversion of sewerage to, and upgrades of, the Ludmilla Waste Water Treatment Plant (WWTP). Upgrades to the WWTP are now proposed to be primary treated, with chemically assisted sedimentation (a reduction in standard to the 1998 proposal), and will be discharged through the existing EPO, until a $40 million outfall extension can be constructed (after formal environmental assessment of the EPO by the NT and Commonwealth governments).* *An environmental improvement and cost benefit approach was provided by PWC in 2008 for the closure of the Larrakeyah outfall, however this did not include the 1998 proposal for returning treated effluent to Larrakeyah, and it is unknown whether there would be improved environmental and social outcomes from this alternative compared to the current proposal. This option should be discussed as an alternative in the PER Supplement, as well as justification for the proposed approach compared to the 1998 approach.* *Following the split assessment approach of the ERM and EPO projects, key risks identified in the 2010 Final PER Guidelines for the East Point effluent rising main and extension of the East Point outfall project are required to be addressed for the ERM assessment, except for issues relating only to the construction and operation of the proposed EPO. The PER has been assessed against these Guidelines and resulted in the following comments below and in Table 1.*	1.5.1
2 (NRETAS)	*Acid Sulphate Soil* *The PER provides statements on best practice acid sulphate soil management across the site. It also provides liming rates based on Chromium Reducible Sulphur (CRS) results from soils on sites. A commitment to a detailed documented acid sulphate soil management plan is also provided. Dependant on the proposed scale of works such a plan should be reviewed and approved in writing by a suitably qualified independent third party auditor such as a suitably qualified environmental consultant.*	4.1
3 (NRETAS)	*Water quality: Outfall mixing zone, Impacts on species and ecosystems, Impacts on recreation areas.*	8.1

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	No information was provided in the PER on the timing of the upgrade at the Ludmilla WWTP, although in recent discussions and presentation by PWC it was stated the upgrade would not be complete until late 2012 (timeframes for the construction program of the ERM and EPO are in Figure 2-3). Please provide details on the timing of works in relation to other construction and operational works. The PER states in Section 2.1 that the Larrakeyah outfall would be closed by October 2011. However, a new Waste Discharge Licence for its operation was issued on 1 November 2011 until end of May 2012. If this closure occurs as proposed, this would mean that upgrades at Ludmilla WWTP are incomplete before 3 ML/day of additional effluent is diverted from Larrakeyah (about 30% more than currently treated at Ludmilla). *Further discussion is required on the environmental implications of this timing and the gap in treatment in relation to the discharge location. The existing outfall is in a very shallow and sometimes exposed location, and the current mixing zone is considered poor to nonexistent. The proposed extension of the EPO is not scheduled to come online until the end of 2013, so there is at least 18 months of additional effluent being discharged at the existing EPO, and for six months this will be poorly treated until the upgrades to Ludmilla WWTP are complete. There is therefore likely to be water quality impacts at the existing site and impacts related to the increased volume, including impacts relating to effluent load on shallow intertidal waters.* *Some of the claims stated in the PER are not supported by evidence. For example in section 6.6 it is stated that the combined effluent discharge at the existing outfall is "considered unlikely to lead to long term or irreversible changes in the marine environment". Please support this statement with quantitative data. Please also provide details on the short term impacts that may occur, including impacts to biota and recreation values. Substantiate the claims with data or models.* *There is a lack of discussion of water quality impacts throughout the document. Information is required on potential marine water quality impacts that may be associated with the increased loads associated with this proposal and the current operation. Please present data indicating existing water quality in the existing outfall vicinity.* *Please provide specific numbers to support 'significant reduction' claims for BOD, TSS, P, and E. coli on page 36. (Actually for E. coli the data in tables 6-5 and 6-6 predict an increase in median E. coli concentration from 80 to 1000 cfu/100 mL)* *Please explain how the dilution of raw sewerage during extreme weather by 5-7 times is a "key aspect of plant performance" (page 36) when the plant is being bypassed and raw sewerage is released to Ludmilla creek? The reduction in nutrients and E. coli is due to dilution – i.e. concentration (mg/L) is reduced but load (kg/day) is the same, or more likely higher as the plant is being bypassed and there is no nutrient removal or disinfection. Also on page 36 it is stated that "accurate predictions of treated effluent quality from the upgraded treatment plant are difficult (to provide)", yet predictions of treated effluent quality are available in section 6? Please clarify if these predictions are accurate.* *Provide technical information as to how the upgrade to the Ludmilla WWTP will improve treatment performance. The risk assessment section refers to improvements in phosphorous removal, however a capacity upgrade would not achieve this, the treatment process must be modified – what modifications are proposed? Also explain changes in treatment processes that will result in the projected increase in bacteriological parameters. How are the reductions in N and P achieved that are*	

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	described in Table 6-6? There is no reference to what is causing this to occur and no mention in the text. Please describe how these reductions will be achieved. It is not clear what the differences between Tables 6-7 and 6-8 are. The figures of total reductions in N and P in the text do not appear to correspond to data presented in these tables. *Identify wet weather bypass points. What (if any) treatment will sewerage receive when bypassed to Ludmilla creek?* *The heading for Table 6-6 (p.93) is mislabelled (should be 'predicted', not 'current'). Also please note these levels will only be achieved after the Ludmilla plant upgrade is complete, not if Larrakeyah diversion occurs before plant upgrade is completed (this could be clarified by including diversion and upgrade in the timeline p.31 as suggested above).* *On page 94 it is stated that levels of bacteria load will be managed through changes to the disinfection regime. Under what circumstances would levels be managed, and what is the trigger?* *The discussion on Lyngbya, phosphorous and nitrogen in Section 6 is largely conjecture and not supported by any data, data analysis, referenced facts, or evidence to support these claims. Please provide:* • *a reference for the Lyngbya information, particularly that is P limited in Darwin Harbour - "source NRETAS" is not an adequate reference for a public document. What are other major sources of N (and P) in Darwin Harbour? What are the background concentrations of N and P in Darwin Harbour? How do inputs from Ludmilla WWTP impact on N and P levels in the vicinity of the outfall?* • *data analysis (baseline/reference concentrations, inputs, impacted areas, present concentration with current outfall, projected increase with additional inputs proposed) to support the 'conclusion' that the combined outfall will "result in a small additional area of elevated concentrations of effluent parameters about the outfall location". What are the effluent parameters?* • *the predicted reduction in P concentrations in the vicinity of the outfall.* • *a reference to the claim that WWTPs are the major source of P in Darwin Harbour, again, "source NRETAS" is not a valid reference.* • *details on ammonia, sediment toxicity, other toxicants, etc. in the risk assessment.* *In Section 6 (p 92) the statement "It is noted that the combined discharge will not include any industrial waste, i.e. heavy metals or other chemical contaminants," appears to have no data backing these claims, and yet Appendix Q reports that copper, mercury, nickel and zinc levels can exceed ANZECC Guidelines in Ludmilla WWTP effluent. It is likely that there are many businesses operating in the catchment that contribute to Ludmilla WWTP. There is also work (not presented in the PER) of substantial increases in sponge tissue (eg Spheciospongia vagabunda) on heavy metal accumulations from the Larrakeyah outfall in studies by Charles Darwin University staff (Anna Padovan pers comm. with Aquatic Health Unit). Please provide data or justification on why these pollutants are not included in the PER. Please also provide a catchment map of the whole Ludmilla WWTP catchment identifying sectors such as residential, industrial and commercial.*	

