7. Draft EIS Section 4 Project Description

7.1 Section 4.1 Project Overview

NLC 31: Page 48-49, Table 4.1. A 0.5 hectare pioneer construction camp is required, prior to construction of the main camp inside the gas plant footprint, a 1 hectare construction waste facility and a beach pipe laydown area of 100*100 metres (1 hectare). TOs have not been consulted over this land use request.

NLC 32: Page 49-construction of waste facility. Woodside wish to place this facility over 1 hectare of the plant footprint area. TOs will need to be advised of this aspect of the plant footprint area.

NLC 31: Address lack of consultation with the traditional Aboriginal owners with regards to the 0.5 hectare pioneer construction camp, 1 hectare construction waste facility and the beach pipe laydown area.

NLC 32: Advise traditional Aboriginal owners of Woodside's wish to construct a 1 hectare waste facility within the plant footprint area.

Consultation: The NLC and traditional Aboriginal owners are key stakeholders in the project development and have been more closely involved than any other stakeholder since the project's inception and have seen the various options and land requirements develop over time. Consultations regarding development of the Blacktip reserves have been undertaken with traditional Aboriginal owners since November 2001 and in the case of the NLC, ahead of exploration prior to this time. Consultations and intensive fieldwork commenced in earnest from July 2003 following the signing of the Heads of Agreement between the Proponent and Alcan regarding the supply of gas to their Gove bauxite mine and alumina refinery.

Pioneer Camp: In 2004, a temporary camp was established at an area approved by traditional Aboriginal owners to facilitate the geotechnical and topographical surveys. On several occasions since 2003, the concept of a pioneer camp, immediately ahead of construction has been raised with the NLC and traditional Aboriginal owners. The proposal is that a pioneer camp be located in the same location as the 2004 camp for a period of approximately 2–3 months and as soon as possible to be relocated to the plant site area.

Construction Waste Facility: A 1 ha construction waste facility is required and will be located within the plant site area as it will be necessary to deal with construction waste.

Beach Laydown Area: A laydown area at the beach will be required for the shore crossing construction for a 2–3 month period during the dry season of 2007.

While the beach laydown area land requirement has been identified specifically, relatively recently (4th Quarter 2004), formal consultations with traditional Aboriginal owners about this will be undertaken in 1st Quarter 2005.

Page 53-the Project Schedule

NLC 33: This schedule is unrealistic as site preparation commences in the second qtr of 2005. Unless Woodside plans on only contracting local council construction, road access will not be possible across the Daly River until late June in the second qtr with the earliest work starting in the 3rd Qtr 2005.

NLC 33: Clarify the project schedule, addressing the timing of road access across the Daly River.

Site preparation will commence as soon as possible after FID, subject to access across the Daly River.

7.2 Section 4.4 Well Construction & Completion

7.2.1 Section 4.4.2 Well Construction

ECNT 3: There is no discussion in the EIS of the cumulative impacts on the seafloor and benthic and fish communities of all the different drilling wastes such as cuttings, water-based muds and their chemical additives. Drilling waste, including 5764 cu metres of mud and 689 cu metres of drill cuttings, will be largely discharged to sea (4.4.2. Well Construction, p59).

ECNT 3: Discuss the cumulative impacts on seafloor, benthic and fish communities of drilling wastes such as cuttings, water based muds (WBMs) and their chemical additives.

The cumulative effects of drilling on the receiving environment are largely determined by the options associated with the drilling programme: for example, the number and location of wells; the type of drilling fluids; the method of cuttings and fluid disposal. The cumulative impacts are summarised in **Section 11.8**, **Volume 1** (p. 348) of the Draft EIS as follows:

> **Environmental Risk of Drill Cuttings, Drilling Muds and Additives:** The environmental impacts associated with drill discharges to the marine environment are likely to comprise localised short to medium term effects. These impacts are likely to be caused mainly by smothering and oxygen depletion, as well as some temporary impacts over a wider area caused by small alteration to the sediment characteristics.
>
> Benthic organisms are widely distributed in the area of the proposed development and the environmental impact associated with drill cutting disposal is predicted to be minor due to the relatively small area affected and the wide distribution of similar community types throughout the region.

The impacts and mitigation measures will be addressed further in the Drilling Environment Plan (EP) to ensure that the drilling operation is conducted in an acceptable manner. The reader is also directed to the response to **OEH 28** below.

Drilling Muds

OEH 28: Specify the hazardous qualities of drilling muds. Environmental impacts of using non water-based muds should be analysed in the Supplement and analysis of the costs and benefits of open versus closed circulation systems should also be included. The extent and temporal persistence of drilling mud wastes and discharge plumes should be quantified and presented with associated impacts to biota.

OEH 28a: Specify the hazardous qualities of drilling muds.

OEH 28b: Analyse the environmental impacts of using non water based muds, including analysis of the costs and benefits of open versus closed circulation systems.

OEH 28c: Quantify the extent and temporal persistence of drilling mud wastes and discharge plumes and their associated impacts to biota.

A direct comparison between open and closed circulation systems is not appropriate because for technical reasons each system can only be used at defined stages of the drilling process (refer to **Table 4-5**, **Volume 1** of the Draft EIS). To commence the hole an open system is always employed through unconsolidated sediments where well casing cannot be installed. Only when the well casing is set can the closed drilling system commence in the lower sections of the well. A closed system in the lower sections is critical to maintain well control (**Section 4.4.3**, **Volume 1** of the Draft EIS). The depth at which drilling can switch from an open to a closed system varies, depending on the geology and the likelihood of encountering shallow hydrocarbon deposits. All wells are drilled using both systems.

Open systems are drilled using sea water with minor quantities of Pre-hydrated Bentonite (clay). The cuttings generated are discharged directly to the seabed. Impacts are largely limited to physical smothering of the seabed. The smothering effect will be confined to the immediate area of the cuttings pile and there will be a larger area surrounding the cuttings pile where dispersion of fine cuttings material occurs. Toxic effects will be dependent on the type of mud used and the disposal methods. Due to the decreasing size of the hole, open systems generate the vast majority of the total volume of cuttings generated during drilling (**Table 4-5, Volume 1** of the Draft EIS). Turbidity is minimal as cuttings are deposited directly on the seabed around the well.

Closed systems are drilled using WBMs or Non Water Based Muds (NWBMs). Closed systems return the cuttings and muds to the drill rig for processing where the cuttings are removed. Once the muds and cuttings have been separated, the cuttings are routinely disposed to sea. Cuttings themselves have minimal environmental impact as they are generally inert; aside from direct smothering, sediment size alterations and increased turbidity as they fall through the water column. While these effects may be serious in the short-term, it is likely that these physical effects will have a minimal effect on the benthos in the longer-term (Montagna and Harper 1996). Turbidity impacts at the Blacktip location will be insignificant because of the short temporal duration of the turbidity plume, the lack of sensitive receptors near the well and the high background turbidity of the Joseph Bonaparte Gulf.

WBMs are complex, alkaline mixtures of natural clays; weighting agents (usually barite); lignins to control viscosity; and, other chemicals; all dissolved or suspended in water (Atema et al. 1982, Gilbert et al. 1985, Swan et al. 1994). WBMs are regularly used for drilling operations in the Timor Sea and are generally approved by the regulatory authorities as being the most acceptable option particularly in environmentally sensitive locations. The toxicity of drilling muds will depend on the specific chemical components used and the level of dilution during use and once discharged. WBMs are miscible in water, they undergo rapid dilution upon discharge and have minimal impact on the marine environment. WBMs do have components such as preservatives and biocides, which by their nature are toxic, particularly in concentrated form. However, these components are added to the mud in very small concentrations, the mud is usually further diluted with water and by the time the mud has been used and is discharged to the sea with cuttings and further diluted in the sea, the resultant product is essentially non-toxic.

The exact details of the WBMs to be used for each drilling operation will be determined as part of the detailed design phase for the drilling programme.

Recovery following the drilling of a single well with a WBM is typically rapid with no long-term effects on infaunal communities (Neff et al. 2000). WBMs have low toxicity and regulatory authorities routinely allow the discharge of WBMs to the marine environment at the completion of drilling operations.

NWBMs are similar in composition to WBMs but also contain varying amounts of hydrocarbons. NWBM must be used under certain conditions where the performance of WBM is insufficient, particularly in long, deviated wells or drilling through difficult geology. Modern Synthetic Based Muds (SBMs) use synthetically made hydrocarbons such as olefins and alkyl benzene or ethers, esters and acetals and contain no toxic Poly Aromatic Hydrocarbons (PAHs). Unlike WBMs, NWBM (including SBMs) are not allowed to be discharged at the completion of drilling and are returned to shore for recycling.

Therefore, the only method for NWBM to enter the marine environment is the residual muds attached to drill cuttings, greatly reducing the volume of NWBM discharged to the marine environment. Although cuttings are treated to remove muds (both WBM and NWBM), some muds will remain (around 10% by weight) on the cuttings when they are discharged to sea.

NWBM are immiscible in water and cuttings coated in NWBM clump together, creating heavier clumps which settle more rapidly and generate less turbidity than cuttings generated using WBMs. This has the effect of increasing the concentration of contaminants immediately around the well but decreasing the areal extent of the impacted area (Neff et al. 2000). Elevated hydrocarbon levels have been observed around wells drilled with SBM, typically contained within about 200 m but can be at concentrations in excess of 1000 mg/kg (Neff et al. 2000). Studies of oil contaminated sediments suggest that sediments can become anaerobic if they contain more than 1000 mg/kg of hydrocarbons (Vik et al. 1996a as cited in Neff et al. 2000). Anaerobic conditions greatly slow the hydrocarbon degradation process. Field studies indicate that degradation of SBMs can take in the order of 3–5 years (Neff et al. 2000).

As stated in **Section 11.8**, **Volume 1**, of the Draft EIS (p348):

> The environmental impacts associated with drill discharges to the marine environment are likely to comprise localised short to medium term effects. These impacts are likely to be caused mainly by smothering and oxygen depletion, as well as some temporary impacts over a wider area caused by small alteration to the sediment characteristics.
>
> Benthic organisms are widely distributed in the area of the proposed development and the environmental impact associated with drill cutting disposal is predicted to be minor due to the relatively small area affected and the wide distribution of similar community types throughout the region.

7.2.2 Section 4.4.3 Drilling Fluids

Pipe Dope

OEH 23: The Supplement should explain the composition of "pipe dope," and quantify its likely volume and likely impact especially with respect to the comment that pipe dope may be "lost to sea"

OEH 23: Explain the composition of "pipe dope" and quantify its likely volume and impact with regards to the comment that the pipe dope may be "lost to sea".

Pipe dope is a 'specially formulated blend of lubricating grease and fine metallic particles that prevents thread galling (a particular form of metal-to-metal damage) and seals the roots of threads' between pipe strings.

Small quantities of pipe dope can be released to the marine environment, particularly when drilling using an open system. This results in isolated lumps of pipe dope occurring in the sediments around the drilling locations. The lumps, which are essentially grease, result in localised sediment contamination, occurring over an area of several centimetres and characterised by elevated hydrocarbon concentrations. Over the localised small scale, sediments will become organically enriched and anoxic, which will alter the infaunal community composition, favouring deposit feeding polychaetes and causing decreasing in the abundance of most other taxa (Peterson et al. 1996). The impact of pipe dope will therefore be negligible. The disposal of drilling waste is discussed in response to **OEH 28** (**Section 7.2.1**).

7.3 Section 4.5 Installation & Construction Activities

7.3.1 Section 4.5.2 Field Layout

Scenarios

OEH 1: The Draft Environmental Impact Statement (Draft EIS) Supplement needs to present "worst-case scenarios" for evaluation, for example the catastrophic failure of the wellhead platform (Section 4.5.2). A management plan for its occurrence should be part of the Supplement.

OEH 1: Present "worst-case scenarios", for example the catastrophic failure of the wellhead platform, for evaluation together with a management plan for its occurrence.

Blowouts: A blowout is a sudden, uncontrolled flow of drilling fluid, oil, gas, or water from a wellbore when the formation pressure in a permeable formation exceeds the pressure in the borehole.

A blowout is one of a number of potential sources of oil spills, all of which have been included in calculating the probabilities of different size oil spills presented in **Table 11-2**, **Volume 1** of the Draft EIS, which are attributable to all activities associated with the offshore petroleum industry.

However, a blowout at the Blacktip Field is not considered a worst-case scenario oil spill, for the following reasons:

- A blowout would occur at the wellhead platform, 90 km from the coast and any sensitive resources.
- Due to the dry nature of Blacktip Gas the biggest risk from blowout is not a condensate spill but fire.
- Blacktip is a gas field with only small quantities of condensate.
- Blacktip condensate is a very light oil and would evaporate quickly (60–85 % in the first 24 hours), before reaching the coast and sensitive resources (**Section 11.19**, **Volume 1** of the Draft EIS).
- Probability of a blowout is low although this has not been specifically calculated.
- No shallow gas is anticipated based on offset wells and shallow seismic review.
- Primary and secondary well control systems will be in place including blowout preventer and/ or diverter.

Well Control: Well control, which is of prime importance when drilling any well, will be in accordance with the relevant governing authority, NT DBIRD, and the Blacktip Project internal management system. Mitigation measures will include industry standard procedures and fully trained personnel controlling the operation. Control of wells (reservoir pressure control and blowout prevention) is normally achieved using such devices as blowout preventers and sub-surface safety valves (SSSVs). The exact method to be used will be determined during the detailed design phase of the project. The well control measures, including the equipment to be used, will comply with the regulations set out in the P(SL)A *Specific Requirements as to Offshore Petroleum Exploration and Production – 1995*, or any requirements which supersede this. Detailed mitigation measures will be developed and approved by the Designated Authority as part of the Drilling Environment Plan.

The reader is also directed to the response to **NTG 68b** (**Section 1**).

Worst Case Scenario: A realistic worst case scenario is described in **Technical Appendix K, Volume 2** of the Draft EIS, consisting of a 500 m^3 heavy fuel oil spill from a trading tanker at the condensate export mooring. This is a worst case scenario because of the proximity of the spill to the coast (3 km) and the properties of heavy fuel oil, which is considerably more persistent than

Blacktip condensate. The probability of a 500 m^3 spill is estimated at 1 in 1,000–10,000 years (**Table 11-2, Volume 1** of the Draft EIS).

The results of modelling a 500 m^3 heavy fuel oil spill indicates that:

- Approximately 50 km of coastline is at risk during the wet season and 40 km during the dry season, based on the 5% probability contour.
- There is a 25% probability of oil impacting the shoreline during the wet season within one day after a spill has occurred and a 5 to 10% probability in the dry season.
- The overall probability of a 500 m^3 oil spill occurring and the spill contacting the coast is one in 4000 years during the wet season and one in 10,000 years during the dry season.
- A total of 400,000 kg of oil was predicted to be washed onto the shoreline, under a worst case scenario. This is likely to be persistent and, if left unattended, is likely to cause a significant environmental impact.

Effects of an oil spill on matters of National Environmental Significance (NES) are described in **Section 11.19.2**, **Volume 1** of the Draft EIS, which includes discussion of effects on turtles, whales, dolphins and dugongs. This section also includes discussion of affects of spilt oil on turtle food resources: algae and seagrass, and intertidal shorelines. As stated in **Section 11.19, Volume 1** and **Technical Appendix K**, **Volume 2** of the Draft EIS, oil spill modelling indicates that in the event of a large spill of heavy fuel oil, there is less than a 5% probability of oil reaching the turtle nesting areas near Cape Hay.

Impact of Hydrocarbon Spills on Turtles: The impact of hydrocarbon spills on sea turtles, their food or their nesting is dependant on the timing of the spill, the hydrocarbon characteristics and volumes lost. In the worst-case scenario, a heavy bituminous hydrocarbon would cause more severe impacts on the sea turtles simply because of its physical coating of the animals and the ability to block airways and digestive tracts if ingested. Animals compromised in such a way would require treatment to physically remove the hydrocarbon and to ensure that the airways and digestive tracts are clear. The species that are likely to be most affected are the Loggerhead and the Olive Ridley sea turtles. In turbid waters such as those that occur in the project area, Loggerheads and Olive Ridleys are less discriminate in their choice of prey. In the turbid waters of Fog Bay to the north of the project area, Olive Ridley and Loggerhead sea turtles feed on benthic molluscs by biting into the mud, removing a mouthful of the sediment, forcing water out of the throat, rinsing away the mud, crushing the shells of the molluscs and swallowing the molluscs, shell and all (Conway 1994). These two species ingest not only molluscs but also other hard objects including fishhooks and pebbles in the mud. They would be particularly prone to negative impact by a heavy bituminous oil spill covering on the sea floor.

The other species of sea turtles (Flatback, Green Hawksbill and Leatherback) rely on visual acuity to identify the food items before ingesting. They would be less susceptible to accidental ingestion of hydrocarbons.

When they surface to breathe, all of the sea turtle species would be susceptible to inhalation of hydrocarbon vapour and liquid on the surface of the sea. Depending on the consistency of the hydrocarbon this may cover the eyes and would require physical removal and veterinary care as indicated above. Hydrocarbons reaching the beach would only coat the beach to the high water mark. This is below the level where sea turtles lay their eggs. The eggs of sea turtles are unlikely to be affected by hydrocarbon spills for this reason. Hatchlings may be physically impeded by and entrapped in intertidal and surface hydrocarbon spills. They may suffer high mortality if not removed and placed in veterinary care.

7.3.2 Section 4.5.3 Gas Export Pipeline Specification & Corridor Requirements

Redundancy in Pipeline Design

NTG 119: The potential for the development of other petroleum facilities in the Joseph Bonaparte Gulf and their importance to the future energy demands for Darwin/Northern Territory is identified and acknowledged in dot points 2 and 3 on pp 136 Chapter 5 of the EIS.

Has pipeline design considered the potential for future increased capacity for petroleum developments utilising the export pipeline as a carrier to processing facilities?