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	Please provide a justification in the supplement for the changed level of treatment of sewerage at the Ludmilla WWTP from the previously assessed (1998) secondary and tertiary treatment level.	
4 (NRETAS)	*Modelling* *There is no information presented in Section 4 on existing modelling of the current environment, and section 6 contains very limited information on some modelling undertaken. Modelling that was provided in Section 6 and Appendix Q was not supported by any details to assist in understanding how it was produced or how the conclusion "discharging the combined Larrakeyah and Ludmilla WWTP (upgraded) effluent streams through the EPO will result in a small additional area of elevated concentration of effluent parameters about the outfall location" was reached.* *Modelling referred to on page 94 provides no details as to what modelling, methods, assumptions, which model, parameterisation etc. has been undertaken, and no data on existing water quality monitoring in the existing outfall vicinity. There is no detailed information presented on existing modelling of the current environment. Appendix Q also has some results on modelling (Plate 3-1) presented, but appears to have no relation or reference to the text. There is no interpretation presented. Please provide details on the following:* • *What modelling program was used?* • *What is being modelled?* • *Why was copper used as a parameter and why is it conservative? The only indication that copper was used is provided on the figure itself – no other explanation in the text is provided.* • *How does copper behave (fate) in marine environments and is this different to nutrients / ammonia or other parameters of interest/concern in effluent?* • *What was the input parameter (initial concentration)? What factors/conditions/inputs were used in the model?* • *What is the dilution profile, how was this derived?* • *Does the discharge velocity change with the new rising main and increased discharge volume compared to existing?* • *What specific hydrological conditions were used, and justify why these were used (i.e. worst case scenarios)?* • *Using the plume model, what habitats are impacted and what species would be impacted? How are EPBC listed species impacted?* • *Will any recreation areas be impacted? Will there be any odour issues for recreation areas or housing?* • *How is compliance area defined (what standards and parameters)?* • *Provide data (distance from outfall or area of impact) to support the claim of a 'relatively small' increase in compliance*	8.2

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	area. • *What effect might the increased contaminant loads have on the mixing zone?* • *What effects might the increased contaminant loads have on marine waters in relation to water quality objectives?* • *What are the scenario assumptions and conditions?* • *For Figures 6-2 and 6-3 please use same scale for both figures. Why do these figures differ from plate 3-1 in Appendix Q (this could be explained if the input parameters had been provided).* *Overall the above components are very poorly explained. Some of the claims are not backed up by evidence or stating the source of evidence.* *Please provide information on all types of models considered to assess plume dispersion, the advantages and disadvantages of each (including costs) and justification for the selection of the preferred approach. Examples should also be provided depicting cases where the model has been used, the outcomes, any particular problems encountered and how they were resolved. Further clarification is required on the purpose of this model within the context of the PER and the EPO Water, Sediment and Biota Monitoring Program.*	
5 (NRETAS)	*Monitoring* *Section 5 - Overall, this section appears to result in a reasonable monitoring program. Further discussion is required on justification of monitoring sites, and why sites closer to beaches e.g. Fannie Bay have not been included. There does not appear to have been presented information on likely or modelled tidal flows, or how proposed monitoring sites have been chosen in relation to modelling results. This should be further discussed in the supplement along with substantiation of whether the current sampling design is sufficient to adequately determine what impacts the proposal may have. The EPO Water, Sediment and Biota Monitoring Program in Appendix Q provides for a multiple lines of evidence approach to assessing potential environmental impacts. It is recommended the addition of near shore sampling points that reflect the plume dispersion model provided in the PER, or any updated model.* *Provisions for data sharing with NRETAS should be outlined in the supplement. Additional monthly and time series water quality data in this area would be very valuable and help inform current monitoring of seagrass and corals by the Marine Biodiversity Unit.*	8.3
6 (NRETAS)	*Species and ecosystems* *In relation to the impact assessment on the marine environment there are a number of issues that require further discussion in the supplement. The issues relate to:* • *increased waste water discharge from Ludmilla WWTP*	4.2

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	• *risk assessment of nutrient discharge* • *water quality and sediment monitoring program* *The Draft PER has ignored the potential risks and impacts on the marine environment from the interim scenario where there is an early closure of Larrakeyah, coupled with the incomplete construction of the Ludmilla WWTP resulting in continued effluent discharge at the current EPO. The Preliminary Risk assessment only provides very brief discussion of potential risk. The following issues need to be addressed in the supplement:* • *risks to benthic community health (notably coral and seagrass) and marine megafauna from increased nutrient and toxicant output within an intertidal area, including EPBC listed species, and* • *risks to marine ecosystems from potential raw sewerage discharge into Ludmilla Creek during high rainfall periods.* *A recent aerial survey (October 2011) conducted by NRETAS has identified a large seagrass meadow between East Point and Nightcliff. The meadow is found approximately below the 0.2 m LAT. Its extent on the seaward side is unknown; however, Appendix 3 of the 2009 ERM and EPO NOI reports seagrass at depths of -3.1 and -5.7 m AHD just north of East Point (sites A2, B3 respectively).* *Further, bathymetric surveys conducted on behalf of PWC (presented in Appendix 2 of the 2009 NOI) indicate that sand waves have seemingly created a sedimentary basin in which the current EPO discharges into. Prior to the construction of the new outfall there is the likelihood that discharge of particulate organic matter and flocculants from the existing EPO may accumulate in this sedimentary basin. This may create similar environmental conditions as in Buffalo Creek (i.e. anoxic layer), resulting in a deterioration of sediment health and its ability maintain healthy benthic communities (infauna and/or epifauna/flora). This should be discussed further in the supplement, with responses based on valid justification.* *The impacts on benthic habitats from waste water discharge from the current EPO will need to be closely monitored until the new outfall pipeline within the marine environment is completed. As a consequence, the supplement should include discussion on a broader scope for the water quality and benthic monitoring program to include monitoring of benthic community and sediment health, or valid justification of why the current proposed program is sufficient. Currently the monitoring program is designed only to monitor impacts from a human health perspective whereby two species of mollusc are sampled for contaminants, due to them being sessile and filter feeders.* *The Draft PER includes a risk assessment of the increased discharge into the marine environment and a water quality and marine monitoring (physicochemical) program. However, the Draft PER does not provide any background information on the marine environment from either a physical or biological perspective. And, although the risk assessment chapter does provide some of the nutrient loading data, the draft PER does not provide adequate information in Existing Environment (Section 4). The following topics require further discussion and validation in the supplement:* • *Hydrodynamic modelling and mixing zone characteristics, nutrient and flocculation characteristics and likely*	