NTG 119: Has pipeline design considered the potential for future increased capacity for petroleum developments utilising the export pipeline as a carrier to processing facilities?

This has been considered. The current sizing of the pipeline may be able to accommodate a throughput higher than the current contracted throughput from the existing customer. However, the final size will be determined by the Proponent as part of the economic assessment of the Blacktip Project and the level of pre-investment it wishes to make in this regard.

The subsea gas export pipeline will be sized to meet contracted gas demand as at the FID. The Proponent as 'Operator' of the Blacktip Project is seeking to develop a gas hub around the Blacktip infrastructure – both offshore and onshore. If successful, the infrastructure will be appropriately sized.

7.3.3 Section 4.5.4 Subsea Export Pipeline

NTG 9: Disposal options and approvals for dredging spoil disposal have not been outlined in Section 4.5.4 for Commonwealth waters or Northern Territory coastal waters. It would be prudent to discuss options involving disposal of spoil at sea with the custodians of the Commonwealth *Environmental Protection (Sea Dumping) Act 1981* and the Northern Territory Department of Infrastructure Planning and Environment Office of Environment and Heritage as custodians of the Northern Territory *Water Act.* The proponent should identify any possible effect trenching methods will have on the WALPINHTHI REEF sacred site. This discussion should include comment on alternatives, their impact and the basis of selection.

NTG 10: The report should explore any possible effects of trench dredging would have on the WALPINHTHI REEF sacred site.

NTG 70: This table [Summary of Marine Impacts] should also summarise the possible negative effects on the WALPINHTHI REEF sacred site.

NTG 9a: Discuss options and approvals for dredging spoil disposal at sea with reference to the Commonwealth Environmental Protection (Sea Dumping) Act 1981

During the trenching and installation of the offshore pipeline, standard construction techniques will be used as outlined in **Section 4.5.4**, **Volume 1** of the Draft EIS. Excavated material from the trench will be temporarily placed or pushed to the side of the trench and allowed to naturally backfill the trench covering the pipeline. Therefore, a spoil ground should not need to be established.

It is recognised that both the Commonwealth *Environmental Protection (Sea Dumping) Act 1981* has relevance to the disposal or dumping of spoil. However, the act is not relevant to the proposed pipeline trenching activities. The material excavated during trenching activities will be temporarily placed or pushed to the side of the trench and used again to backfill the trench. There should be no disposal or dumping of spoil as defined under the *Environmental Protection (Sea Dumping) Act 1981*. However if it is determined that a spoil ground is required after selection of the installation contractor and progression with the detailed design, then the Proponent will abide by the Act and seek a Sea Dumping Permit as required as defined under the Act.

Pipeline trenching techniques are currently under consideration by the Proponent. The basis for selection of individual techniques will depend on a number of factors including:

- technical feasibility and performance;
- geotechnical issues including geological characteristics;
- economic feasibility;
- environmental performance;
- contractor selection and tendering process.

The pipeline trenching techniques considered in the Draft EIS include the use of plough and/or jetting for the offshore waters and an excavator dredge in the nearshore waters. The Proponent is also considering the use a cutting suction dredge or trailing suction hopper dredge for trenching in

the nearshore waters and for potential 'smoothing' of the seabed respectively. The nearshore crossing technique selected will be based largely on the geotechnical results for the nearshore area. The material type and strength to be dredged, and most importantly the water depth at the landfall location will largely influence the selection of a nearshore crossing technique. The reader is also directed to the responses to **OEH 3**, **OEH 4** and **OEH 5** (**Section 14.2**).

The pipeline trenching activities will be undertaken in accordance with the requirements of an approved EP which will outline the environmental performance objectives, standards and measurement criteria for the construction and installation of the pipeline (refer to **NTG 98**, **Section 18.2**) as per the P(SL)A (Management of Environment) Regulations 1999. The contract tendering process will also take into consideration environmental issues.

NTG 9b: Identify any possible effects of trenching methods on the Walpinhthi Reef sacred site.

NTG 10: The report should explore any possible effects of trench dredging would have on the WALPINHTHI REEF sacred site.

Reef Location: A difficulty has been the lack of accessibility to the area to define the exact location and extent of the Walpinhthi Reef sacred site for the Proponent to adequately plan the proposed activities around (refer to response to **OEH 67** (**Section 12.4.1**). Consequently, little is known about the extent of the reef, its location in relation to the proposed pipeline route or its cultural or environmental significance. The export and condensate pipeline trenches are located approximately 300–330 m to the north of the Walpinhthi Reef Exclusion Zone (refer to **Figure 4.8**, **Volume 1** of the Draft EIS). The centre of a known localised high spot (i.e. the reef) is approximately 740 m south of the proposed pipeline route (refer to **OEH 67** in **Section 12.4.1**).

Baseline Environmental Data: As part of the reef is designated a sacred site, access is also not readily available. Consequently no baseline environmental data exists for this location, nor has any been obtained to date. However, shallow water reef environments in the western Joseph Bonaparte Gulf are likely to contain similar species to those recorded by Walker et al. (1996) who surveyed various habitats on the eastern side of the Joseph Bonaparte Gulf. These reefs were described as follows:

- The crustacean fringing reef fauna was dominated by wide spread Indo-Pacific or Indian Ocean species. It was also noted that lack of coral development also limited that diversity of Xanthid crabs (Davie and Short 1996).
- The shallow reef fish fauna was dominated by species able to tolerate waters of high turbidity. The most abundant species observed underwater belong to the families Labridae and Pomacentridae. Hutchins (1996) suggests that there may be a barrier to the interchange of fish species in the vicinity of the Berkeley River in the western Joseph Bonaparte Gulf. Fishes located to the west are endemic to Western Australia while those to the east are typical of the NT fish fauna, including the apogonid *Pseudamia nigra*, the chaetodontid *Chelmon mueleri*, the gobiid *Acentrogobius gracilis* and the tetradontid *Chelonodon patoca*.
- The mollusc fauna was depauperate in terms of species richness due to the restricted number of habitats available and the silty conditions (Wells and Bryce 1996).

- The diversity and abundance of algae was low. This was attributed to extreme tidal exposure for intertidal species and high water turbidity, which limits light penetration and results in smothering with fine sediments (walker 1996).

Nearshore tidal currents are known to exhibit a large variation in movement and trajectory in the vicinity of the proposed Blacktip Project area. As stated in **Appendix I**, **Volume 2** (p.50) of the Draft EIS, tidal currents in the Joseph Bonaparte Gulf rotate in a clockwise direction with the major flood and ebb directions towards the south-east and north-west, respectively. **Figure 3-4** (**Appendix I, Volume 2** of the Draft EIS) presents the anticipated water circulation in the vicinity of the project area. Metocean Engineers (2004) provides additional information on the ambient oceanographic conditions at various locations along the proposed export pipeline and offshore pipeline location. The results of these investigations support the information presented in **Section 7**, **Volume 1** of the Draft EIS. In terms of ocean currents, which are critical in determining the behaviour of sediment suspended into the water column from trenching techniques, semi-diurnal tides are dominant. Tides ebb to the northwest and flood to the south-southeast, at speeds typically in the order of 1 m/s at the sea surface and approximately 0.6 m/s at the seabed. Tides become orientated more north–south on approach to the shoreline.

Sedimentation associated with pipeline trenching is therefore unlikely to extend to the Walpinhthi Reef Exclusion Zone. However, the bathymetry gradients of the Walpinhthi Reef Exclusion Zone are relatively steep and currents are strong, which should limit any sedimentation build-up and impact on the Walpinhthi Reef environment.

Potential impacts on the Walpinhthi Reef Sacred Site exclusion zone are likely to be limited to nearshore excavator or cutter suction dredging activities, as previously discussed in **Section 11.3**, **Volume 1** of the Draft EIS. Potential impacts associated with these techniques are considered with regard to suspension of sediments in the water column and smothering of benthic communities. In addition, potential impacts from the pipeline laybarge are considered with respect to seabed disturbance from anchors. The actual extent of the exclusion zone is currently being discussed by the AAPA, NLC and Proponent.

Effects from Re-suspension of Sediments*:* Pipeline trenching has the potential to result in the re-suspension of sediments into the water column. Potential impacts are likely to be limited for the following reasons:

- Seabed sediments in the coastal waters of the Joseph Bonaparte Gulf are routinely subjected to natural disturbance due to tides, currents and storm wave action. The Blacktip Project Offshore and Intertidal Environmental Surveys undertaken as part of the EIA (**Appendix B, Volume 2**) identified turbidity levels that exceeded the ANZECC default trigger value range of 1–20 NTU for inshore tropical waters (p.21, **Appendix B**, **Volume 2**). Benthic communities in the vicinity of the Walpinhthi Reef, located in relatively shallow waters (5–12 m) will therefore be accustomed to a considerable degree of natural sediment disturbance and increased turbidity. They are likely therefore to recover from the trenching activities within a relatively short timeframe.

- The pipe trenching activities will be a 'transient' operation and potential disturbance impacts to benthic communities resulting from sediment re-suspension will be temporary.
- The boundary of the Walpinhthi Reef Exclusion Zone is located 300–330 m away from the pipeline trenching activities; the reef itself is likely to be 740 m from the proposed subsea pipelines.

Effects of Laybarge Anchoring: A typical anchor configuration for the laybarge in the nearshore water is presented in **Figure 4-8**, **Volume 1** of the Draft EIS. The Exclusion Zone presented in this figure is currently being discussed with the local community via the NLC. It is anticipated that these discussions will result in agreement on a revised exclusion zone.

The laybarge will find it very difficult to anchor on the hard substrate of the reef for technical and safety reasons and will thereby avoid potential impacts to reefal communities. The reader is also directed to the response to **OEH 67** (**Section 12.4.1**).

NTG 70: This table [Summary of Marine Impacts] should also summarise the possible negative effects on the WALPINHTHI REEF sacred site.

The Walpinhthi reef will not be endangered by trenching activities as trenching only effects a limited area of the seabed adjacent to the pipeline and the laybarge will avoid where possible anchoring directly on the hard substrate of the reef and it will therefore not be affected. Negative impacts are therefore deemed highly unlikely and any resulting consequence would be slight. The risk is therefore low. The reader is also directed to the response to **OEH 67** (**Section 12.4.1**).

Impacts on the Walpinhthi Reef from a cultural perspective are discussed in the response to **NTG 66b** (**Section 12.4**).

7.3.4 Section 4.5.6 Shore Crossing

Beach Temporary Laydown Areas

ECNT 9: There will be two laydown areas on the beach approx 100m by 50m, yet the exact location is not yet confirmed (4.5.6. Shore Crossing, p78). We wonder if this is due to the turtle nesting sites, but no explanation is offered.

OEH 8: Discuss the alternative options with respect to the laydown area at the pipeline shore crossing and provide justification for the final selection.

NLC 18: The EIS identifies that two temporary laydown areas of 100m by 50m each will be required near the shore crossing construction site. These will be large areas of disturbance possibly requiring upgrading to hard stand, particularly if the beach area is to be used for a barge landing as proposed in the EIS. The EIS does not consider the alternatives nor how these areas will be rehabilitated.

NLC 35: Page 78, 4.5.6. There is no Figure 4-6b. Re laydown area for the shore pull winch operations the two temporary laydown areas of 100 x 50 metres are very large and there is no consideration of the alternatives. Is the beach needed or the dune area where the midden is present?

ECNT 9: Explain why the exact location of the two beach laydown areas has not been confirmed.

OEH 8: Discuss the alternative options for the laydown area at the pipeline shore crossing, and provide justification for the final selection.

NLC 18: Discuss alternatives for the two temporary beach laydown areas, and detail how these areas will be rehabilitated.

NLC 35: Consider alternative locations for the two temporary laydown areas. Is the beach or the dune area needed?

The exact location of the beach laydown areas will be confirmed once the detailed design is complete and the contractor appointed.

A number of alternative locations for laydown areas have been highlighted. These will be assessed further during detailed design and through discussions with the contractor responsible for pipe lay operations. The final selection of the laydown areas will be based on those sites that offer the best technical, environmental and social solutions. The area shown for the laydown areas is the maximum size required. If possible the size will be reduced.

All laydown areas will be rehabilitated using the best techniques available which will enable them to return to pre-construction condition.

OEH 9: Description of the proposed shore crossing should provide relevant detail that would enable an environmental assessment to be made (Section 4.5.6), including: beach composition, geology, geomorphology, ecology, flora and fauna.

OEH 9: Provide details for the proposed shore crossing that would enable an environmental assessment to be made.

Section 4.5.6, **Volume 1** of the Draft EIS specifically provides a description of the shore crossing activities associated with the proposed pipeline installation activities. The section does not serve to describe the existing environmental conditions at the pipeline landfall location. Baseline environmental data at the shore crossing location is presented throughout **Section 7** and **Section 8** of the Draft EIS. **Table 5** provides a cross reference to sections within the Draft EIS where a description of environmental receptors at the shore crossing location is made to enable an adequate assessment of the potential environmental impacts.

- **Table 5 Cross reference table of Draft EIS sections describing environmental baseline at the shore crossing location**

Environmental Receptor	Cross reference to Draft EIS, Volume 1
Physical	
Geology, Geomorphology, soils - prevailing geology and soil types at shore crossing location	Section 8.2.5
Acid Sulfate Soils	Section 8.2.5 (Figure 8-6)
Sediment Composition	Section 7.3.3
Topography	Section 8.2.3
Land Systems	Section 8.2.4
Biological	
Intertidal Flora	Section 7.3.3
Intertidal Fauna - includes summary of intertidal survey and infauna invertebrate species	Section 7.3.3 Section 7.3.4
Mobile Fauna - includes Sea turtle nesting activity	Section 7.3.9
Coastal vegetation and Flora Species - includes description of species at shore crossing location	Section 8.3.2
Coastal Fauna Habitats and Species - includes description of shore bird species	Section 8.3.5
Conservation significance - includes description of sand dunes at shore crossing location	Section 8.3.3
Human	
Archaeology - includes description of archaeological sites recorded at shore crossing location	Section 9.9.2

Existing Environment

A variety of baseline surveys and desk-top assessments were undertaken during the development of the Blacktip Draft EIS to Supplement data deficiencies. The reader is directed to the following surveys and studies for additional shore crossing specific baseline environmental data:

- *Blacktip Project Offshore and Intertidal Environmental Surveys* (**Appendix B**, **Volume 2**): **Section 4.3.1** provides detailed information on intertidal flora and fauna observed at the pipeline shore crossing.
- *Sea Turtles, Dugongs and Seagrasses in the Blacktip Project Region* (**Appendix C**, **Volume 2**): This survey was conducted along the coastline to the north and south of the proposed pipeline landfall site at Yelcher Beach.
- *Desktop Assessment of Acid Sulfate Soils* (**Appendix D**, **Volume 2**): A summary of anticipated acid sulfate soil potential at the pipeline landfall is described in **Section 4** of the desktop assessment. A follow-up site visit and survey was conducted by Sinclair Knight Merz and a report produced in February 2005 (refer to attached **Appendix B**).
- *Desktop Assessment of Hydrology and Water Quality* (**Appendix E**, **Volume 2**): Summarises ground and surface water conditions at the shore crossing location.

- *Vegetation and Flora Study* (**Appendix F**, **Volume 2**): Includes a desktop review and site survey including the pipeline shore crossing location.
- *Terrestrial Fauna Study* (**Appendix H**, **Volume 2**): Includes a desktop review and site survey including the pipeline shore crossing location.
- *Archaeology and Cultural Heritage Survey* (**Appendix I**, **Volume 2**): Includes a desktop review and survey including the pipeline shore crossing location.

In order to Supplement any perceived data deficiencies relating to the physical attributes at the shore crossing, extracts from the *Nearshore Geotechnical Investigations Report* (Advanced Geomatics 2004) and as well as a summary of the key physical and ecological baseline conditions at the shore crossing location are provided again below.

Regional Physical Setting: Previous studies have described and mapped various aspects of the Holocene to Recent sediments of the gulf and adjacent shelf (van Andel et al. 1967; van Andel & Veevers 1965, 1967; Jones Burgis 1974; Lees 1992a, b; Clarke & Ringis, 2000; Deacon 2001). Moreover, recent studies on the nearshore sediments of the Joseph Bonaparte Gulf have focused on drowned strandlines that potentially may host diamonds derived from the Kimberley block. These studies have shown that modern sedimentation in the gulf is dominated in the nearshore by a wedge of coarse to fine terrigenous siliciclastic sediments that progressively thins seaward and is replaced by finer and more calcareous sedimentation offshore. Much of the central gulf is floored by silty and clayey sands. Drowned strandlines are present on the inner shelf at 20 m to 30 m water depths (Clarke et al. 2001). The seaward thinning wedge of Holocene to Recent muds that dominate the inner shelf, overlies Late Pleistocene mixed carbonate, sand and gravely sands. These in turn rest upon older Pleistocene calcareous sandy deposits.

Nearshore Geology: The available geological information indicates a westward dipping, Permian age sequence deposited on the continental margin of a stable, crustal block. Local deposition on the edge of a slowly subsiding basin within a delta or near-shore lake or lagoon of fine grained sediments is suggested. Cyclic deposition could be anticipated with laminated sediments reflecting settlement over long periods. Sediments within such an environment may be expected to fine upwards. However, local gravity-driven slumping (turbidity flows) on very low slopes may generate local mixed assemblages. Such a sequence may also include thin gravel bands and lateritic horizons as a result of local (on a geological time scale) changes in base level. The entire sequence has subsequently been exposed to recent Quaternary cycles of erosion and deposition (e.g. recent coastal sand dunes) with concentrations of iron oxides producing local laterites / duricrusts of variable aerial extent. The ten boreholes drilled as part of the Geotechnical investigations along the pipeline shore approach corridor intersected a sequence of sandy claystone and siltstone conglomerate overlying claystone, laminated siltstone and sandstone.