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	transport/sedimentation of flocculent and macerated material; determine the zone of influence for each impact parameter. • *Background information on (1) the water quality conditions in Darwin Harbour, (2) pre- construction discharge characteristics (e.g. nutrient loads for dissolved, particular and flocculent matter and overflow events) and (3) post-construction discharge characteristics (e.g. nutrient loads for dissolved, particular and flocculent matter and overflow events).* • *Describe the physical environmental and biological environment within the zone of influence, including EPBC listed species.* *Provide a risk assessment for existing benthic community types (including, coral, seagrass and soft bottom communities (infauna and epifauna)).*	
7 (NRETAS)	*East Point Recreation Reserve contains patches of two sensitive or significant vegetation types as classified under the 2010 NT Land Clearing Guidelines; monsoon vine forest, and mangrove vegetation communities. Monsoon forest patches are significant as they cover only 0.2% (2700 km2) of the NT landscape, but contain 13% (604 species) of all known Territory flora. Mangrove communities are significant as they support a distinctive suite of species, and are important as nursery sites for many fish species and provide for important physical processes. The pipeline is to be located on mostly cleared areas and a relatively small area of existing monsoon forest and mangroves (approx 0.5 ha) will be cleared.* *A number of threatened or significant plant and animal species are reported in the PER as occurring, or potentially occurring, in or near East Point Recreation Reserve. No systematic flora and fauna surveys were conducted along the proposed corridor of the effluent rising main, or broader East Point Reserve. Data was limited to observation records only. Therefore all threatened and significant flora and fauna may not have been identified.*	4.3
8 (NRETAS)	*Please discuss how the Darwin Harbour Strategy (Darwin Harbour Advisory Committee, 2010) will be incorporated into the proposal?*	2.1
9 (NRETAS)	*In regards to testing the rising main (p. 30) please provide volumes of hydro test waters, disposal plans, use of dyes or any other chemicals.*	2.2
10 (NRETAS)	*In Table 6-8 please use SI numbering (i.e. 22508 x 109 should be 2.25 x 1013, etc) to allow numbers to be compared.*	5.1
11 (NRETAS)	*The figure 2-5 on page 34 is incorrectly labelled.*	2.3
12 (NRETAS)	*Table 2-1 has incorrect values for E. coli concentration (i.e. 4x106, not 4x106).*	2.4
13 (NRETAS)	*Please provide a full reference list in the supplement for all documents referenced in the PER.*	10.1
14 (NRETAS)	*It is noted that the explanation of objectives, benefits and justification is addressed quite well. As is the maximum operational*	8.4

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	and discharge capacity. However, there appears to be a lack of raw data on the characteristics of the waste before and after treatment. While secondary data is provided in tables and broadly discussed, there is no detail on the seasonal change on the influent and effluent. The existing monitoring of water quality is tied to the discharge licences and a summary is provided in the Draft Water and Sediment Monitoring Program. This mentions a more intensive water quality monitoring program started in 2010 aimed at obtaining data on the effect of discharge on the marine environment. Raw data is not provided from this program either. *If Harbour wide modelling of water quality has been conducted, there is no discussion within the PER on this.* *How this guideline could be met:* • *Raw data, from previous sampling activities, on the characteristics of both the effluent and influent would need to be provided, which would also show the seasonal changes in quality.also show the seasonal changes in quality.* • *Harbour-wide water quality modelling would need to be discussed, including how previous data has been incorporated.*	
15 (NRETAS)	*There is no mention of the level of treatment (i.e. the PER does not specify that the Ludmilla upgrade will result in primary treatment).* *There is an outline of the current waste characteristics (such as pH, BOD, TSS, nitrogen etc) and also the quality requirements of their previous waste discharge licenses (discussed as current, but have in fact expired), but not the expected future characteristics of the discharge.* *How this guideline could be met:* • *The level of treatment of sewerage would need to be specified and described (i.e. primary, secondary or tertiary).* • *It would be essential to know the expected characteristics of the discharged waste (pH, Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and temperature as a start).*	2.5
16 (NRETAS)	*The area being considered for water quality monitoring is potentially limited, and without a discussion on hydrodynamic modelling, it is not possible to understand whether or not the sites being proposed for monitoring are sufficient for effective Harbour-wide water quality modelling.* *How this guideline could be met:* • *Harbour-wide hydrodynamic modelling would be required so as to properly assess whether the proposed 'Harbour-wide' water quality monitoring regime is sufficient.* — *If appropriate, it would be acceptable to draw from existing data and modelling, and discuss how this existing information applies to the Effluent Rising Main proposal.* — *If the hydrodynamic modelling suggested that more monitoring sites are required, a discussion on where these would*	8.5

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	be placed and why it is needed.	
17 (NRETAS)	*The PER mentions that modelling has been commissioned for the associated EPO extension project, not for the project under consideration. Modelling is again mentioned in the Preliminary Risk Analysis, but is not discussed.* *How this guideline could be met:* • *A discussion on what modelling has been/will be undertaken for the project, including limitations, assumptions, calibration etc (use existing data if appropriate)* — *Of particular interest would be Harbour-wide hydrodynamic modelling and water quality modelling.* — *Limitations would need to include a definition of what is considered Harbour-wide. For instance is Darwin Harbour Advisory Committee's definition used (from Charles Point to Gunn Point)?* — *Identify (quantifiable if possible) some of the main uncertainties associated with the modelling and scenarios.*	2.6
18 (NRETAS)	*This is not discussed to any significant extent.* *How this guideline could be met:* • *First, Harbour-wide hydrodynamic modelling would be required (use existing data if appropriate)* • *The current situation would need to be discussed, drawing attention to how the hydrodynamics, sediment, flocculation, and nutrient dynamics operate with current waste discharge volumes and qualities.* • *Future scenarios would need to be discussed, outlining the effects that the change in discharge would have within Darwin Harbour.* • *Future scenarios should consider future population projections* • *Modelling and scenarios would need to consider seasonal changes in the hydrodynamics of the harbour and the waste discharge would be essential to understanding the links.*	8.6
19 (NRETAS)	*It appears that because the Ludmilla WWTP is being upgraded already, the PER has not taken this point any further. In light of the modified treatment level since the upgrade was assessed in 1998, justification should be provided on why upgrading the sewerage treatment to secondary or tertiary treatment levels has not proceeded.* *How this guideline could be met:* • *Discuss what potential upgrades could be implemented at the Ludmilla WWTP that would result in better environmental outcomes, including upgrading to secondary or tertiary treatment.*	2.7
20 (NRETAS)	*There is no mention that recognised experts were consulted in relation to EPBC listed threatened and migratory species. Nor was there evidence that the reports and studies that were referenced in relation to relevant species negated the need for*	4.4

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	expert consultation. Field surveys did not suggest that experts were consulted on methodology, timing or scope. *How this guideline could be met:* • *Discuss what expert consultation was undertaken, its scope and any recommendations given. If recognised experts were not engaged;* — *Consult with recognised experts in relation to EPBC listed threatened species.* • *If recognised experts were not engaged, evidence demonstrating that the methodology, timing and scope of the field surveys were adequate is required. Possible options include;* — *Seeking expert advice on the methodology, timing and scope of the field surveys, or* — *Seeking peer review of the field surveys.* • *Consultation should focus on marine species, such as the Dugong, Dolphins, and Turtles.*	
21 (NRETAS)	*Many EPBC listed threatened and migratory species found in the field surveys are not described any further. Maps were not provided for where EPBC listed threatened and migratory species were found.* *How this guideline could be met:* • *Describe the EPBC listed threatened and migratory species found in the area, especially those found through the field surveys or identified as likely to be found by recognised experts.* • *It would also be useful to describe the species, especially marine; species identified on the EPBC Database Search as "Known to occur", "Breeding known to occur" or "Roosting known to occur".* *Include maps of where EPBC listed species are found.*	4.5
22 (NRETAS)	*An overall layout of the proposed project, including final location and siting of works and facilities if known, or preferred option.* *Addressed - Nothing further required*	2.8
23 (NRETAS)	*"A detailed construction program has not been developed at this stage", however there is a broad overview of the timeframes expected (construction to take place in the dry season of 2012 and be finished before the onset of the wet season).* *How this guideline could be better met:* • *Prepare a few different schedules or timelines for different possible scenarios.* — *Possible scenarios should consider schedules with and without the related outfall extension project.*	2.9
24 (NRETAS)	*It is stated that a Community Consultation and Communication Strategy was developed by PWC. This however is not provided in the PER and where it is discussed, it appears that the strategy is limited to events and actions prior to construction. Potential infrastructure and services that may be interrupted by construction has been discussed elsewhere in*	9.1