Beach Crossing Geology: In summary, beach and dune sands overlie lateritic clay. A borehole was drilled at the back of the beach to a depth equivalent of approximately –8 m LAT (Lowest Astronomical Tide). This borehole intersected the clay layer at approximately 6.1 m LAT,

followed by a layer of very dense sand at approximately -1.96 m LAT. Cross-bedded quartz feldspathic sandstone of high strength underlies the sand layer at approximately -7 m LAT.

Sandy Beaches with Sandflats: The beach where the pipeline comes ashore is 700 m wide. The high tide mark has been observed within a few metres of a low sand dune system at the back of the beach (Woodside 2003). Landward of the dune is a broad sandy grassland area that merges with upland monsoon vineforest and woodland. Only scattered trees including the Tamarind (*Tamarimdus indica)* and White Bush Apple (*Syzygium eucalyptoides eucalyptoides)* occur within the grassland. The dominant species in the grassland area behind the beach is Annual Sorghum (*Sarga (Sorghum) timorense*) with Beach Spinifex (Spinifex longifolius) and the vines *Ipomoea pes-caprae* and *Canavalia rosea*.

Below the beach dune, but above the high tide level, the beach is gently sloping and composed of very coarse sand. Flotsam and jetsam are abundant in this habitat, providing shelter for high densities of the terrestrial hermit crab (*Coenobita variabilis*).

The upper intertidal zone slopes relatively steeply to the flatter mid-tidal zone. The sand in the upper intertidal zone is typically coarse and comprises mainly shell grit with abundant quartz pebbles. The invertebrate infauna was abundant, though species richness was low and dominated by molluscs. In contrast, the mid-tidal zone at Yelcher Beach to the south is more variable, both in terms of topography and invertebrate fauna. Northern Yelcher Beach has a relatively steep gradient and the width of the intertidal zone is not particularly broad. The intertidal zone at Yelcher Beach is much wider and this beach has a more complex topography with rocky areas and intertidal sand spits. Large numbers of Soldier Crabs (Mictyris sp.) were common in sections of Yelcher Beach but uncommon on Northern Yelcher Beach.

Rocky Headlands: Rocky shoals are located on the northern and southern ends of the pipeline shore crossing beach and extend offshore. The northern rocky point (Maninh Point) was not surveyed as it is of significance to the traditional Aboriginal owners. The Yulow Point rocky platform at the south of Yelcher Beach comprises a flat lateritic point that extends approximately 400 m from the beach. It is relatively steep sided and flanked with an extensive area of lateritic boulders, up to 100 m wide to the north, standing water and mangroves to the south. The distribution of the biota was highly variable reflecting micro-topography. However, visual observations indicate that the more seaward section of the rocky platform supports a higher diversity and abundance of invertebrate fauna, including isolated corals, anemones, chitons and larger crustaceans than the nearshore sections.

Mangroves: The survey of intertidal habitats near the pipeline crossing recorded eight species of mangroves. The mangroves at the southern end of the beach pipeline crossing are extremely sandy habitats with muds occurring in most seaward margins. The mangroves at the northern end have a mud substrate and support a taller, more dense forest. **Figures 7-4** and **7-5**, **Volume 1** of the Draft EIS show the intertidal habitats near the landfall site.

An intertidal environmental survey was conducted at the landfall site in May 2004. The findings of the survey are contained in **Appendix B**, **Volume 2** of the Draft EIS.

Impacts

It is acknowledged that some data included in the various baseline surveys (**Volume 2** of the Draft EIS) has not been summarised in detail in **Volume 1**. The following information provides further assessment of potential impacts to support information contained in **Section 11, 12** and **13**, **Volume 1** of the Draft EIS. This information should be read in conjunction with the relevant Draft EIS sections (as cross-referenced below).

Seabed Disturbance (Draft EIS Section 11.3):

Potential impacts at the intertidal shore crossing location will result in the direct loss of flora and fauna habitat within the pipeline working width and from the development of a temporary groyne (refer to response **OEH 16**, **Section 14.3**). The beach crossing location exhibits low species abundance and diversity. Species located in the intertidal area which are likely to be disturbed include the bivalve *Donax faba* which dominates the upper intertidal zone at the shore crossing location and a species of Polychaeta in the family Glyceridae (**Appendix B**, **Volume 2** of the Draft EIS). These species are representative of Northern Yelcher Beach. No marine flora or macroalgae were observed during the Blacktip Project Offshore and Intertidal Environmental Surveys.

Fauna species were recorded in low abundance in the nearshore water immediately above the LAT mark (drying height) and include but are not limited to the polychaete worms, *Lumbrinerid sp, Poeceliochaelid sp, Sabellarid sp* and various amphipods (**Appendix B**, **Volume 2**). Other species located in close proximity to the shore crossing location may be disturbed through re-suspension of sediment and associated smothering effects, but it is anticipated that these species will recover from disturbance quickly.

The pipeline construction footprint will not result in the direct loss of mangrove habitats located at Yulow Point, to the south of Northern Yelcher Beach or the mangroves at Maning Point, to the north of northern Yelcher Point. These two mangrove habitats are located approximately 600 m and 300 m away from the export pipeline route, respectively.

Beach Disturbance (Draft EIS Section 11.4):

The shore crossing location at Yelcher Beach is comprised of very fine to medium graded sands (**Appendix B**, **Volume 2**). During pipeline shore crossing operations and depending on the state of the tide at the time, sediment will be suspended within the water column. This has the potential to lead to short term disturbance of intertidal habitats and species in the immediate vicinity of the construction activities. The intertidal component of the Blacktip Project Offshore and Intertidal Environmental Surveys (**Appendix B**, **Volume 2**) identified low species diversity and abundance at the shore crossing location, as is typical of sandy beaches, and that the nearest sensitive receptors to disturbance are mangroves located 300 m to the north of the crossing point. Consequently, potential impacts are considered minor. With regards to beach disturbance effects resulting from the temporary groyne construction, the reader is directed to the response to **OEH 16** (**Section 14.3**).

NLC 4: Shell midden and pipeline route

The Draft EIS advises on page 21 of the Executive summary that construction of the pipeline will be through the beach middens (Shell midden 1) and the impacted area of the midden will be subject to salvage archaeology prior and during construction. P 285 of the EIS advises the consulting archaeologist, C Crassweller considers that the site has a high archaeological significance. Page 457 advises that it is a registered archaeological site and advises that a part of the midden will be destroyed. Woodside requests a permit to destroy the site on p 469. There are 38 separate parts of Vol 1 of the EIS that provide information on the shell middens.

The consulting Archaeologist in figure 2, on page 18, Vol 2 in the Archaeology and Historic Heritage report has recommended a pipeline route through the midden in a sand dune behind Yelcherr Beach. Woodside has moved the route to the south further into the midden. The NLC understands that Woodside have moved the pipeline route to avoid the rocks and reef at either side of the bay.

There has been no information or discussion by Woodside in the Draft EIS of the advantages and disadvantages of using directional drilling to bring the sea pipeline onshore and avoid any impact to nesting turtles, the archaeology site or to roosting or nesting shore birds. Woodside has advised it needs the beach area for its project as a laydown area. The laydown area overlays the beach access track-see figure 4.6b in EIS. Woodside should be requested to provide reason why directional drilling should not to be used to avoid these impacts.

NLC 4: Provide further information on the pipeline alignment through the Shell Midden and reasons why directional drilling to bring the pipeline onshore should not be used to avoid environmental impacts.

The need to avoid geotechnical obstacles (location of bommies) in the nearshore water resulted in the selection of the proposed pipeline alignment through the shell midden, rather than the alignment recommended in the archaeologist's report.

The Proponent did consider directional drilling at the shore approach; however, it presented a number of problems that were judged to be unacceptable to the project and presented additional environmental impacts. These are detailed below:

The laybarge can only be set up approximately 1500–1700 m from the high water mark due to water depth and draft limitations. Therefore the two horizontal directional drill holes would need to be about 1500 m long. The geotechnical survey results obtained in late 2004 indicate the presence of sand and clay to reasonable depths in this area. Drilling through these materials over this distance, with the possibility of hitting isolated gravel patches along the way, is very problematic and a high risk exercise.

There is a much higher technical risk profile of horizontal directional drill operations as opposed to the open trench option that the Proponent has selected. Based on the geotechnical survey work to date, there is a very low probability that problems will eventuate with the open cut trench option.

There is a requirement for fresh water for the bentonite drilling muds used in horizontal directional drill operations. Approximately 10,000,000 l of fresh water would be required. This would have to be sourced from local aquifers or other supplies.

All of the bentonite mud that is pumped into the holes will exit at the subsea end, 10,000,000 l. This mud could also escape the holes and travel up through localised weak spots in the seabed to the surface at locations other than the subsea end.

There would still be a requirement for an offshore dredging spread to support the horizontal directional drill operations. Localised dredging around the horizontal directional drill exit holes would be required to lower the pipelines where they exit the holes.

The pipelines would be installed from the onshore end of the horizontal directional drill holes and pushed out towards the offshore end. This would mean a far larger and more imposing operation at the onshore end than currently envisaged with the open cut trench option. A larger area would be required at the beach end for additional equipment and for the storage of linepipe.

Approximate cost for the horizontal directional drill operations would be A$12–15 million. The estimated cost for the open cut trench method is approximately A$6–7 million.

OEH 10: Clarification is sought regarding the proposed placement of the laybarge anchors, that is, on the beach or in the dune.

OEH 10: Clarify the proposed placement of the laybarge anchors e.g will they be on the beach or in the dune.

This will ultimately depend on the installation contractor engaged by the Proponent and the particular laybarge they select to use on the project. However, current indications are that there should not be a requirement to place stern laybarge anchors on the beach above the low water mark. This requirement will be confirmed during the procedure development phase of the offshore installation contract, after contract award.

NLC 36: Page 83 Figure 4.9 is misleading, as the beach would have been trenched before the pipe is winched ashore.

OEH 79: The Supplement should present plans for backfilling the proposed pipeline trench (Section 4.5.6).

NLC 36: Figure 4-9 is misleading as the beach would have been trenched before the pipe is winched ashore.

Figure 4-9, **Volume 1** of the Draft EIS is not intended to be a detailed description of the shore pull process but is provided as an example of what the shore pull winch system will typically comprise.

OEH 79: Present plans for backfilling the proposed pipeline trench.

With regard to backfilling the Draft EIS (p.80) states the following:

> The requirement for backfilling will be confirmed during the detailed design phase. However, it is expected that indigenous sediments and/or imported backfill material stockpiled adjacent to the trench will be used to backfill the pipeline trench in the nearshore trench. The material will be replaced in the reverse order to which it was excavated. Similarly, in the dune/beach area the material excavated will also be returned to the trench.

Further information is provided as follows:

The top 100 mm of soil will be stripped and the trench excavated. All suitable backfill material will be stockpiled. There may also be a need to import suitable bedding material. Backfilling will occur in layers using the excavated material; the topsoil will then be replaced. Any surplus material will be removed.

7.3.5 Section 4.5.7 Onshore Pipelines

Table 4.8 Landfall Construction Methods

NTG 11: It is noted that blasting will be conducted in the nearshore area if necessary. What results from the previous geotechnical surveys justify the use of explosives in this location? It is suggested that if an excavator is being used in the nearshore area, as proposed in Section 4.5.6, then the area may be excavated using a rock hammer attachment. This method was successfully used as an alternative to explosives for the Bayu Undan project.

If blasting is to be conducted as part of trenching operations authorisations are required under the *Northern Territory Dangerous Goods Regulations*. Blasting risk assessment and any subsequent justification for use of this technique will need to address the concussive impacts on reef ecosystems.

NTG 11: Discuss alternative methods to nearshore blasting and justify why blasting is the preferred method.

Nearshore Geotechnical Survey: The nearshore geotechnical survey conducted in mid 2004 (Woodside 2004) identified discrete ridges of ferruginous caprock running in a north–south direction located out to 2 km from the shoreline. Testing indicated a medium rock strength for this material (UCS value could be greater than 20 MPa). However, the report did note that the laboratory strength testing was difficult. This was due to the number of joints (natural and drilling breaks) in the cores which could have biased the UCS test results towards higher strength values consistent with the more competent nature of the test specimens between breaks. The Proponent agrees that the use of an excavator dredge fitted with a rock breaker may work in this environment in a similar way to the Bayu-Undan Gas Recycle Project and that this is a preferable alternative over the use of explosives. However, the Proponent is currently tendering for this work and wishes to evaluate the various installation tenderers' proposed methodologies for excavation of the trench in this area before adopting the final methodology. Award of this contract is currently scheduled for July 2005, subject to project sanction.

Blasting: In the event that blasting is necessary to assist in nearshore installation of the pipeline, authorisation will be sought from the *NT WorkSafe* under the *Dangerous Goods Regulations (1985)*

*(*NT) and Australian Standard AS2187.2 - 1993 - Explosives Storage, Transport and Use, Part 2, in advance of blasting activities commencing.

Impacts: A description of potential seabed disturbance impacts resulting from pipeline installation activities are identified in **Section 11.2**, **Volume 1** of the Draft EIS. Potential impacts to the reef habitats and communities may result in injury and mortality to marine biota. The extent of injury and mortality will depend on, amongst other factors, the size and depth of charge, composition of explosive used, water depth, seabed composition and proximity to sensitive environmental receptors. During and immediately following blasting, the deposition of displaced materials will result in disturbance to benthic communities.

A potential impact associated with underwater blasting is the potential noise effects on fauna. Underwater explosions are the strongest point source of explosions in the sea (Richardson et al. 1995). Furthermore, potentially damaging sound pressures can propagate greater distances along hard substrate as opposed to soft substrate. The following information presents typical behavioural and physiological responses exhibited by marine fauna to noise disturbance from the effects of blasting.

Fish and Invertebrates: Studies by Goertner (1978) and Falk and Lawrence (1973) indicate that underwater blasting is known to cause severe effects on fish and invertebrates in the immediate vicinity of the blast source (HDR Alaska 2003). Mortality effects in fish are primarily due to trauma to internal organs, especially swim bladders and kidneys.

Sea Turtles: There is very little data available on the impact of blasting on turtles and it is generally assumed that turtles would be affected to a similar degree as marine mammals. Young (1991) suggests that organ tissue damage in sea turtles may occur at range distances less than 750 m from a 100 kg surface charge, with hearing damage at range distances within 1500 m.

Observations in 2003, during which the RAAF disposal team detonated World War II bombs on Bare Sand Island and on nearby Quail Island, revealed no evidence of sea turtles being adversely affected by the explosion. Detonations included a 200 lb Japanese bomb detonated in the intertidal zone, which left a crater more than 5 m in diameter. Following the detonation, female Flatback Turtles nested that night as usual, there was no hiatus in hatchling production and feeding turtles were present on the reef in their usual numbers (Dr M Guinea [Charles Darwin University] *pers. comm.*, 14 January 05). It is highly unlikely that explosions associated with blasting for the nearshore pipeline route will be as large as the bomb detonations, therefore the impacts on sea turtles of blasting in the intertidal zone are likely to be insignificant, short-lived and undetectable.

Marine Mammals: Few specific data are available relating to disturbance or blast injury effects of underwater explosions on marine mammals. Richardson et al. (1995) notes that certain pinnipeds and toothed whales exhibit short-term avoidance reactions. Furthermore, various marine mammals show considerable tolerance of noise pulses from explosions. Nearby blasts can result in injury and death, but exact threshold levels for these physiological characteristics are not well established (Richardson et al. 1995).

Mitigation and Management Measures: In the event that blasting is used by the Proponent, the following mitigation and management measures will be undertaken and refined during detailed design when the exact blasting requirements and specification are known:

- Pre-blasting visual inspections – in the event that sea turtles or marine mammals are identified in the immediate vicinity, blasting will be delayed, until they leave or are herded away using a boat.
- Mitigation measures associated with marine blasting will be incorporated into the Blasting Management Plan, which will be prepared in advance of construction and approved by the relevant regulatory authorities (**Section 15**, **Volume 1** of the Draft EIS).

Preparation of Right of Way

NTG 12: Temporary artificial depression of a water table may require the use of pumps to abstract water from the area of concern. Artificial depression of the water table has impacts that need to be addressed these being:

- lowering of the standing water groundwater levels below annual variation;
- discharge point of abstracted groundwater; and
- impacts on beneficial users (if any).

It is suggested that for this and the upcoming Trans Territory Pipeline project that Woodside contact the Controller of Waters within Department of Infrastructure Planning and Environment Conservation and Natural Resources Division to discuss.

The proponent plans to clear vegetation for a maximum width of 40m, along a 2.5km stretch. The proponent will require a land clearing permit under the *Planning Act.* Woodside have been advised of this requirement by the Agency. No work on clearing the Right of Way shall commence prior to receipt of this permit.

NTG 12a: Discuss the impacts of temporary artificial depression of the water table.

Haig and Matsuyama (2003) described the ground water resources under the Blacktip Project area to be a widespread shallow aquifer in sandstone with the potential to yield 5 L/s or even 10 L/s if the rock is fractured. From Yelcher Beach, this aquifer system extends approximately 14 km inland and is approximately 20 km wide, stretching from around Port Keats down to Treachery Bay.

Given the size and volume of the underlying aquifer system, lowering of the standing water groundwater levels below annual variation for the short period of time that the pipeline will be being installed, is going to produce a temporary, negligible impact on the local water table. It is also not expected to have any impact on water availability to any communities which obtain water from various areas of this widespread system.

Where necessary, sediment control structures will be installed across drainage, downstream from the trench and prior to its final discharge destinations. Care will be taken to avoid discharging into potentially sensitive habitats. This will minimise any sediment load being carried from the disturbed trench area.

NTG 12b: Clarify plans to obtain clearing permit to clear vegetation in preparation of Right of Way.

The Proponent recognises the need to have obtained Vegetation Clearing Permits before any vegetation is cleared. These permits will be lodged with the appropriate government departments for approval well in advance of any vegetation clearing occurring.