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	the PER. *How this guideline could be met:* • *Include the Community Consultation and Communication Strategy in the PER as an Appendix.* • *Ensure that the Community Consultation and Communication Strategy include how stakeholders will be engaged throughout the process.* • *Make particular note of how PWC will communicate specific issues (such as the East Point Bicycle Path)* • *Include how the Community Consultation and Communication Strategy will be managed throughout the operation of the outfall*	
25 (NRETAS)	*Design layout and standards, including drainage, roads, buildings, process descriptions, outfall alignments, discharge points etc;* *PWC has adopted Water Services Association of Australia codes for construction, and details on the design layout are provided. Information appears adequate.*	2.10
26 (NRETAS)	*Design limitations imposed by site characteristics (including adjacent land use); Considerations on design limitations are included.*	2.11
27 (NRETAS)	*Tenure/s under which the proposal would be held, any planning issues, and any Native Title issues; Addressed - Nothing further required*	2.12
28 (NRETAS)	*Relevant National and Northern Territory legislation, standards, codes of conduct and guidelines; Addressed - Nothing further required*	2.13
29 (NRETAS)	*This guideline was written prior to the Darwin Harbour Advisory Committee's Darwin Harbour Strategy was released in 2010. The management plan is listed in the PER under Section 1.4.3 Other Regulatory Obligations ("It sets out goals, principles and guidelines for all users and stakeholders of Darwin Harbour") but there is no discussion on how this project or the Strategy will operate together.* *How this guideline could be met:* • *Discuss how this project fits with the "goals, principles and guidelines" of the Darwin Harbour Strategy for the management of Darwin Harbour.* — *Water quality issues would be of principal interest.* *Methods for storage, handling, containment and emergency management of chemicals and other hazardous substances*	8.7

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	(including fuel) that may pollute soil or water during construction or operation; Addressed - Nothing further required	
30 (NRETAS)	*Expected lifetime of the proposal; Addressed - Nothing further required*	2.14
31 (NRETAS)	*Rehabilitation objectives for the site beyond the intended use; Not discussed. No expected lifetime or use of the rising main was provided. It is unclear if the rising main would be left in situ in the event of future mains installed.*	2.15
32 (NRETAS)	*Are there potential impacts relating to fishing, diving or wildlife watching? Will fishing and diving sites be put off limits because of the greater dispersion area from the outfall? PWC also notes that there will be approx 10 people employed for the construction work and that there will not be any long term socio-economic impacts.* *How this guideline could be met:* • *List and discuss any other potential economic impacts;* — *If no further economic impacts are identified, draw attention to this fact.*	5.2
33 (NRETAS)	The cumulative impacts from future discharge are not discussed. Even when future discharge volumes are considered, no future forecasting, taking population growth, is provided. How this guideline could be met: • *Discuss* the cumulative impacts of discharging effluent; — Consider *future* discharge volumes, taking into consideration population growth. • *Discuss* the cumulative impact within both the immediate outfall area and harbour wide. — When examining the immediate area, it would be imperative to discuss how combining the two outfalls *and* the subsequent increase in localised volume will affect the marine environment. • In considering cumulative impacts, consideration should also look at which, if any, species could be *impacted* from bioaccumulation?	
34 (NRETAS)	*"A detailed construction program has not been developed at this stage", however there is a broad overview of the timeframes expected (construction to take place in the dry season of 2012 and be finished before the onset of the wet season).* *How this guideline could be met:* • *Prepare a few different schedules or timelines for different possible scenarios.*	2.16
35 (NRETAS)	*Addressed - Nothing further required*	2.17
36 (NRETAS)	*Not applicable to this proposal*	1.3.3
37 (NRETAS)	*Not applicable to this proposal*	1.3.4

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38 (NRETAS)	*Not applicable to this proposal*	1.3.5
39 (NRETAS)	*Not applicable to this proposal*	1.3.6
40 (NRETAS)	*There are suggestions throughout Section 2.3.2 of possible methods and construction materials for the rising main, however nothing is conclusive and there is no direct explanation for the choices in terms of efficacy and longevity.* *How this guideline could be met:* • *Add a paragraph to Section 2.3.2 explaining how the construction methods and materials chosen ensure efficacy and longevity.*	2.18
41 (NRETAS)	*This guideline is missing text, and should have read "Cross sectional diagrams of the sediment/soil stratigraphy in the areas where there is a higher risk of spill or infrastructure failure (such as pipeline joins) to assist in defining exposure pathways for risk assessment purposes".* *How this guideline could be met:* • *Provide diagrams and discussion on potential pathways for effluent spills in the construction corridor of the rising main.*	2.19
42 (NRETAS)	*Odour is recognised as a potential environmental impact, however because of the distance between areas PWC has identified Acid Sulphate Soils and residential premises the impact of odour is considered low and therefore not discussed further. Odours emitting from the existing outfall caused by additional effluent were not discussed.* *How this guideline could be met:* • *Add a paragraph to Section 5.1.5 detailing whether odours at the existing outfall will impact on recreational users of East Point Reserve or the nearby offshore waters.*	5.4
43 (NRETAS)	*Waste is discussed in Appendix R, however it would be important to discuss construction wastes specifically and how they will be disposed of.* *How this guideline could be met:* • *In the PER, discuss how the Waste Minimisation and Disposal Procedure applies specifically to construction wastes.*	7.1
44 (NRETAS)	*Vegetation types, extent and locations are provided in sufficient detail throughout the PER.* *Vegetation clearing, preparatory works and earthmoving are discussed.* *The specific locations of compounds, lay-down and turn around areas are not described.* *How this guideline could be met:* • *Map and describe the chosen location for compounds, lay-down and turn around areas and discuss why the sites were chosen and how the mitigate impacts on sensitive vegetation.*	4.6