Rehabilitation and pipeline markers

NTG 13: Australian Standard 2885.3-2001 Section 6.2.2 'Patrol of route', Section 6.4.2 'Access to the pipeline' and Section 6.4.4 'Vegetation on and near the pipeline' need to be considered when rehabilitating the right of way especially with regard to and pipeline inspection and operational requirements.

NTG 13: Consider Australian Standard 2885.3-2001, Section 6.2.2, Section 6.4.2 and Section 6.4.4 in plans for rehabilitating the right of way.

As stated in **Section 1.8.3** of the Draft EIS (Technical Standards & Codes of Practice), 'The 2.5 km onshore component of the export pipeline will be designed, constructed, operated and maintained as per Australian Standard (AS) 2885 'Gas and Liquid Petroleum' (Parts 1, 2, 3 and 5)'. All sections of this Standard including Sections 6.2.2, Section 6.4.2 and 6.4.4 will be considered where relevant.

Onshore export pipeline

NTG 14: It is mentioned elsewhere that wildlife maybe impacted by being trapped, exposed or dehydrated in the trench or in the cleared area. Will there be limits for time that sections of the trenches remain open or are the time limits restricted only to the development of the total pipeline?

NTG 14: Will there be limits on the time that sections of the trenches remain open?

The length of pipeline that will have to be laid from the landfall site to the onshore gas plant is approximately 2.5 km. The trench will be prepared, the pipeline will be laid and then the trench will be backfilled and rehabilitated once testing is complete. During the time it is open, the trench will be inspected frequently throughout the day and any animals removed. Escape ramps will also be placed along the excavated trench, where possible, to allow animals to escape.

The trench may be open for a maximum period of 4–6 weeks depending on the speed of construction. However, this period is likely to be significantly reduced.

The EMP and the Safety Management Plan will include requirements for trenches to have ramped exits to enable trapped fauna to escape, also trenches will be inspected daily for trapped fauna by a trained animal handler to remove any trapped fauna.

7.3.6 Section 4.5.8 Onshore Gas Plant

Hydrotesting -Bore Water

NTG 15: It is proposed to use approx 6000 m^3 of water to hydrotest onshore storage tanks and pipelines. The proponent indicates that they are considering the use of bore water or sea water, with the likely choice being bore water. The proponent should demonstrate their rationale behind the use of bore water as apposed to alternative options such as filtered seawater.

Bore water is of high quality and has other beneficial users as identified in Section 8.2.1. This issue should be discussed with the Controller of Waters within Department of Infrastructure Planning and Environment Conservation and Natural Resources Division.

The project requires the clearance of 64ha of native vegetation and will require a land clearing permit [under] the *Planning Act*. Woodside has been advised that a permit will be required. No work on clearing the gas plant site shall commence prior to receipt of this permit.

NTG 15a: Demonstrate the rationale behind the use of bore water for hydro testing of on shore water tanks.

It is industry practice to use high quality water for the hydrotesting of the storage tanks and plant piping to ensure integrity of the plant. If seawater is used, additives will be required and the use of bore water will still be required to flush the seawater from the plant piping/tanks to ensure no future corrosion.

NTG 15b: The project requires a land clearing permit under the Planning Act for the clearance of 64ha of native vegetation.

This is acknowledged by the Proponent.

7.3.7 Section 4.5.10 Construction Access Routes

NTG 16: The proponent should acknowledge within the EIS the need for increased maintenance during construction on the proposed access route from Darwin to Wadeye to maintain accessibility at current standards and the need for reinstatement of the route on completion of construction.

In examining this issue the proponent should note all up-grading of roads will require Authority Certificates. AAPA records suggest that the Daly River-Port Keats Road has some particularly difficult site issues.

The proposed road from the Wadeye Airstrip to the Onshore Process Facility needs to address:

- Impact upon the proposed sub-division
- Hazard to aircraft such as dust

NTG 16a: Acknowledge the need for increased road maintenance on the proposed access route from Darwin to Wadeye during construction and the need for reinstatement of the route on completion of construction.

The need for increased maintenance has been addressed in the Traffic Management Plan (**Appendix B** at the end of Supplement).

NTG 16b: Address the impact of the road from the Wadeye Airstrip to the onshore process facility on the proposed sub-division and hazard to aircraft such as dust.

Insignificant Dust Hazard to Aircraft: Dust emissions from an unpaved road in the vicinity of an Aerodrome[2] or Authorised Landing Area[3] may cause the following aeronautical hazards:

(1) Ingestion of dust particles into jet (turboprop or turbofan) engines and other aircraft air intakes.

(2) Reduced pilot-visibility due to clouds of dust.

However, the risks associated with these hazards are considered to be very low, because pilots operating in the Northern Territory would be familiar with local conditions and act accordingly to operate within safe limits. Ultimately pilots are responsible for aircraft/passenger safety and as such, pilots must be familiar with the operating and meteorological conditions of a particular airstrip, and account for these prior to operations. Conditions to be considered by pilots would include wind conditions, raised dust and reduced visibility (refer to Airservices Australia, *En Route Supplement Australia*; and Civil Aviation Safety Authority, *VFR Flight Guide)*.

Therefore dust emissions from the proposed road are not expected to present any new and unexpected hazard to aircraft and pilots.

OEH 11: Details of proposed vehicle access to the beach and laybarge anchors should also be provided, stating their movement and access restrictions.

OEH 11: Provide details of proposed vehicle access to the beach and laybarge anchors, stating their movement and access restrictions.

Vehicle access to the beach will be restricted to the pipeline ROW, however, there may be some initial access to the beach along existing tracks but not to an extent greater than there has been to date.

OEH 12: Detailed surveys of the drainage of proposed construction access roads need to be presented in the Supplement (Section 4.5.10). These earthworks potentially affect runoff and the export of sediment, nutrients and pollutants.

OEH 12: Present detailed surveys of the drainage of proposed construction access roads, addressing the potential effects of earthworks on runoff and the export of sediment, nutrients and pollutants.

[2] For Regulations covering Aerodromes refer to Civil Aviation Regulations (CAR), Part IXA - Aerodromes, and CAR 92.

[3] For requirements in relation to Authorised Landing Areas (ALAs), refer to Civil Aviation Authority, Civil Aviation Advisory Publication, Date: July 1992 No: 92-1(1) Subject: Guidelines for Aeroplane Landing Areas.

The design of the access road will allow for the appropriate drainage to accommodate the anticipated runoff. A detailed survey can only be provided once the roads have been constructed.

OEH 13: Justification is sought for both the placing of a laydown area in a 50m road corridor and the specified width of 50m. Traffic risks should be described, along with changes to local traffic conditions (such as diversions required during construction).

OEH 13: Justify the placing of a laydown area in a 50 m road corridor and the specified width of 50 m.

The 50 m corridor is to allow for the construction of the new access road, construction access, temporary traffic access and laydown. Traffic risks have been identified in the Traffic Management Plan (attached to this Supplement as **Appendix B**).

OEH 14: The Supplement should contain the results of "detailed environmental surveys" for "the proposed access roads and associated drainage channels and ditch run-outs" mentioned in the Draft EIS (Section 4.5.10).

OEH 14: Present the results of "detailed environmental surveys" for "the proposed access roads and associated drainage channels and ditch run-outs".

Environmental surveys for the proposed access road and associated drainage channels and ditch run-outs were planned for the 4th Quarter of 2004. Persons were on-site to complete the surveys in early October 2004. Due to reasons outside of the Proponent's control, these were unable to proceed and therefore data were not able to be included in the Blacktip Draft EIS.

At present, these surveys are unable to be conducted due to the inaccessibility of the region during the wet season. These surveys will be conducted as soon as the proponent is able to safely access the region. The NT Government will be supplied with the results of the surveys once they are completed, the data reviewed and an assessment of impacts and mitigation measures is made.

Beach Barge Landing & Haul Road between beach and Gas Plant

NLC 19: At 4.5.10.3 the Draft EIS advises that, depending on the selected method of construction, there may be a requirement to bring in large loads and that due to restrictive road access the preferred option for large loads would be transport to the pipeline shore crossing location via flat top or landing barge. The Draft EIS further advises that in both cases it is expected that some earthworks or ground improvements would be required and that in the event that the barge landing option is used a temporary corridor parallel to the shore approach, of approximately 50 m wide, will be required to facilitate landings.

The Draft EIS also advises that while the beach barge access may be required for some loads, use of barges is not confirmed. However, in the event that beach barge access is required then a Haul road between the beach and the gas plant would need to be constructed within the pipeline ROW to a standard suitable to transport pipe lengths and shore pull machinery and equipment.

Traditional Aboriginal owners have commented to the NLC that: "they didn't tell us about this one…how would they get over the dunes and off the beach…do they plan to bulldoze the dune or build up off the beach and if so with what from where?"

Table 4.4, Project Schedule, indicates that construction using heavy machinery is intended to commence as soon as possible each dry season, i.e. from the commencement of the 2nd quarter, this precludes construction commencement via road access given that such access across the Daly River is unlikely before the end of May/early June and thus, despite references in the Draft EIS to 'not confirmed' the Yelcherr Beach barge access and haul road to the Plant site will be required if the construction schedule identified in the Draft EIS is to be followed.

If it is that the barge landing at Yelcherr Beach is not confirmed then the project schedule should be amended to reflect more realistic construction commencement dates and the impacts of further compression of construction timelines (limited to dry season road access June to-mid December) should also be identified.

The Draft EIS should have clearly described the proposed beach barge landing and associated construction methodology as well as describing the particularities of the proposed haul road between the proposed barge landing and the plant site. Construction of the proposed haul road within the ROW should also address safety concerns during construction given Woodside's concerns about similar road construction within the ROW when such construction has been proposed by the NLC in relation to the proposed all-weather access road.

NLC 19: Clearly describe the proposed beach barge landing, and associated construction methodology, and the proposed haul road between the landing site and the plant site.

The Proponent agrees to removing the requirement for a separate barge landing area. If barges are used, then they should be able to land in the existing 60 m wide offshore pipeline corridor.

Road access to the plant site will be via the Daly River Road, after the Daly River crossing has been opened in the dry season of 2005.

Airstrip to Plant site proposed all-weather access road

NLC 17.1: The process of Blacktip undertaking the topographical surveys associated with the proposed development highlighted for traditional owners the on-ground reality of what was proposed in relation to this all-weather access road. The result of that understanding elicited particular concern regarding what traditional owners considered to be unnecessary destruction of trees and comment to the effect that "we don't want three (3) roads…the pipeline ROW, this all-weather access road and the existing Injun Beach track…better that they combine the ROW with their access road".

Traditional owners have expressed concern about destruction of trees associated with the proposed 30m Trans Territory Pipeline (TTP) right of way (ROW) paralleling this proposed all-weather access road with its own potential clearance of trees over a 50m wide corridor. The topographical survey also demonstrated for traditional owners that the straight lines associated with construction of this access road would mean that the existing Injun Beach track would not simply be upgraded but in substantial part left untouched meaning, essentially, three immediately proximate and parallel routes to Yelcheer.

The NLC recommends combining the TTP ROW with the proposed all-weather access road from airstrip to plant site. This would effectively mean that for a distance of approximately [x]kms that the ROW would need to be 40m wide instead of 30m. Significantly less destruction of tress would be involved than in the current proposal. Blacktip have verbally advised the NLC that such an option would carry unacceptable construction safely risks. The NLC does not accept that safety issues could not readily be addressed.

NLC 17.1: Discuss the option of combining the Trans Territory Pipeline right of way with the proposed all-weather access road.

The Trans Territory Pipeline Project and the Blacktip Project have agreed to align the pipeline and road within a 50 m corridor. The Trans Territory Pipeline and Blacktip Projects have agreed to locate the TTP within the same 50 m corridor as the all weather access road, on its east – west leg. The width required for construction access, laydown, pipeline installation and maintenance will be optimised within this 50 m corridor

Temporary use of existing track through Men's Ceremony Ground

NLC 17.2: Woodside's application to the Aboriginal Areas Protection Authority for an Authority Certificate covering construction activity refers to: "temporary use of the existing track leading south from the airport junction to the Kultchil for access for construction of the new, permanent, all weather access road". The Draft EIS Executive Summary, when discussing impacts on Aboriginal cultural sites at p21, fails to make any mention of the planned use of access roads within the restricted area of the Men's Ceremony Ground at Wadeye. Further, the NLC has been unable to locate any reference in the remainder of the Draft EIS to this proposed use of a track inside the men's ceremony site restricted area.

The apparent lack of description in the Draft EIS of precisely what is intended by the reference in the AAPA application to "temporary use" makes it impossible for the NLC to properly consult with traditional owners over this apparent change of scope.

The NLC is not currently of the view that any "temporary use" of access through the restricted area of the men's ceremony ground will be necessary for "access for construction of the new, permanent, all weather access road". The NLC is of the view that access for construction of the all-weather access track, the proposed "pioneer construction camp" and clearing of the proposed Plant site can all be readily effected by use of the access route alignment already identified by traditional owners as avoiding infringement on sacred sites.

NLC 17.2: Discuss Woodside's application to the AAPA for an Authority Certificate for "temporary use of the existing track leading south from the airport junction to the Kultchil".

The existing track that leads south from the eastern end of the Wadeye airstrip to the area known as the Kultchil and a track which leads from this track westward to the plant site, is the route that all project contractors, NLC, traditional Aboriginal owners and others have been using to visit the plant site for all of the activities that have been undertaken to date.

It is purely a practical requirement that this track be used in the first instance, perhaps for a period of up to three months from when the site preparation contractors are able to mobilise, in order to establish the pioneer camp and construct the approved permanent access road, as this latter road is not yet in existence. The Proponent, in any event, will seek to minimise the temporary use of the existing track as the priority upon mobilisation will be to construct the approved permanent access road.

Since the closure of the public comment period, the Proponent has entered into tripartite discussions with the NLC and the AAPA with a view to resolving all sacred site issues associated with the Project. These have been constructive and progressive and the NLC is due to undertake further consultations with the traditional Aboriginal owners about possible resolutions.

During the site survey, the TOs and NLC were consulted on the use of the existing track for temporary use whilst the new access road was being constructed. At that time, it was understood that consent was granted. Temporary access to the plant site will be required until the new access road has been constructed.

Minor Light Vehicular use of Existing Track to Yelcherr Beach

NLC 17.3: Woodside's application to the Aboriginal Areas Protection Authority for an Authority Certificate covering construction activity refers to: "minor light vehicular use of existing track to Yelcherr Beach". There is, however, no reference in the Draft EIS to such proposed use or more detailed description of "minor" or proposed duration of use. Clarification of this matter, should such use be intended, is necessary.

NLC 17.3: Clarify Woodside's application to the AAPA for an Authority Certificate covering "minor light vehicular use of existing track to Yelcherr Beach".

The Proponent will undertake to use the pipeline ROW from the plant site to the shore crossing for all of its access to the coast. However, there may be a requirement for some light vehicle usage, no greater than that which has occurred to date, for the existing track to the beach. The Proponent is prepared to discuss with the NLC and traditional Aboriginal owners what would be acceptable minor usage if this is required.

Since the closure of the public comment period, the Proponent has entered into tripartite discussions with the NLC and the AAPA with a view to resolving all sacred site issues associated with the Project. These have been constructive and progressive and the NLC is due to undertake further consultations about the possible resolutions reached.

NLC 37: On Page 117 and in Section 9.4 the EIS advises that it is envisaged that supplies & equipment will be transported to the site by road from Darwin during the dry season & by barge during the wet season and Section 4.5.10.2 further advises that the existing boat ramp in Sandfly Creek is an option in terms of importing some materials during construction and provisions such as spare parts and lubricants during operation, subject to satisfactory arrangements being made with the Wadeye community. There is no discussion, however, in relation to the degree of potential use and the potential impacts of such use of this existing fortnightly barge service which currently forms the primary means of Wadeye regional supply during the wet-season. What, for example, is the capacity of the service to manage increased demand without potentially impacting on existing users?

NLC 37: Discuss the possible impacts on existing users of the fortnightly barge service to Sandfly Creek boat ramp.

Supplies and materials will only be transported by road during the construction phase of the project. The barge landing will not be used, unless under exceptional circumstances and if so the community and Thamarrurr Regional Council will be consulted.

Draft EIS Section 4.5.10.3 Beach Barge Landing

NTG 17a: Has the proponent considered the option of combining the pipeline shoreline crossing with a barge ramp? The areas for the pipeline shoreline crossing and the right of way to the gas treatment plant would have already been cleared to facilitate construction. As suggested on pp 98 paragraph 1, the right of way could then accommodate a dry weather haul road.

NTG 17a: Discuss the option of combining the pipeline shoreline crossing with a barge ramp.

The Proponent agrees to remove the requirement for a separate barge landing area. If barges are used, then they should be able to land in the existing 60 m wide offshore pipeline corridor.

Access from the pipeline shore crossing to the gas plant will be via the pipeline ROW. All weather access to the beach is not required.

NTG 17b: Has the proponent considered the option of upgrading the road to an 'all weather road' from the pipeline shoreline crossing to the gas treatment plant. This will be not only a useful facility during the construction phase as an all weather transport route.

NTG 17b: Discuss the option of upgrading the right of way haul road from a 'dry weather' road to an 'all weather' road.

The haul road from the airstrip to the gas plant will be constructed to allow vehicle access during wet and dry season weather conditions. The road will not be accessible during extreme weather events that result in significant rainfall impacting on the road surface.

The access track from the gas plant to the beach will be constructed for access during dry season construction only.

Draft EIS Section 4.5.10.4 Wadeye Airstrip

NTG 18: Table 4-10 alludes to the use of helicopters or light aircraft to transport personnel to the plant site. The use of helicopters is not detailed in the report. The use of helicopters at Wadeye will require the construction of a helipad with associated infrastructure in line with CASA guidelines. It is requested that the proponent address the use of helicopters including the process to ensure appropriate infrastructure is in place in a timely manner.

NTG 18: Address the use of helicopters, including the process to ensure appropriate infrastructure is in place.

There are currently no plans to provide for a helipad at Wadeye.