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45 (NRETAS)	*The Power and Water Land Management Procedure outlines how PWC will manage soil conservation and rehabilitation. The aspect of soil erosion and sedimentation is addressed to a limited extent in Section 7.2.2. This states that an Erosion Sedimentation and Drainage Management Plan will be prepared and an overview of what will be included in this is discussed.* *How this guideline could be met:* • *Provide a draft copy of the Erosion Sedimentation and Drainage Management Plan as an Appendix to the PER.*	7.2
46 (NRETAS)	*Addressed - Nothing further required*	7.3
47 (NRETAS)	*Addressed - Nothing further required*	0
48 (NRETAS)	*Addressed - Nothing further required*	7.4
49 (NRETAS)	*Limited discussion on the effluent treatment process, upgrade to Ludmilla is stated and the treatment process is partially discussed. Overflow events (into Ludmilla Creek) and their likelihood are not discussed.* *How this guideline could be met:* • *Discuss exactly what is involved in the treatment process.* • *Discuss whether the upgraded capacity of Ludmilla will be sufficient, when Larrakeyah's effluent is diverted, so as to avoid discharge events into Ludmilla Creek.*	2.21
50 (NRETAS)	*There is limited information on the characteristics of the waste before and after discharge. There is a table listing the influent characteristics, however effluent characteristics are only discusses in terms of what the previous waste discharge licence allowed (i.e. not the actual characteristics). As far as heavy metals and chemical contaminants are concerned the PER states that the discharge will not include any industrial wastes.* *How this guideline could be met:* • *Provide and discuss data that demonstrates the characteristics of the effluent that is currently being discharged.* • *It would be extremely useful to have data on heavy metals and chemicals; this would, if nothing else, ensure that no contaminants are entering the waste water system.*	2.22
51 (NRETAS)	*Limited information is provided on nutrient loads. However, attempting to compare current loads and predicted loads is impossible, as the data, in tables 6.7 & 6.8, is exactly the same yet supposedly represents different information.* *How this guideline could be met:* • *When discussing nutrient and other discharge loads, it is important to not focus on the harbour-wide loading but the localised loading at East Point.* — *For instance, is the loading at Ludmilla going to increase? If so what effects will this have on the surrounding*	6.1

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	environment where effluent is discharged? • *Discuss the effect that the change in nutrient load at Ludmilla will have on the marine environment.* • *Data should always be clearly displayed, including raw data, labelled correctly and include maps that show the area of influence.*	
52 (NRETAS)	*This information is not clearly available in the PER.* *How this guideline could be met:* • *Discuss the likely fate of suspended solids (i.e. what will happen with suspended solids after they enter the marine environment?);* — *This may require hydrodynamic modelling to be undertaken (use existing data if appropriate).*	8.8
53 (NRETAS)	*This is not discussed. However the waste discharge licence is discussed. More detail is needed to make a proper assessment of how the nutrient loads compare with the Darwin harbour water quality objectives.* *How this guideline could be met:* • *When discussing water quality, nutrient loads, licence requirements etc, make explicit how they interact (i.e. tie water quality objectives with the projected nutrient loads, BOD, TSS, pH etc).*	8.9
54 (NRETAS)	*The expected volumes and capacity of the upgrades are addressed and it is explained that the upgrades will be able to manage future population growth for the next 20 years. However, it would be important to discuss the expected volumes of effluent if population growth projections are correct.* *How this guideline could be met:* • *Considering population growth is acknowledged add a paragraph discussing the impacts of population growth and the associated effluent discharge increases on the environment;* — *Particularly nutrient loading, chemicals, pH etc.*	2.23
55 (NRETAS)	*No discussion of future potential for expansion is offered.* *How this guideline could be met:* • *Discuss the possibility of future diversions and what impacts this could have on the environment.*	2.24
56 (NRETAS)	*A detailed preventative maintenance program will be developed. A list of measures that will be included is provided. This guideline should also consider the long term disruption and potential future impacts along the rising main corridor.* *How this guideline could be met:* • *In Section 2.3.3 or Section 5 (Potential Impacts) discuss what maintenance activities might be required throughout the*	5.5

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	lifespan of the rising main and what impacts these may have on the environment.	
57 (NRETAS)	*The Geotechnical Investigation Along Proposed Alignment (Appendix D) identifies that 6 out of 10 test sites have the potential to be 'Mildly Aggressive' in corroding concrete piles. However the corrosive nature of soils along the proposed rising main corridor is not discussed.* *How this guideline could be met:* • *Add a paragraph or section addressing the durability of the pipeline materials, especially considering the presence of marine, mangrove, and acid sulphate environments.* — *What are the consequences and impacts, if the pipes are corroded, on the environment?* — *How can this be mitigated?*	1.1
58 (NRETAS)	*Addressed - Nothing further required*	3.1
59 (NRETAS)	*Addressed - Nothing further required*	3.2
60 (NRETAS)	*Ongoing measures proposed to minimise the potential for mosquito breeding on site and any off site locations that may be affected by the proposal.* *Not addressed* *How this guideline could be met:* • *Discuss what alternatives are available to discharging effluent, such as effluent reuse and recycling waste water.*	3.3
61 (NRETAS)	*Addressed - Nothing further required*	3.4
62 (NRETAS)	*The PER discussion was restricted to East Point as the only location for a new outfall and no other locations considered. Options for alternate locations should be raised so that justification of a duplicate rising main to East Point can be made.*	3.5
63 (NRETAS)	*Not applicable to this proposal*	1.3.7
64 (NRETAS)	*The construction of the ERM component addressed. Water quality issues at the existing outfall remain outstanding as per comments in the main body of the comments on the PER.*	7.5
65 (NRETAS)	*Alternative environmental management techniques for moderate or higher risk impacts.* *Not addressed.* *How this guideline could be met:* • *Add a paragraph to Section 3 (Alternatives) that offers alternative Environmental management techniques, with specific reference to moderate and high risk impacts.*	3.6

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66 (NRETAS)	*Many potential risks have been identified; however there is a lack of discussion on these risks.* *How this guideline could be met:* • *In the Risk Assessment section provide a discussion of each of the risks, the likelihood of the risk and the potential impact of the risk if it was to occur.* — *If particular risks are identified to be of special concern to the public, discuss these and make note of the public significance.*	6.2
67 (NRETAS)	*Addressed - Nothing further required*	6.3
68 (NRETAS)	*The uncertainty about risks is not provided.* *How this guideline could be met:* • *Discuss the uncertainty surrounding the risks that have been identified and effectiveness of the controls and mitigation methods discussed.*	6.4
69 (NRETAS)	*The benefits of the project are described in terms of treatment of sewerage, ceasing discharge of untreated sewerage, and improving hydraulic capacity of the Ludmilla WWTP to reduce overflows into Ludmilla Creek. However the risk assessment does not discuss any problems in achieving these goals, merely impacts if the proposal goes ahead.*	6.5
70 (NRETAS)	*Residual risks were not discussed except in Appendix O on Risk Profile Procedure.*	6.6
71 (NRETAS)	*Addressed - Nothing further required*	1.1
72 (NRETAS)	*Addressed - Nothing further required*	4.9
73 (NRETAS)	*It is said that an Acid Sulphate Soil Management Plan will be prepared.* *How this guideline could be met:* • *Considering the risk and potential impacts of Acid Sulphate Soils it would be of paramount importance to develop the Acid Sulphate Soil Management Plan and provide details of the draft plan to NRETAS. Without a draft plan it is not possible for PWC to demonstrate an understanding of the risk of soil disturbance.*	7.6
74 (NRETAS)	*Without a draft Acid Sulphate Soil Management Plan or Erosion and Sediment Control Plan it is difficult to assess how water quality will be protected.* *How this guideline could be met:* • *Provide draft copies of both the Acid Sulphate Soil Management Plan and Erosion and Sediment Control Plan.* • *In Section 7, Mitigation, Management and Monitoring, describe how water quality will be protected.*	7.7