7.3.8 Section 4.5.11 Construction Materials and Infrastructure

NTG 19: In accordance with the Northern Territory *Mining Act* and *Mining Management Act* construction materials including rock fill and aggregates should be sourced from valid mining tenements with appropriate authorisations. It would be prudent to discuss extractive options and other mining related issues with the Department of Business, Industry and Resource Development Titles and Mining and Petroleum Management Divisions.

NTG 19: It would be prudent to discuss extractive options with the Department of Business, Industry and Resource Development.

Acknowledged.

4.5.11.1 Quarantine and Staging Areas

NTG 20: The EIS refers to the possible requirement for a quarantine and staging area in Darwin, but no detail has been provided. Will the proponent be using Darwin, another site in the NT or will material be inspected overseas? Establishing such a site may have timing and regulatory implications for the project.

NTG 20: Detail possible requirements for a quarantine and staging area, including its location and timing and regulatory implications.

A supply base will be established in Darwin. All construction traffic to the plant site will be coordinated from the supply base.

Section 4.5.11.2 Concrete Batch Plant

OEH 15a: The Supplement should also detail the proposed works at the concrete batch plant if it is located outside the gas plant footprint.

OEH 15a: Detail the proposed works at the concrete batch plant if it is located outside the gas plant footprint.

The proposed concrete batch plant will be located within the plant fence line.

Section 4.5.11.4. Aggregate Sources Gravel

NTG 22: It is important that the proponent note that all such areas require Authority Certificates. In accordance with the Northern Territory *Mining Act* and *Mining Management Act* construction materials including rock fill and aggregates should be sourced from valid mining tenements with appropriate authorisations. This will need to be considered prior to the commencement of extractive activities and may be discussed with the Department of Business, Industry and Resource Development Titles and Mining and Petroleum Management Divisions.

OEH 15b: Further survey work is required regarding the feasibility of sourcing suitable aggregates, their volume, accessibility, and works likely to be required.

NTG 22: Note that all sources of aggregate material require an Authority Certificate.

Acknowledged.

OEH 15b: Further survey work is required regarding the feasibility of sourcing suitable aggregates.

For local road gravels, a survey was done as part of the onshore gas plant geotechnical survey. Once aggregate volumes and sources are known this will be subject to the appropriate regulatory approval. The project is in consultation with the Office of Territory Development (OTD) and the Department of Business, Industry and Resource Development (DBIRD), regarding the necessary approvals for extractive minerals.

7.3.9 Section 4.5.13 Construction Workforce & Accommodation

NTG 23: There is no mention of the provision of a commercial food preparation facility for the construction camp. Such a facility will need to comply with the requirements of the *Food Act 2004 and Food Standards*. The construction camp and the subsequent permanent camp will also require registration as a boarding house in accordance with the *Public Health Act and Regulations*. All building works must comply with *NT Food and Public Health Acts and Regulations* and the Building Code of Australia and be carried out to the satisfaction of the DHCS Environmental Health Darwin Rural office. Detailed plans, in relation to work proposed within the terms of the above legislation, must be submitted to DHCS Environmental Health Darwin Rural for assessment, prior to any works commencing.

NTG 23: There is no mention of the provision of a commercial food preparation facility for the construction camp.

Detailed plans, in relation to work proposed will be submitted to Department of Health and Community Services Northern Territory (DHCS) Environmental Health Darwin Rural for assessment, prior to any works commencing.

7.4 Section 4.6 Commissioning Activities

7.4.1 Section 4.6.1 Offshore Facilities

Offshore – Construction

OEH 22: Specification is sought regarding the disposal location and composition of commissioning fluids made up of "brine and diesel," that are proposed to flush the well after completion.

OEH 22: Specify the composition and the disposal location of commissioning fluids that are proposed to flush the well after completion.

Prior to perforating the well the brine will be circulated out of the well and into the drill rig mud tanks, leaving the well full of diesel. After the wells have been completed they will be flowed into

the separator on the attendant drill rig for a period. During this time the diesel/gas mixture will be burnt in the drill rig burner boom.

7.4.2 Section 4.6.3 Export Pipeline

OEH 25: The Supplement should name and quantify the chemicals that are expected to be used for hydrotesting and name their toxicity The location, time, frequency, concentrations and loads of any discharge should also be detailed. Disposal options for hydrotest water, including possible disposal at the wellhead platform, should be discussed with respect to impacts and management.

OEH 26: If seawater is to be used for hydrotesting, discuss the composition of biocides, oxygen scavengers and corrosion inhibitors in the water, along with their likely quantity and effect on the local environment.

NTG 76: Please provide further justification for the stated hydrotest discharge location. See discussion Section 4.6.3 of this review.

NTG 24: Information regarding the categories of chemicals to be used to conduct the hydrotest should be included in the EIS. It is understood that the specific chemicals to be used have not been selected but a general discourse demonstrating associated risk awareness could be included addressing items such as:

toxicity;

environmental persistence; and

expected breakdown products primary, secondary and tertiary

It should also be noted that a discharge license under the Northern Territory *Water Act* will be required as the discharge location is within NT Coastal Waters.

It is requested that the proponent provide a review regarding environmental impacts of discharges associated with releases of hydrotest water. The objective is to identify the average range of chemical concentrations expected to enter the marine environment resulting from the release of hydrotest water. What criteria will be used to select chemicals that are 'environmentally suitable'?

NTG 25: The volume of hydrotest water to be discharged in the nearshore environment is almost 13 times the daily volume of produced formation water (PW) to be discharged at peak period. The volume of hydrotest water to be discharged in a day will be greater than predicted peak volumes of PW.

In consideration of the chemical constituents of hydrotest water and the volume of the discharges for both the export pipeline and the onshore storage facilities, modelling of hydrotest discharge plumes should be undertaken. The location of the discharge in the nearshore marine environment and the proximity of sensitive environmental receptor such as Emu Reef and Howland Shoals is of key concern.

OEH 43: The Supplement should contain "specific hydrotest and dewatering procedures" that "stipulate management measures to deal with any predicted environmental impacts" as mentioned in the Draft EIS.

NTG 76: Please provide further justification for the stated hydrotest discharge location.

OEH 25b: Detail the location, time, frequency, concentrations and loads of any discharge.

OEH 25c: Discuss disposal options for hydrotest water, including possible disposal at the wellhead platform, with respect to impacts and management.

The hydrotest discharge options are discussed in **Section 4.6.3**, **Volume 1** of the Draft EIS.

The pre-commissioning philosophy of the pipeline is based on dewatering the pipeline with actual product from the wellhead platform. Furthermore, it is industry practice to displace hydrotest water from the lowest point towards the highest point to ensure that all water is correctly displaced and the pipeline is left sufficiently dry. If the water was displaced from the onshore end towards the wellhead platform it would be necessary to establish a significant dewatering spread at the onshore gas plant and it would also be necessary to fill the line completely with nitrogen before the introduction of product subsequently due to safety considerations of mixing air with product. The amount of nitrogen required to fill the line is enormous and very costly.

This currently adopted pre-commissioning philosophy will be reviewed again during the detailed design phase. Dewatering of the pipeline from the onshore end is technically possible, but has significant disadvantages with little additional environmental benefit over dewatering from the wellhead platform.

NTG 24c: Discuss what criteria will be used to select chemicals for the hydrotest that are 'environmentally suitable'.

As outlined in the Draft EIS, the need and amount of chemical additives required for the hydrotest water will be determined as detailed design of the Blacktip Project proceeds. It is not possible to provide exact details and quantities of the chemicals used for hydrotesting at this stage. The selection of hydrotest chemicals will consider environmental performance, in much the same manner that the environmental performance of corrosion inhibitors were assessed (**Section 2.4.6, Appendix J**, **Volume 2** of the Draft EIS). Further information is provided below on the flooding water and its chemical treatment:

Filtered treated seawater will be used as the flooding medium. The seawater to be used for the various pressure testing operations will be of a quality that protects the pipeline from the ingress of foreign matter, sedimentation and internal metal corrosion. Only clean sea water taken from the open sea will be used.

The flooding water shall be treated with oxygen scavenger and biocide. Only those chemical brands with a minimum HQ category of 'Silver' or Offshore Chemical Notification Scheme (OCNS) Category D under the UK OCNS Notification Scheme will be used. The chemicals to be used will either be included on the Centre for Environment Fisheries and Aquaculture Science (CEFAS) List of Notified Chemicals in accordance with the Harmonised Offshore Chemical Notification Format (HCONF) format and the above categories or it will be demonstrated that sufficient information or data exist with these chemicals to support a HCONF application. The dosages of oxygen scavenger and biocide shall be sufficient to prevent internal corrosion and bacterial attack for the entire period that the water will be resident in the pipeline.

NTG 24b: Provide a review of the environmental impacts of discharges associated with releases of hydrotest water.

Only chemicals with low potential for environmental harm will be selected (as detailed in the response to **NTG 24c** above). This includes selecting chemicals which have the following characteristics:

- low ecotoxicity;
- high biodegradability;
- low potential for bioaccumulation.

A low toxicity will limit any impact immediately after discharge. A high biodegradation rate and low potential for bioaccumulation will ensure that the chemical will not persist in the environment. A combination of these three characteristics and high dilution rates at the discharge point will ensure minimal environmental impact.

NTG 25: Modelling of hydrotest discharge plumes should be undertaken.

Once the chemicals are selected, the risk to the marine environment is likely to be assessed using modelling and the ratio of the Predicted Environmental Concentration (PEC) to Predicted No Effect Concentration (PNEC) approach, similar to that used for the PW (refer to **Section 14.8**). The PNEC for the chemicals and the PECs will be provided for the volume of the discharge by the numerical model developed for the PW. If the results of this work indicates that the discharge of hydrotest waters at the condensate mooring is environmentally unacceptable, alternatives will be investigated.

OEH 25a: Name and quantify the chemicals that are expected to be used for hydrotesting, and detail their toxicity.

OEH 26: If seawater is to be used for hydrotesting, discuss the composition of biocides, oxygen scavengers and corrosion inhibitors in the water, along with their likely quantity and effect on the local environment.

NTG 24a: Demonstrate awareness of the risks associated with the chemicals used to conduct the hydrotest.

OEH 43: Detail specific hydrotest and dewatering procedures, stipulating management measures to deal with predicted environmental impacts.

The Proponent is not in a position to provide specific hydrotest and dewatering procedures at this time, over and above what currently is included in the Draft EIS, and before a contractor responsible for this work is engaged. However as per the requirements of Petroleum (Submerged Lands) (Management of Environment) Regulations 1999, Petroleum (Submerged Lands) (Pipeline) Regulations 2001 and the applicable NT onshore pipeline regulations, the Proponent will be required to develop specific hydrotest and dewatering procedures and obtain Regulator approval for

same before environmental approval and a Consent to Construct the pipelines is granted. This is standard practice and the Proponent confirms compliance with this requirement.

Specific hydrotest and dewatering procedures will be contained in an Environment Plan, which will assess any predicted environmental impacts and stipulate management measures to reduce environmental risks to acceptable levels. The EP will provide details on the exact chemicals and quantities to be used and will be reviewed and approved by the regulatory authorities before hydrotesting occurs. All proposed hydrotest chemicals will be agreed with regulatory authorities prior to use.

Typical additives to hydrotest waters include:

- oxygen scavenger;
- biocide;
- leak detecting dye.

Oxygen Scavengers: The active ingredient of oxygen scavengers used previously by the Proponent is Sodium Bisulphite (Cas No. 7631-90-5). This chemical is on the OSPAR list of chemicals and is deemed to 'Pose Little Or No Risk' (PLONOR) to the environment and is therefore not deemed to be toxic.

Biocide: Environmentally acceptable biocide chemicals used previously by the Proponent include:

- Tetra (hydroxymethyl) Phosphonium Sulphate (THPS);
- Biguanide (1,6-Hexanediamine, polymer with N,N'''-1,6-hexanediylbis{N'-cyanoguanidine}, hydrochloride).

THPS: THPS works as a biocide by disrupting the disulphide bonds in proteins and enzymes (Ballantyne and Jordan 2004). After reacting it forms Tetra (hydroxymethyl) Phosphonium Oxide (THPO), an environmentally benign chemical.

If used in the presence of the oxygen scavenger, ammonium bisulphite, THPS has been known to react resulting in an increase in the dissolved oxygen content. In this case an alternative such as Biguanide would be used.

Biguanide: Biguanide has a low toxicity, is highly biodegradable and does not bioaccumulate. It is therefore believed to pose little risk to the marine environment when discharged.

Leak detecting dye: Typically the dye is only introduced into those sections of the pipeline which contain obvious potential leak paths like flanges. Typically a non toxic fluorescein or red dye is used.

Verification of model outputs

NTG 26a: It is noted on pp 14 of (Teikoku Oil (Bonaparte Gulf) Co Ltd 1994) that the high turbidity of waters within Joseph Bonaparte Gulf (the Gulf) ' improves markedly' north of Point Pearce. This would suggest that the discharge location is not under the influence of currents experienced in the lower sections of the Gulf (Teikoku Oil (Bonaparte Gulf) Co Ltd 1994). On page 50 of Appendix J Volume Two Technical Appendices Blacktip Environmental Impact Statement it is stated that " there are no specific current measurements in the region of the Blacktip development….". Considering the importance of the nearshore environment to traditional subsistence, will verification of modelled current movements be undertaken prior to discharge of hydrotest waters from the condensate or produced formation water discharge pipelines?

NTG 26b The wind data used as input to the model parameters utilises records for the years 2000 to 2003. For the purposes of running a robust model is the wind data sufficient to represent the typical of the wind regime for the nearshore area?

NTG 26a: Will verification of modelled current movements be undertaken prior to discharge of hydrotest waters?

Since undertaking the modelling and publishing the Draft EIS, measured current data have become available along the pipeline route. **Figure 2** to **Figure 13** presents the model verification plots. It can be seen that both modelled current directions and speeds compare favourably with measured data. The model is therefore deemed fit for the purpose of simulating the fate of discharges to the marine environment.

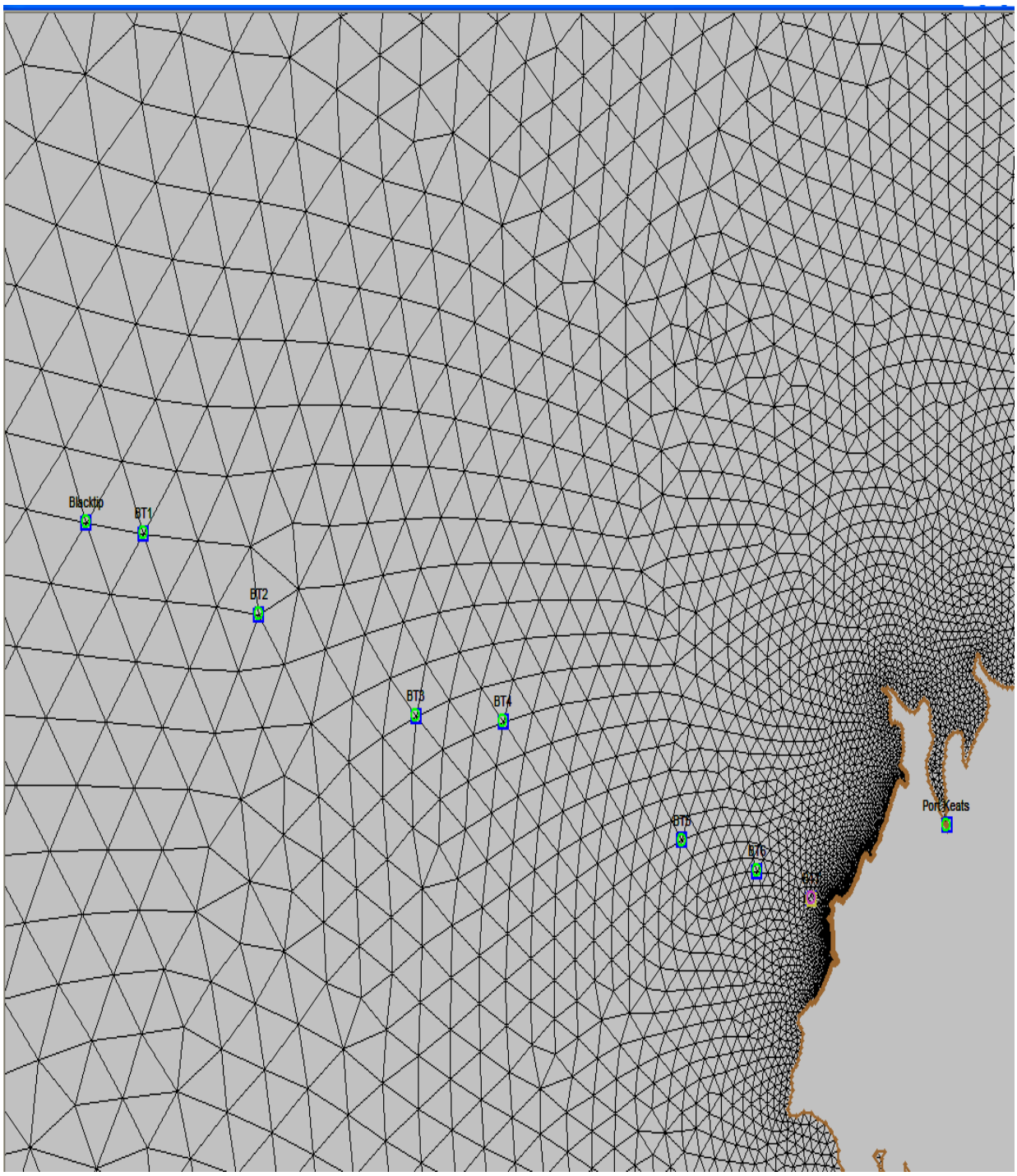
NTG 26b: Is the wind data used as input to the model parameters sufficient to represent the typical wind regime for the nearshore area?