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75 (NRETAS)	*It is noted that the proposed action is not to change the outfall location and as such there is no plan to change the location of the mixing zone. However, due to the proposed increase in effluent discharge volume and different effluent characteristics, it is imperative that the mixing zone is properly understood so as to avoid the risk of long term impacts.* *Maps, depicting the dispersion area of the discharged waste at the existing and outfall location, indicates a relatively small area of expansion with the proposed additional discharge volume. However the two maps are shown at different scales, so a proper analysis is difficult. (Section 6.6: Risk Assessment: Upgraded Ludmilla WWTP and Existing East Point Outfall, pp. 94-96).* *How this guideline could be met:* • *Conduct and/or describe the results from hydrodynamic modelling of Darwin Harbour and discuss the dilution and mixing zone characteristics at the outfall location (it is possible to use existing data and modelling if available).* • *Provide an argument as to why the discharge location is still appropriate considering the different discharge volumes and qualities.* • *Discuss the changes in area of the dispersion and mixing zone, including the predicated area that will be affected.* • *If/when presenting maps to demonstrate the differences in the dispersion area ensure the scales are the same so as to enable better comparisons.*	6.7
76 (NRETAS)	*Not adequately described in the PER. Modelling provided has not been substantiated, and no discussion on likely impacts beyond the immediate discharge site.* *How this guideline could be met:* • *Provide details of modelling results with updated maps.* • *Provide a discussion on impacts beyond the mixing zone.*	8.10
77 (NRETAS)	*Water quality of treated effluent is not discussed in sufficient detail. While the daily loading to Darwin Harbour (Section 6.6) is part of the picture, to properly understand the issue much more water quality indicators would need to be considered. Currently, the indicators for the water quality, although not explicitly stated, are nitrogen, phosphorus and e. coli levels.* *The Draft Water and Sediment Monitoring Program outlines a range of metals that will be monitored. It would be useful to then discuss metals in water quality of treated effluent.* *Section 6.6 states that 'the combined discharge will not include any industrial waste'. Is this the definitive statement on Trade Wastes?* *How this guideline could be met:* • *In addition to the daily loading on Darwin Harbour, discuss water quality parameters such as pH, Biochemical Oxygen*	6.8

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	Demand (BOD), Total Suspended Solids (TSS), and temperature. — *Include heavy metal indicators in this discussion;* • *It would be important to consider both the dry and wet season qualities;* • *Make explicit what indicators are to be used;* • *Considering that the guidelines look heavily into Trade Wastes more information on Trade Wastes should be provide.*	
78 (NRETAS)	*The Draft Water and Sediment Monitoring Program is based on the East Point Effluent Rising Main and extension of the EPO (Appendix Q, p. 16). Hence, much of the monitoring program suggested is in relation to the extension of the EPO, not on the action proposed in this PER.* *How this guideline could be met:* • *Discuss how that the Water and Sediment Monitoring Program that has been developed is applicable to the current proposal,* — *Include a discussion on how this is still appropriate if the extension of the East Point Outfall does not eventuate.*	8.11
79 (NRETAS)	*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.* *This is not discussed.* *How this guideline could be met:* • *It would be necessary to discuss how PWC's Trade Waste guidelines are in line with contemporary practices and standards.* — *Possible areas to consider are whether any reviews of the guidelines have taken place or whether there are any international/national trade waste standards that PWC's guidelines are based.* • *More information on Trade Wastes should be provided, potentially add a paragraph devoted to dealing with Trade Waste.* — *If no trade wastes are going to enter the sewerage system, this should be explicitly discussed, including how this is ensured and what monitoring in conducted to ensure this.*	8.12
80 (NRETAS)	*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.* *This is not discussed to any significant extent. It is stated that the "Water Supply and Sewerage Services Act 2002 (NT) regulates the provision of sewerage and water services in the Northern Territory. The NT Power and Water Corporation must be contacted before any trade waste or noxious waste is disposed to sewer".*	9.2

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	How this guideline could be met: • *If PWC does not manage Trade Waste issues, discuss how it operates within the context of the Water Supply and Sewerage Services Act 2002.* • *Again, more information on Trade Wastes should be provided, what activities (e.g. compliance activities or public educational programs) are undertaken by PWC to ensure trade waste does not enter the sewerage system and then enter the marine environment as effluent.*	
81 (NRETAS)	*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 sewerage system as future growth in light industry expands within the Ludmilla WWTP sewerage catchment. Identify which industries discharge which pollutants or Trade Wastes.* *This is not discussed.* *How this guideline could be met:* • *It would be necessary to identify what industries and the associated pollutants may enter the sewerage system now and into the future.* • *If there is a strict policy that prohibits trade waste from entering the system, this should be outlined.*	8.13
82 (NRETAS)	*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.* *This is not discussed* *How this guideline could be met:* • *Describe what, if any, pre-treatment ponds will be used to extract noxious trade wastes from effluent prior to standard treatment.* • *If no pre-treatment ponds are to be used, discuss how the current treatment techniques, compliance activities, and safe guards are in place to ensure trade waste does not enter the marine environment.*	8.14
83 (NRETAS)	*Monitoring of sediment and water quality will be carried out across a range of monitoring sites, and include testing Telescopium and Rock oysters. Monitoring includes;* • *Collection of baseline data* • *Construction phase surveys* • *Bi-annual to annual monitoring during operation for three years (and to reviewed at end of this period)*	8.15

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84 (NRETAS)	*No in-depth consideration for Coastal Dolphins or marine habitats.* *There appears to be a suggestion that the reduced phosphorus will mean reduced nutrient enrichment and less likelihood of algal proliferation (NB. Nitrogen will increase by 28%) and that the only impact the proposal might have on the marine environment is the nutrient levels.* *The very fact that there will be an increased volume of discharge would suggest greater sediment, toxicity, heavy metals and turbidity. These should all be considered in terms of their impacts on species.* *How this guideline could be met:* • *Describe what marine species may be/are likely to be in the vicinity of the outfall (or downstream from the outfall – where harbour currents take the effluent).* — *What impacts are expected on each species?* — *This should include habitat (e.g. sea grass meadows);* • *Bioaccumulation is another area within this guideline that could be important if identified by appropriate experts.*	6.9
85 (NRETAS)	*There are two maps provided that are labelled as demonstrating the conservative dispersion area for both the current volume and the combined volume (after Larrakeyah is diverted to East Point, via Ludmilla WWTP). These two maps are introduced as showing that there will be only a minimal increase in the dispersion area after the effluent is combined. However the maps are deceptive in that they are shown at different scales, so while the area appears not to increase significantly the true scale of the increase is much larger.* *There is also a map in the Draft Water and Sediment Monitoring Program of the current typical dispersion area. The current typical dispersion area is by far larger than what is suggested as the conservative area after the effluent discharge is combined. This brings up serious concerns of what is classed as typical and what is conservative (let alone the map scales issue).* *How this guideline could be met:* • *Ensure all maps that show the dispersion area are the same scale;* • *What is actual area expected to be potentially impacted;* — *Quantifiable where possible;* *Define what is meant by typical and conservative;* • *When comparing two areas use a percentage to describe the increase;* • *Discuss the expected area of impact on sensitive marine species;* — *This may be far greater than the dispersion area.*	8.16

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86 (NRETAS)	*Benthic habitat mapping is not provided.* *How this guideline could be met:* • *After defining the expected area of potential impact on sensitive marines species (see previous guideline) provide benthic habitat mapping in and around the area (it is possible to use existing data and mapping, if available).*	4.10
87 (NRETAS)	*No detail provided. This is a vital concern and much more attention needs to be placed on marine species.* *How this guideline could be met:* • *Discuss what species may be impacted* • *Discuss what measures are in place to mitigate any potential impacts* • *Impacts need to be widely considered, taking into consideration habitat etc.* • *Once mitigation measures have been identified discuss the predicted effectiveness of the measures.*	8.17
88 (NRETAS)	*This is an area that could have much more space devoted to it in the risk assessment.* *How this guideline could be met:* • *Identify what equipment has the potential to fail.* — *If failure occurs what are the potential impacts of these, and* — *How can these impacts can be mitigated.*	6.10
89 (NRETAS)	*The predictions provided in the PER are limited to saying that the increased capacity of Ludmilla after its upgrade will "reduce the number of days that a process bypass (i.e. treatment discharge to Ludmilla Creek) occurs at year 2030".* *How this guideline could be met:* • *Discuss actual expected frequency and volume. How much will it be reduced (obviously this would also require what the current situation is).* • *What will the nutrient loading be when these events occur?* — *What effect will this have on the environment?*	8.18
90 (NRETAS)	*Although monitoring in Darwin Harbour for health and recreation issues has progressed since the Guidelines were issued, the PER does not discuss how this will integrate with PWC's proposed or current monitoring at East Point, nor does it discuss any of the results of the existing monitoring.*	8.19
91 (NRETAS)	*A mixing zone for the existing outfall has not been substantiated. No communication plan was provided informing the public of the existing outfall or risks to human health of additional effluent.*	9.3

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92 (Ian Hollingsworth)	*The document lacks the project detail needed and the environmental detail needed on topographic analysis and soil properties to make an accurate environmental assessment of significant risks, or propose effective environmental management measures.* *Section 4.1.4 Soils begins with a paragraph on the soils of the area that is nonsense. The description of soils then refers to small scale land unit mapping that is inappropriate to assess environmental impact, while the* *acid sulfate soil risk assessment is not based on sampling designed to address the volume being disturbed or the potential risks. Sulfate has been the System International spelling since the 1970's.* *I do not believe the acid sulfate soil risk assessment presented in Table 7.1 and there is no supporting specialist report to justify it.* *Draft sediment and erosion control and acid sulfate management plans need to be presented that reflect detail appropriate to construction plans and well established professional practice.* *More generally, there are typographic errors (from line 2 in the Executive Summary) and poor expression (particularly relating to the limited scope of this assessment with respect to the formal guidelines) and referencing inaccuracies that make the impact assessment process difficult to follow or believe.* *The environmental consultants being used need to have credible professional qualifications and to conform to accepted professional practice.* *This PER and the recent EIS for the Darwin Port Corporation set very low standards for the environmental assessment in the NT reducing it to a bureaucratic process with little requirement for reasonable assessment or management of environmental impact. This is particularly of concern given the high risk locations of these projects on the coastal fringe.* *The qualification to the scope of this PER with respect to the formal guidelines is also a concern. Detailed feasibility stage plans need to be presented and assessed in a forthright and uncompromising process. The scope limitation combined with the superficial assessment of environmental impact in this PER suggests to me that the approvals process is compromised.*	4.14
93 (DPI)	*There are no strategic lands issues with this proposal.*	9.4
94 (George Roussos)	*The page http://www.nt.gov.au/nreta/environcomment does not exist*	9.5
95 (CDU)	*The page http://www.nt.gov.au/nreta/environcomment does not exist*	9.6
96 (DLP Road Network Division)	*Road Network Division wishes to advise that there are no major Transport concerns with this Draft PER. It does not seem to have direct corridor access implications for NTG roads.*	9.7

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97 (NT WorkSafe)	*There is no mention of reporting significant chemical spills to relevant organisations (i.e. S.64(b)(iii) of the NT Workplace Health and Safety Act 2007).*	7.8
98 (NT WorkSafe)	*Regulatory Body contact is mentioned only if required. An Emergency Response should link in with the incident reporting system as defined within this document. It is suggested that there is a linkage between incident reporting and Emergency response plans so that the users of the Emergency Procedures will ensure appropriate regulatory bodies are notified where necessary.*	7.9
99 (DHAC)	*On behalf of DHAC I wish to raise our general concern regarding the lack of information and modelling to address the potential environmental impact of using the existing outfall following the duplication of the rising main, given the significant additional discharge diverted from the previous Larrakeyah outfall through East Point.* *The committee also seeks clarification of the timing and process, particularly related to the extension of the outfall, and the results of the testing to determine the preferred discharge point, undertaken by Professor Eric Valentine.*	2.25
100 (DH Medical Entomology)	*The accepted abbreviation for the genus name Culex is 'Cx.'.* *When at the beginning of a sentence the genus name is spelt out in full e.g. Aedes.* *Genus and species names should be italicised.*	4.11
101 (DH Medical Entomology)	*Commitments:* *Second last point- 'at the wharf' should read 'within the development area' or 'East point'?*	7.10
102 (DH Medical Entomology)	*Second paragraph, second sentence, 'Whelan et Al,' should read 'Whelan et al.'*	4.12
103 (DH Medical Entomology)	*Murray Valley encephalitis:* *The reference sited 'Whelan 1997' may perhaps been taken from an ME annual branch report in the same year? If so should be sited appropriately.* *Malaria:* *The reference sited 'Whelan 1995' is not in the list of references.* *'Anopheles' should be italicised consistently in this section.* *'East Arm' should read 'East Point'?* *In the last sentence 'monitored' should be replaced with 'investigated', and 'to cause' replaced with 'for'.*	4.13

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	Section P.4: *Second dot point – recommended alternative 'Reduce the risk of health implications arising from exposure to mosquito and biting midge populations.'*	
104 (DH Medical Entomology)	*There were indications that under various scenarios during the implementation of the rising main, the closure of the Larrakeyah outfall, the upgrade of Ludmilla treatment plant and the delayed construction of the of the new East point outfall, there would likely be frequent wet season overflow discharge of effluent to Ludmilla Creek. What would the management strategy be during these overflow events and will these incorporate a control strategy to prevent adult mosquito emergence?* *The Medical Entomology unit should be notified of any overflow events as extensive mosquito breeding can be supported by nutrient rich water as have been found previously behind the Ludmilla plant, indicated by the results of our routine adult trap and confirmed by subsequent field investigation.*	7.11
105 (DH)	*The Department of Health requests that Power and Water Corporation provides further comment on the following issues:* *The PER does not detail the history of the Larrakeyah Outfall Closure Program with respect to why the outfall is being decommissioned.* *Will the Larrakeyah Outfall be completely decommissioned? If so then when?* *The PER does not demonstrate why the option for diverting treated sewerage from the Ludmilla WWTP to the existing Larrakeyah Outfall is not considered. The NRETAS Report on the Larrakeyah Sewerage Outfall, Darwin Harbour, August 2006 states that the 'risk from the Larrakeyah Outfall is low and the Larrakeyah Outfall is considered to be an effective outfall due to its long length of 800 metres, giving an effective buffer to the main shoreline recreation areas. It is also effective because the outfall is located at 14 metres depth in marine waters.'* *Will there be any sewerage discharges from the existing wet weather overflow from the Ludmilla WWTP once the effluent rising main is commissioned?* *The sanitary surveys of Darwin recreational water bodies conducted by the Department of Health in 2010 determined the Sanitary Inspection Categories for East Point area and the CBD coastal areas as moderate risk. The construction of the effluent rising main will not reduce the risk because:* • *The reliability of the Ludmilla WWTP to continually achieve high levels of treatment cannot be guaranteed, especially with wet season 'event' overflows from the Ludmilla WWTP directly into Ludmilla Creek.* • *The Close proximity of the East Point Outfall cannot guarantee sufficient mixing of discharged wastewater at low tides.* • *Discharges from the East Point Outfall are continuous and clearly visible.* *It is noted that the scope of the PER excludes the planned upgrade to Ludmilla WWTP which 'centres on expansion of the existing Chemically Assisted Sedimentation (CAS) process with design capacity sufficient for project demand growth.' DoH*	2.26