Wind information for the study was sourced from the Bureau of Meteorology station at Port Keats. This is the best available information for the region of interest. Analysis showed that the record was consistent with average temporal weather patterns in the area and was therefore deemed fit for the purpose of the modelling.

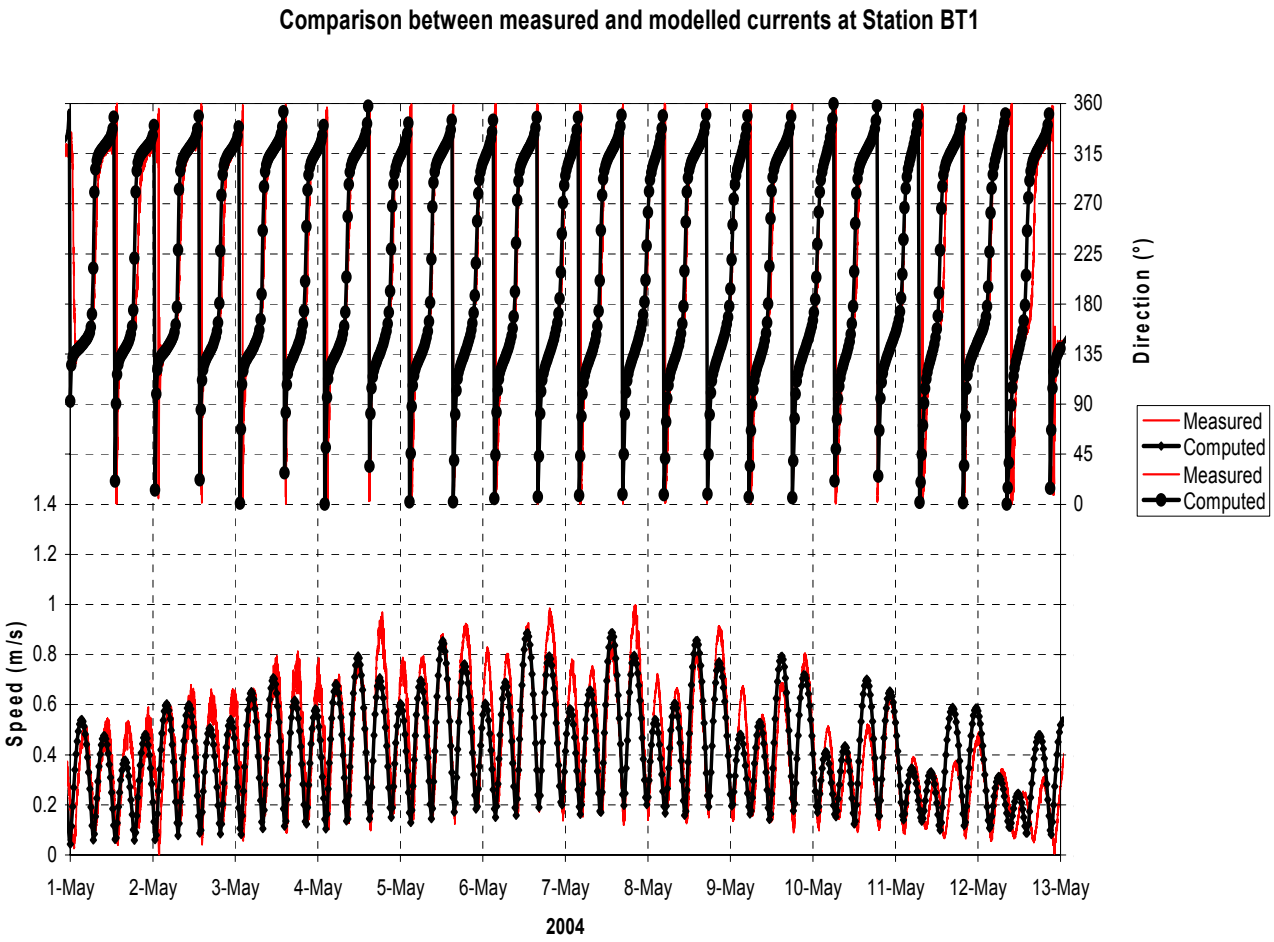
Inter-annual, variability of winds in the region can be linked to La Niña and El Nino events. La Niña and El Nino events are correlated with the Southern Oscillation Index (SOI). A moderate to strongly negative SOI (persistently below -10) is usually characteristic of El Niño, which is often associated with below average rainfall over eastern Australia, and a weaker than normal monsoon in the north. A moderate to strongly positive SOI (persistently above +10) is usually characteristic of La Niña, which is often associated with above average rainfall over parts of tropical and eastern Australia, and an earlier than normal start to the northern monsoon season.

A general review of wind speeds suggests that they are likely to be slightly stronger than average during strong La Niña events and slightly weaker during El Nino events. Over the last five years there has been a weak La Niña in 1999 – 2000 and a weak El Nino in 2003 – 2003. Port Keats therefore covers an El Nino event but misses a La Niña event.

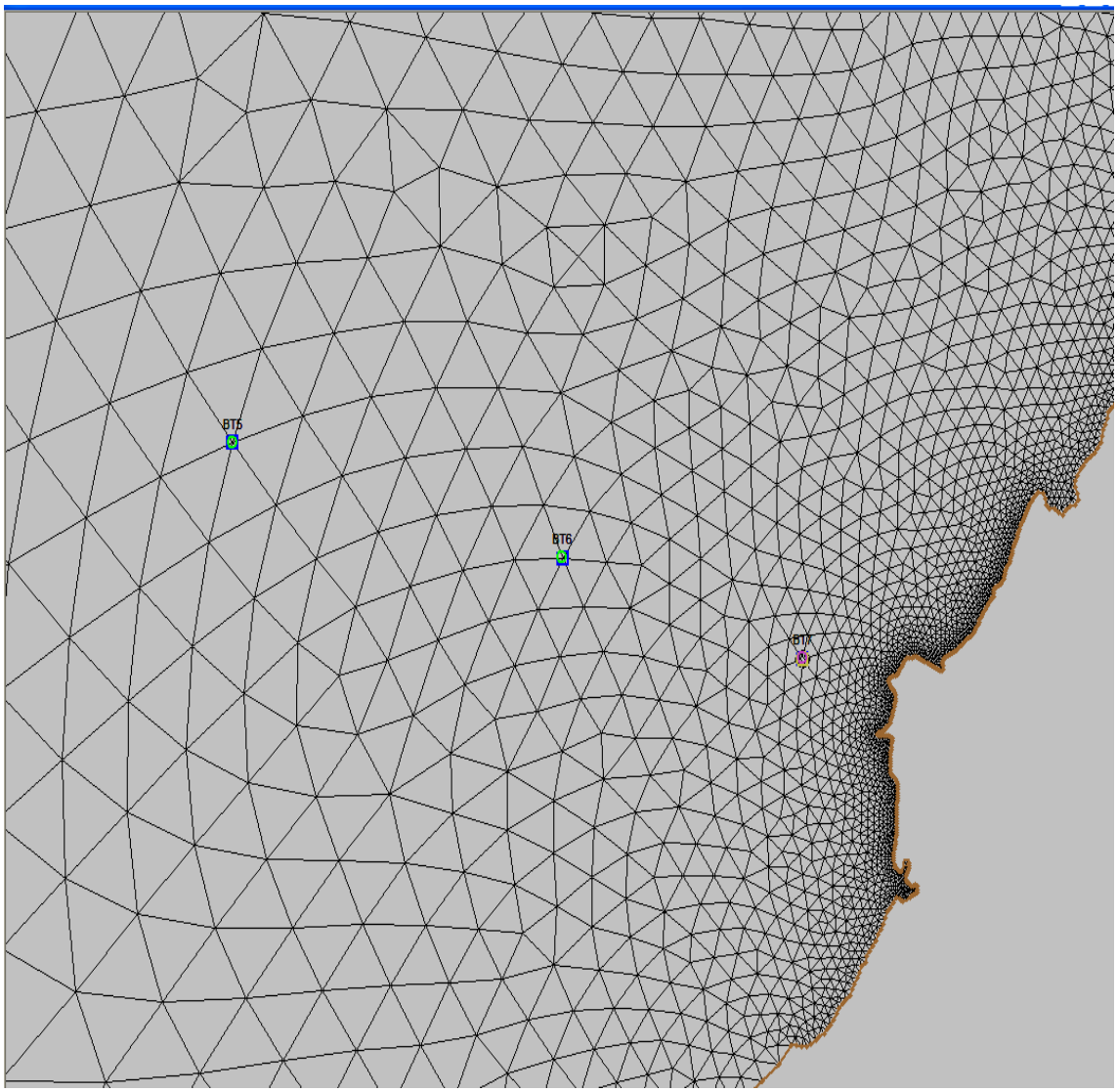
Inter-annual variability should not be an issue for the PW modelling, as onshore winds of low wind speeds were applied. These were deemed worst case for PW dispersion. It may be more of an issue for the stochastic oil spill modelling, however, due to the nature of the scenarios modelled it is not believed that a longer wind record would change the results or the conclusions from the modelling significantly.



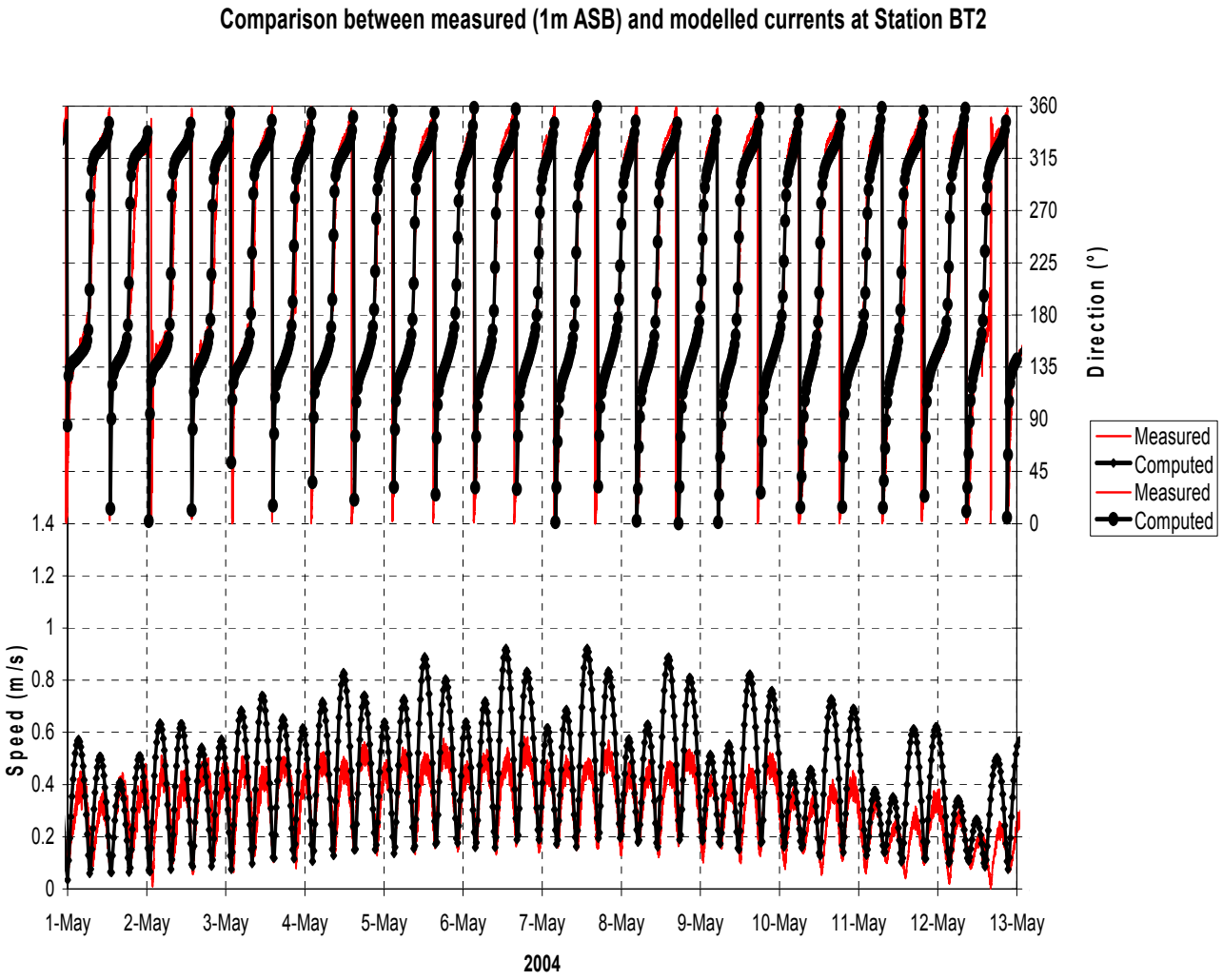
- **Figure 2 Current Meter Stations**



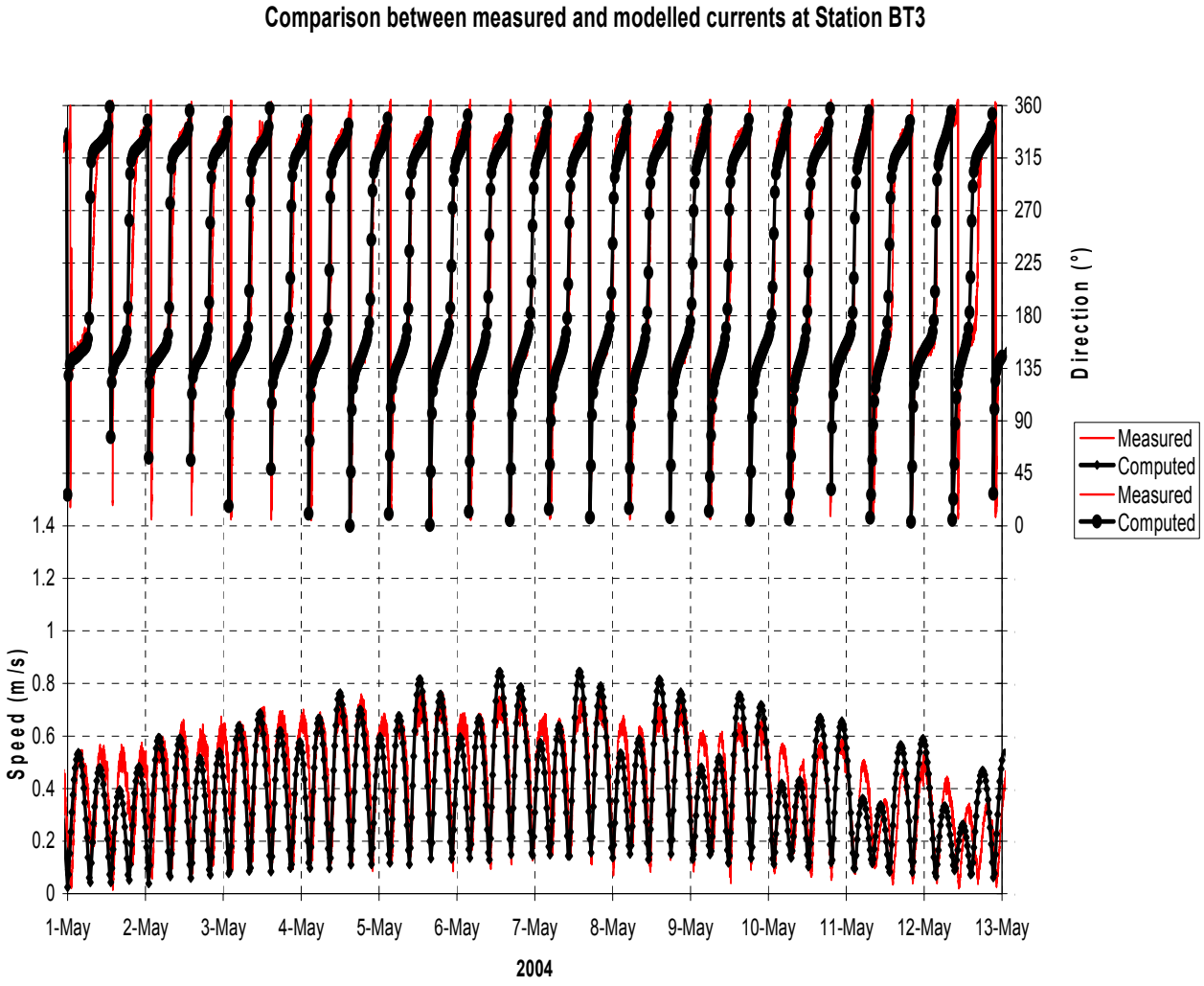
- **Figure 3 Location of Station BT7**



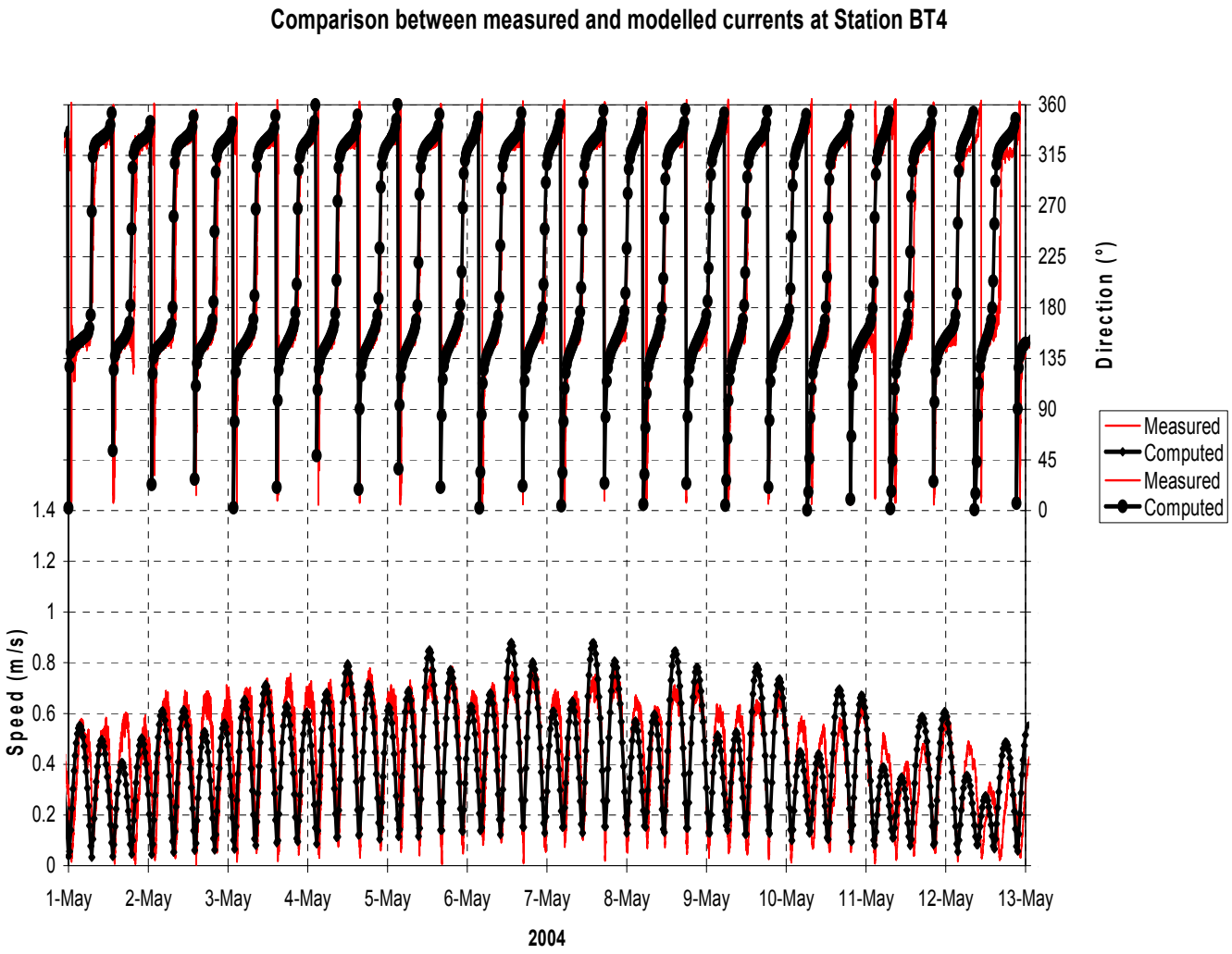
- **Figure 4 Comparison between Measured and Modelled Currents at Station BT1**



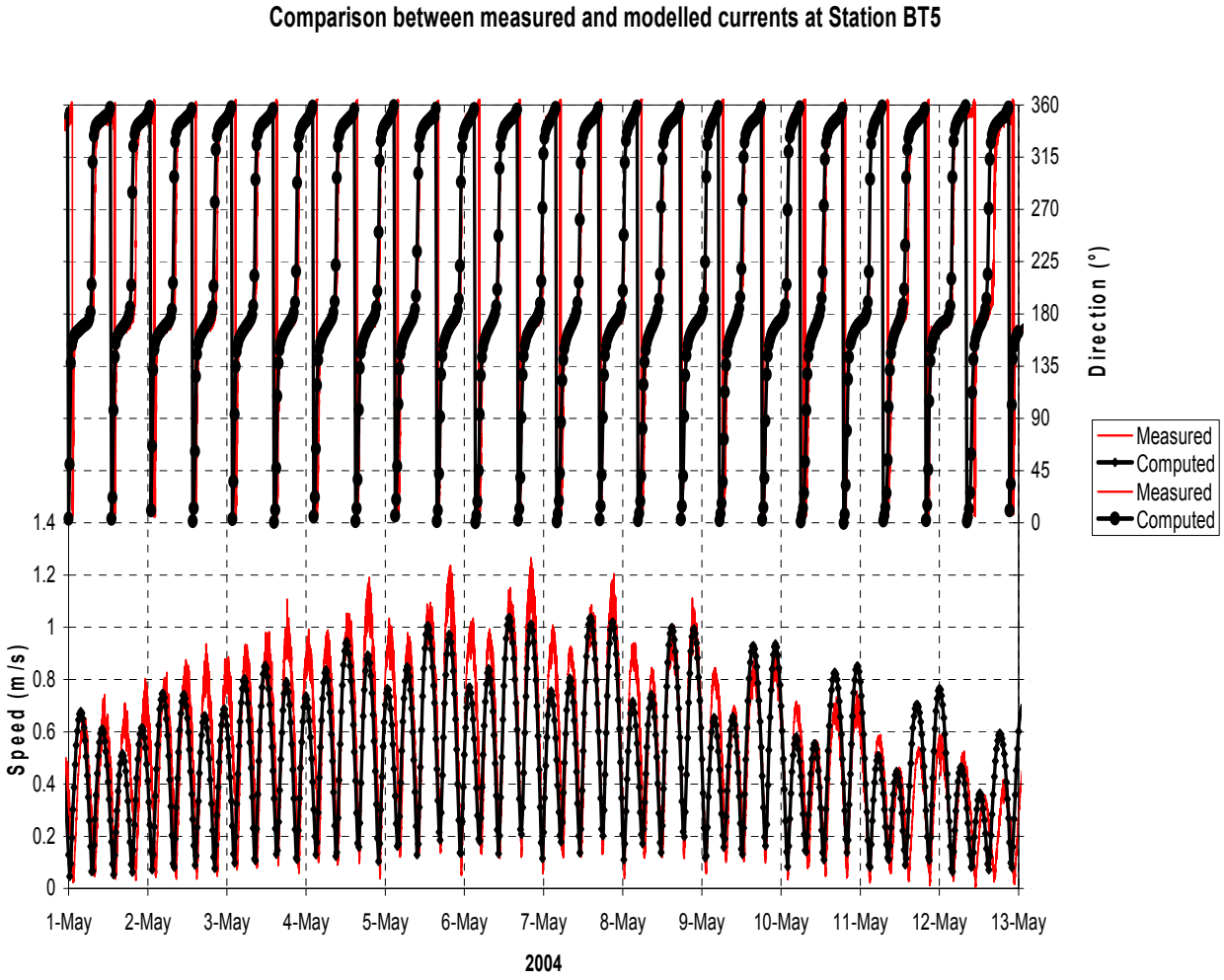
- **Figure 5 Comparison between Measured and Modelled Currents at Station BT2**



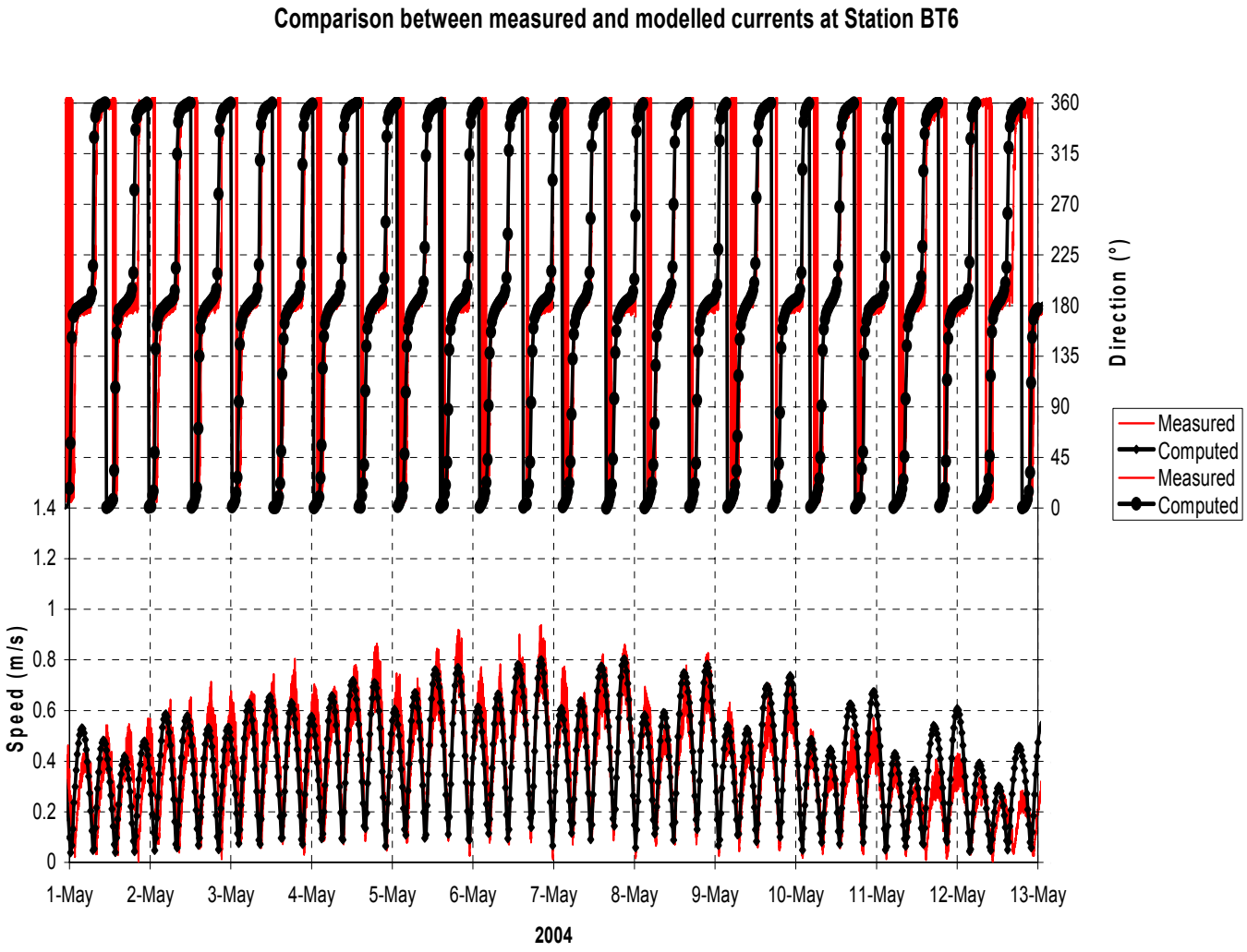
- **Figure 6 Comparison between Measured and Modelled Currents at Station BT3**



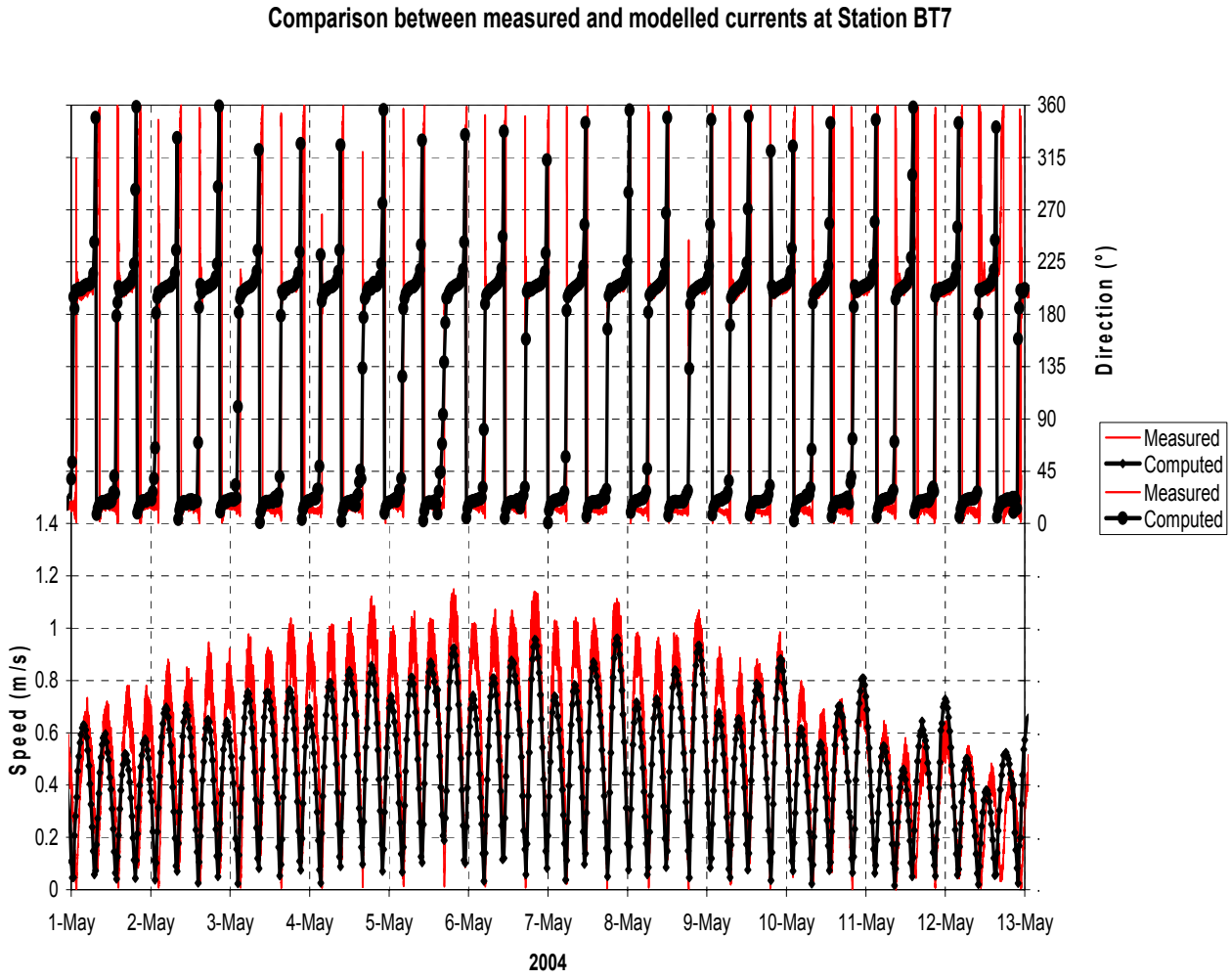
- **Figure 7 Comparison between Measured and Modelled Currents at Station BT4**



- **Figure 8 Comparison between Measured and Modelled Currents at Station BT5**



- **Figure 9 Comparison between Measured and Modelled Currents at Station BT6**



- **Figure 10 Comparison Between Measured And Modelled Current Stations at Station BT7**

Alternative discharge location

NTG 27: Has alternative locations and techniques for the disposal of produced formation water (PW) such as at the wellhead, land based disposal or onshore treatment prior to disposal been considered. The environmental sensitivities of the proposed discharge site and the importance of the area for traditional subsistence need to be taken into consideration. As an example hydrotest discharge could potentially be undertaken at the wellhead platform. The water depth and greater distance to environmental sensitive receptors reduce risk associated with the discharge of PW and hydrotest water at the wellhead platform in comparison to the nearshore outfall.

The EIS states that the risk posed by Process Water is low based on expected contaminant levels, treatment before release, volumes released and dilution. The EIS gives a commitment to characterise the contaminants of Process Water and assess its effect on the marine environment both off-shore and on-shore. These additional studies are required to confirm the minimal effect Process Water discharge is expected to have.

These waters will be treated with biocides and oxygen scavengers which have yet to be specified. The EIS states that a Pipeline Flooding and Hydrotesting Procedure and a Pipeline Pre-commissioning Procedure will be undertaken for review and approval prior to the commencement of hydrotesting. These procedures are required if discharge of hydrotest waters is to occur within NT jurisdiction.

NTG 27a: Discuss alternative locations and techniques for the disposal of PW.

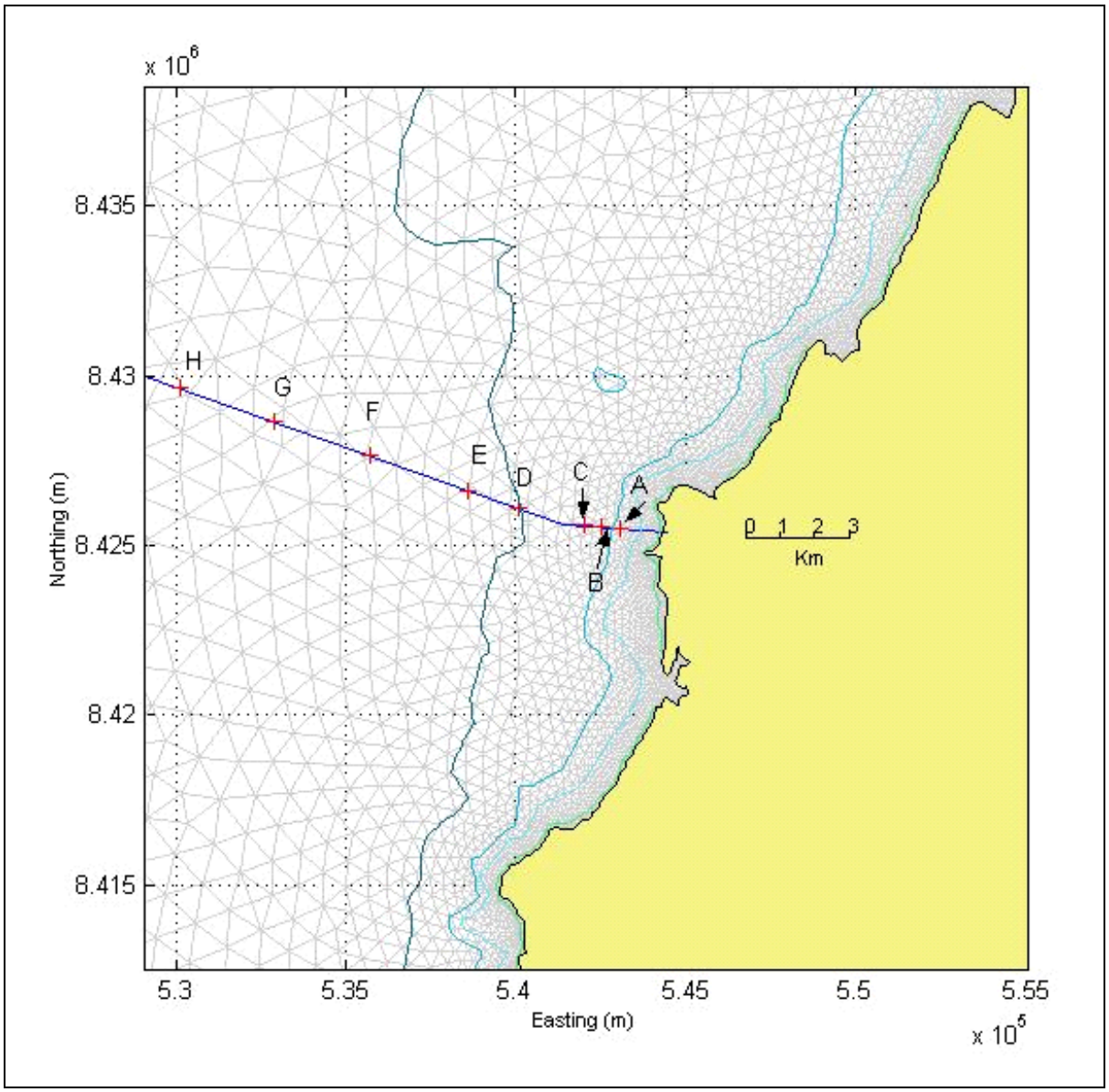
Discharge Location: The modelling assessed eight discharge locations in addition to the preferred option presented in the Draft EIS (**Figure 11**). This study, along with the information presented above, indicates that the preferred location provides sufficient dilution to reduce contaminant concentrations to below levels that could potentially cause harm to the marine environment. The study indicated that it was necessary to locate the outfall outside the nearshore gyre which may recirculate the PW into the bay. Both Locations B and C were found to be outside this gyre; however, for added safety the discharge location was moved further offshore to a similar distance offshore to the export mooring.