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	needs to be reassured that the upgrade to the Ludmilla WWTP will achieve the median and 90th Percentile E. coli counts for combined Larakeyah and Ludmilla effluent as listed in Table 6.6 of the PER, i.e. 103 cfu/100 mL and 104 cfu/ 100 mL, respectively. *How effective will the changes to the Ludmilla WWTP disinfection regime be on reducing the bacterial load discharged at the existing East Point Outfall?* *The PER should provide more information about the modelling mentioned on page 97, which states that 'the bacteria levels, at the proposed discharge concentration of 103 cfu/100 mL will be diluted to a concentration below the water quality trigger value immediately after discharge, i.e. in the immediate vicinity of the outfall.'* *Is there a contingency plan in the event Ludmilla WWTP upgrade and the Effluent Rising Main are not commissioned concurrently?* *Upon closure of the Larrakeyah Outfall, how will Power and Water Corporation manage the possible public and media perception that CBD effluent is only being redirected to another harbour location, especially one which is highly visible at low tide and has a poor mixing zone?*	
106 (Environmental Warrior)	*The environmental impacts associated with increased volumes of sewerage discharged (prior to the upgrade of the East Point Outfall) will definitely have some environmental impact. Should the East Point Outfall extension not proceed then under which mechanism will this potential environmental impact be assessed?* *The PER indicates that the "The primary objective of the Proposed Development is to increase both the hydraulic and treatment capacity of Ludmilla WWTP, necessary due to the planned closure of the Larrakeyah outfall". How then is the LWWTP upgrade component of the project not included for assessment in either the East Point Rising Main duplication or East Point Outfall extension projects.* *Further, the PER on numerous occasions refers to secondary effluent at Ludmilla WWTP, however it is my understanding that the effluent discharged from LWWTP currently is enhanced primary treated effluent. There is no treatment train which significantly removes nutrients (nitrogen or phosphorous) nor BOD other than though chemically aided sedimentation (a primary treatment process). It is also my understanding that the LWWTP upgrade is increasing the hydraulic capacity of the treatment plant and optimising current treatment performance through minor process changes (such as changes to chemical dosing, hydraulic and mixing efficiencies etc).* *Since there is no assessment of the LWWTP included in the PER's, and limited reference in the NOI or guidelines I can only assume that the works are being completed under the Environmental Assessment Report for the PER for the Ludmilla WWTP and Associated Facilities conducted in 1998. This project included the following scope of works:* *"The major components of the proposal include: the augmentation of the Ludmilla WWTP; pipelines to transfer wastewater from Larrakeyah and the Central Business District to the Ludmilla WWTP; tertiary filtration and disinfection arrangements to*	2.27

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	produce high quality effluent for reuse; effluent pumping stations and pipelines to convey effluent to the Larrakeyah outfall; increased capacity of East Point outfall and the possible extension of the East Point outfall." *If this is the case, then I fail to see how a minor number of elements from the 1998 PER can be selected for implementation without committing to the remaining elements of the proposal, especially when it is those elements that provide the most significant aspects of environmental protection – that is an increase in treatment, production of effluent for re- use, decrease in volumes of effluent disposed of (through a recycling scheme) and discharge of treated (as opposed to raw) sewerage through the deep Larrakeyah Outfall. Furthermore, in the 13 years since the submission of the 1998 PER technology improvements, community expectations and increased levels of regulation throughout the rest of Australia and the developed world have significantly increase. To continue using such an outdated document is totally inappropriate and exposes the Darwin Harbour environment to significant and long term risk.* *The PER also refers to the Larrakeya Outfall Closure Plan - this is the plan that should be assessed in the EIA process, not just one minor component of that plan.* *In summary I think the process used to assess this project is totally inappropriate, the level of detail in the East Point Rising Main Duplication is inadequate and assessing the project discreetly (and prior to the East Point Outfall PER, without assessment of the LWWTP upgrade) is just ridiculous.*	
107 (ECNT)	*The Environment Centre of the NT (ECNT) welcomes the opportunity to comment on Power and Water Corporation's proposal to duplicate the East Point rising main. ECNT are satisfied that the likely risks and impacts have been adequately identified, and will be managed appropriately.* *ECNT have often warned of the shortcomings of piecemeal assessment, that may at times risk significant considerations falling through the cracks of successive modular assessment; that may mask the significance of cumulative impacts; and that may overburden assessment of later stages with the weight of inevitability presented by previous approvals.* *In this instance, ECNT are very much aware that, despite reference to marine environment in the guidelines, the draft Report does not discuss marine values, risks or impacts – including the Aquatic Life Reserve. Indeed, at this point we are uninformed about the parameters of the outfall extension. It is not yet clear whether the depth, turbidity and ecological structure of the new outfall will make an acceptable location for the increased effluent once the Larrakeyah sewerage is redirected to the Ludmilla plant. Recognising that this proposal in itself presents no specific risk to marine environments, ECNT will be keen to ensure that these considerations are given adequate attention at a later stage.* *Of far greater concern is the assessment of the diluted proposal to upgrade the Ludmilla Wastewater Treatment Plant.* *ECNT queries why PAWA did not, in accordance with clause 14A of the Administrative Procedures of the Environmental Assessment Act, formally advise the Minister of any changes to the proposal for determination of whether or not further environmental impact assessment is required. Indeed, this very mechanism was employed to divorce the outfall extension*	2.28

Appendix A Responses to the Draft PER

Comment	Respondents Questions, Concerns, Comments or Suggestions	SPER Section
	component from the rising main duplication. ECNT recommend that the variations to the original Ludmilla upgrade PER are great enough to call into question whether the entire Larrakeyah closure program still offers a net environmental benefit. *The 1998 PER for Ludmilla Wastewater Treatment Plant described:* *"upgrading the level of treatment at the Ludmilla plant to biological secondary treatment (with a proportion of the flow receiving tertiary treatment", and specifically identified that:* *"The CAS option is not really compatible with the Darwin sewerage strategy, which envisages long term reuse of effluent produced by the Ludmilla WWTP".* *Yet the closure program has since been watered down to merely offer enhanced primary treatment. Rather than upgrading the level of treatment, the closure program seems to have been redefined around the objective of increasing capacity. As such, the current plan is significantly different to that referred to in the SKM 1998 PER. But the list of project alternatives in this Draft Report does not even encompass discussion of the original configuration of the Ludmilla WWTP upgrade. Neither is adequate consideration given to the alternative of transferring some effluent from the upgraded Ludmilla WWTP to the Larrakeyah outfall – this clear alternative is merely dismissed on policy grounds, without any discussion of the likely environmental benefit.* *ECNT recognise that the proposal to chemically treat the sewerage that is currently dumped at Larrakeyah removes the hazard from Larrakeyah. But in the absence of details regarding the parameters of the outfall extension, it is not clear what greater hazard may be presented at the new Ludmilla outfall, with or without the proposed outfall extension. It appears that the upgrade is proceeding ahead of any indication of the parameters of the eventual Waste Discharge License under which the upgraded infrastructure will operate.*	