The locations beyond the export mooring showed similar dispersion patterns with the plume located progressively further offshore. Whilst these appear to offer greater protection, the PW will be treated to a level below which it could cause harm to the marine environment. The expense of extending the pipeline is therefore not warranted and will more effectively be spent on treatment.

NTG 27b: Characterise the contaminants of Process Water and assess its effect on the marine environment both off-shore and on-shore.

The reader is directed to the response to **NTG 40b**, **Section 8.2**.

- **Figure 11 Modelled PW Discharge Location**



NTG 27c: Pipeline Flooding and Hydrotesting Procedure and a Pipeline Pre-commissioning Procedure are required if discharge of hydrotest waters is to occur within NT jurisdiction.

Refer to response to **OEH 43** in **Section 7.4.2**.

7.5 Section 4.7 Production, Operation & Maintenance

7.5.1 Section 4.7.1 Offshore Production and Onshore Pipeline Operation

Onshore Export Pipeline

NTG 28: In paragraph two it is identified that the frequency of pigging and pipeline right of way inspections will be defined in the pipeline license. It is suggested that this information will be set out in the construction and operations pipeline management plans rather than within the pipeline license.

NTG 28: It is suggested that the frequency of pigging and pipeline right of way inspections be set out in the construction and operations pipeline management plans rather than within the pipeline license.

The Proponent acknowledges this comment. It is a requirement of the NT Energy Pipelines Regulations for the Licensee to develop and submit Construction and Operation Pipeline Management Plans and as such that information will be included in those plans.

7.5.2 Section 4.7.2 Onshore Gas Plant

Hydrogen Sulphide

OEH 27: Clarification is sought as to the presence of H_2S in the gas field and its likely consequences in terms of subsequent air emissions.

OEH 27: Clarification is sought as to the presence of H_2S in the gas field and its likely consequences in terms of subsequent air emissions.

The Blacktip gas contains up to 3 ppm(v) H_2S. Within the gas plant, gas will either be burnt as fuel or in the flare, and the H_2S will be emitted as SOx. The effect of SOx is detailed in **Section 12.6.2** of the Draft EIS. The H_2S in gas released due to fugitive emissions will be vented to atmosphere, this rate is estimated at less than 50 g/yr.

NLC 12: The Project Description section of the EIS does not provide details on the composition of the gas. It is understood that the nitrogen content of the Blacktip gas is around 8 %. While the document discusses CO_2 emissions, it doesn't consider the greenhouse implications of the nitrogen content of the gas, nor how greenhouse emissions could be reduced.

NTG 114: Please provide specifications for gas to be exported to Gove and processed condensate to be loaded at the offshore mooring.

NLC 12a: Provide details on the composition of the gas.

NLC 12b: Consider the greenhouse implications of the nitrogen content of the gas, and how greenhouse emissions could be reduced.

NTG 114: Provide specifications for the gas to be exported to Gove and the processed condensate to be loaded at the offshore mooring.

Nitrogen is not a greenhouse gas, and therefore the nitrogen content of the Blacktip gas has no greenhouse implications. The approximate composition/specification for the export gas and condensate are given in **Table 6**.

- **Table 6 Blacktip Condensate and Gas Composition**

Component	Condensate (mol %)	Sales Gas (mol%)
H_2O	4.91	0.00
CO_2	0.02	0.93
Nitrogen	0.00	8.10
Methane	0.14	87.07
Ethane	0.11	2.53
Propane	0.28	0.80
i-Butane	0.13	0.12
n-Butane	0.40	0.22
i-Pentane	0.38	0.06
n-Pentane	0.43	0.04
Hexanes*	1.39	0.05
Heptanes*	4.86	0.05
Octanes*	16.58	0.03
Nonanes*	16.50	0.00
Decanes*	17.45	0.00
Undecanes*	8.92	0.00
C12+*	27.48	0.00

Section 4.7.2.2 Excess Gas and Flare

OEH 80: Detailed results should be presented for the flare positioning.

ECNT 8: Some design details of the Project are not confirmed yet e.g the flare at the onshore gas plant (4.7.2.2. Excess Gas and Flare, p114).

OEH 80: Present detailed results for the flare positioning.

ECNT 8: Confirm design details for the project eg the flare at the onshore gas plant.

The primary function of the flare system is safety. In an emergency if it is necessary to depressurise the plant the flare provides a safe location for the burning of gas. As the design develops so will the design of the flare system which will be completed at the end of detailed design. Although details are yet to be decided the following can be confirmed:

- The gas plant will have a flare.
- It will be designed and sited within the gas plant boundary and take into account normal design practices to minimise its impact e.g. prevailing winds, noise levels.
- It is stated in the Draft EIS that, 'The flare will be designed so that the radiated heat from the flare flame in the worst case does not injure personnel or damage the plant'. As operations personnel will be closer to the flare than people outside of the plant boundary then by extension the flare will not injure members of the public.

Section 4.7.2.2 Excess Gas and Flare

NTG 29: It is stated that "there is potential for forward notice to be given to the local community of the timing and duration of gas flaring. Although infrequent, medium and large flames will be highly visible and may initially cause concern at the Wadeye Community. What measures will be taken to allay the Wadeye Community's initial concerns about medium & large flames? In addition the noise management plan should address informing local stakeholders of planned flaring.

NTG 29: Describe what measures will be taken to allay the Wadeye Community's concerns about medium & large flames from gas flaring?

As part of the ongoing consultation with the community the Proponent will provide further information on the flaring operations so that the community gains a better understanding of the role of the flare and the visible and audible characteristics of the flare.

The community will be notified in advance of routine maintenance flaring. It will not be possible to notify the community in advance of emergency flaring.

7.5.3 Section 4.7.4 Produced Water Treatment

Design

OEH 34: Design of the PW treatment system needs to account for more than just PW, given that it may also need to account for contaminated stormwater (Section 12.2.2). Clarification is sought as to whether the design has accounted for this and some quantification, if so.

NLC 40: Page 156- States that potentially contaminated stormwater will be mixed with the PW, treated and discharged via the PW pipeline. How will the potentially contaminated stormwater be identified, isolated and treated?

OEH 34: Clarify whether the PW treatment system has been designed only for PW or for other inputs as well.

NLC 40: How will the potentially contaminated stormwater be identified, isolated and treated?

Areas within the plant, in which equipment that contains liquid are located, are bunded to contain potential liquid spills. If a spill occurs it will be contained within the bund and cleaned up. The spilt chemicals not suitable for treatment in the PW system will be removed off site for treatment and disposal. When it rains there is potential for the rainwater to wash residual hydrocarbon

deposits into the drains system. Water from these bunded areas is classified as potentially contaminated water. The water from these areas is diverted to the first flush tank where hydrocarbons are removed and sent to the PW treatment system. The design currently accounts for 11 m^3/hr of potentially contaminated stormwater.

7.5.4 Section 4.7.5 Operational Access Routes

NTG 30: The proponent should assess the capacity of the Wadeye airstrip to handle competing usage and increased maintenance requirements?

NTG 30: Assess the capacity of the Wadeye airstrip to handle competing usage and increased maintenance requirements.

During operation, airstrip usage will be insignificant and have no impact on the current airstrip usage.

7.6 Section 4.8 Ancillary Systems, Facilities and Support

Onshore

NTG 31: The potable water supply shall comply with the NH&MRC Australian Drinking Water Guidelines 1996. Bore setbacks to onsite wastewater disposal shall be in accordance with the *Code of Practice for Small On-Site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent*.

The Proponent acknowledges this comment.

7.6.1 Section 4.8.2 Diesel and Chemical storage

OEH 47: Explanation is required regarding offshore and onshore storage of diesel and chemicals; description of fire-fighting chemicals; and, definition of "appropriate bunding," including citing of Australian Standards.

NTG 32: Offshore Storage: How will wellhead platform design incorporate spillage control techniques for chemical storage areas? Will biocide be stored on the wellhead platform?

Onshore storage: What mitigation measures will be taken to prevent soil contamination from spillages in the diesel drum storage area during the construction phase? Will there be any petrol stored onsite as there are issues with potential petrol sniffing at the Wadeye Community. Will the diesel and chemical storage comprise a secure compound?

NTG 88: Potential petrol sniffing is a concern for indigenous communities, therefore as a public health intervention fuel must be kept secure, particularly petrol. What measures will be taken to ensure that fuel is kept secure?

NTG 88: What measures will be taken to ensure that fuel is kept secure?

OEH 47: Explain further offshore and onshore storage of diesel and chemicals; fire-fighting chemicals and "appropriate bunding".

NTG 32a: How will wellhead platform design incorporate spillage control techniques for chemical storage areas?

NTG 32b: Will biocide be stored on the wellhead platform?

NTG 32c: What measures will be taken to prevent soil contamination from spillages in the diesel drum storage area during the construction phase?

NTG 32d: Will there be any petrol stored onsite and will the diesel and chemical storage comprise a secure compound?

Onshore

Chemicals & Diesel: The chemicals listed in the Draft EIS (**Section 4.8.2**, **Volume 1**) are indicative of the type of liquids to be stored. Appropriate bunding means that the bund will be of the correct dimensions to contain spills from each tank according to the properties of the stored substance in accordance with AS1940.

Construction diesel supplies will be stored in either proprietary double skin vessels or in lined bunded areas. All diesel and chemical storage and handling associated with the onshore components of the Blacktip Project during construction and operation will be undertaken in accordance with Australian Standard AS1940–1993– *the Storage and Handling of Combustible Liquids*. As defined under Section 3.2.6 of the standard, all chemicals and diesel will be contained as follows:

> The spillage catchment and clean-up facilities of the site shall be capable of handling at least 110% of the capacity of the largest tank, compartment or package in the area (Council of Standards Australia, 1993).

Furthermore, and in accordance with the standard, any areas where the Proponent will store or handle flammable or combustible liquids in excess of that described as "Minor Storage" (section 2 of AS1940–1993 "Minor Storage"), a license will be obtained by the local authority. Areas that are likely to handle flammable or combustible liquids in quantities greater than that described as "Minor Storage" (Section 2 of AS1940–1993 "Minor Storage"), will meet special requirements, which may include safety signage, fire extinguishers, spillage provisions etc.

Petrol: Every effort will be made to ensure petrol will not be used at the plant site, including security measures around fuel supplies. Construction diesel supplies will be stored in either proprietary double skin vessels or in lined bunded areas.

Fire Fighting chemicals: Fire fighting chemicals will be Aqueous Film Forming Foam (AFFF) chemicals that will be combined with firewater and used for fighting liquid pool fires, similar to those used by fire-fighters throughout Australia.

Offshore

Chemicals: Mono ethylene glycol (MEG) and corrosion inhibitor will be stored in atmospheric tanks. These tanks will be replenished via tote tanks. The tote tanks will be lifted onto the wellhead platform, connected to the storage tanks which will be filled by gravity drainage. Chemical loading areas will be bunded to contain any potential spills which will include the tote tank laydown area on the wellhead platform. There is no biocide storage on the wellhead platform.

7.6.2 Section 4.8.3 Cooling & Heating Systems

NTG 33: Onshore: Will there be any cooling towers that pose a *Legionella* risk to employees or the public? DHCS Environmental Health Darwin Rural office requests to be notified of these cooling towers as part of the Legionella Risk Management Strategy. Cooling towers must comply with the relevant Australian Standards.

NTG 33: Will there be any cooling towers that pose a Legionella risk to employees or the public?

There will be no cooling towers in the gas plant.

7.6.3 Section 4.8.8 Drainage Systems

NTG 34

Onshore: Open & closed drainage systems must be designed to minimise mosquito breeding onsite (refer Medical Entomology comment in Part 2 of this correspondence).

NTG 34: Open & closed drainage systems must be designed to minimise mosquito breeding onsite.

The Proponent acknowledges this comment and has made commitments to design stormwater drains with erosion control structures to minimise ponding water, and to actively manage standing water in bunded areas (**Section 12.4.1**, **Volume 1** of the Draft EIS). Inspections to remove any man-made breeding sites will occur weekly during construction and monthly during operation.

7.6.4 Section 4.8.9 Sewage and Putrescible Waste

NTG 35: The proponent alludes to the use of the Wadeye landfill for disposal of the sludge from the permanent sewage treatment facility. This facility is unlikely to be suitable. There needs to be more detail provided as to alternatives should this concern be realised. In addition what options have been considered in determining the use of Wadeye Landfill as the preferred disposal option. For example:

- Has consideration been given to transporting primarily treated sewerage to the Wadeye sewerage treatment plant as a temporary measure? What system is intended for use during the operational stage conventional septic tanks or alternatives treatment systems?

- It is stated that "all sewage systems will be approved by the Northern Territory Health Department". Any sewage treatment systems used during the construction and operational phases must comply with the requirements of the *Code of Practice for small on-site sewage and sullage treatment systems and the disposal and reuse of sewage effluent.*

NTG 35a: Provide details of alternative disposal solutions should the Wadeye Landfill be unsuitable for disposal of the sludge from the permanent sewage treatment facility.

NTG 35b: What options have been considered in determining the use of Wadeye Landfill as the preferred disposal option?

The project will have a proprietary packaged unit wastewater treatment plant which will produce very little solids. It is proposed to use the Wadeye sewage treatment facility for the disposal of solids. If this is not acceptable, then the solids will be backloaded to Darwin for disposal.

7.7 Section 4.9 Decommissioning

Decommissioning

NTG 8: It is suggested that the ability to completely remove all project infrastructures at the decommissioning stage is included as a primary design criterion in the Front-End Engineering Design stage. See discussion in Section 4.9 of this review.

NTG 36: It is stated on page 130 that decommissioning is considered on a case by case basis at the time of expiration of the permit, license or lease. Planning for decommissioning of the wellhead platform, pipeline and onshore plant should be considered in the front end engineering design to ensure continual refinement over life of project and ensure "unexpected surprises" are resolved in advance of closure. This planning could include financial provisioning in advance of closure and the evolving nature of industry best practice. As an example;

Resolution A.672 (16) of the International Maritime Organisation 1989 'Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone', Standard 3.13 states:

"On or after 1 January 1998, no installation or structure should be placed on any continental shelf or in any exclusive economic zone unless the design and construction of the Installation or structure is such that entire removal upon abandonment or permanent disuse would [be] feasible".

OEH 65: The only option presented in the Draft EIS is for the pipe network to be left in place at the decommissioning phase (Section 4.9). The Supplement should consider the option that infrastructure is totally removed.

NTG 38: Resolution A.672 (16) of the International Maritime Organisation 1989 'Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone', Standard 3.1 states: " *All abandoned or disused installations or structures standing in less than 75m of water and weighing less than 4,000 tonnes in air, excluding the deck and superstructure should be entirely removed*." Standard 3.2 of the above resolution states "*All abandoned or disused installations or structures emplaced on the seabed on or after 1 January 1998, standing in less than 100m of water and weighing less than 4,000 tonnes in air excluding the deck and superstructure shall be entirely removed*."

It is suggested that Woodside consider these and other identified standards during front end and detailed engineering design phases.

ECNT 10: It very much sounds like the offshore platform will be dumped at sea ('decommissioned') – see 4.9.4 Wellhead Platform, p130-131. The options are given as either dumping in deep water as an 'artificial reef' or leaving on-site with the top removed. Both options will permanently alter the marine environment, which is unacceptable. The platform must be completely removed. Yet there is no discussion of this option in the EIS.

NLC 38: Page 130 It may be best to remove some pipelines when decommissioning, for example the pipeline at the shore crossing, particularly if it could be exposed due to erosion later.

NTG 8: It is suggested that the ability to completely remove all project infrastructures at the decommissioning stage is included as a primary design criterion.

NTG 36: Decommissioning should be considered in the front end engineering design to ensure continual refinement over the life of the project.

OEH 65: The Supplement should consider the option that pipe network infrastructure is totally removed.

NTG 38: It is suggested that Woodside consider Resolution A.672 (16) of the International Maritime Organisation 1989 and other identified standards, during front end and detailed engineering design phases.

ECNT 10: The platform must be completely removed. Yet there is no discussion of this option in the Draft EIS.

NLC 38: Consider removing some pipelines when decommissioning, for example the pipeline at the shore crossing, particularly if it could be exposed due to erosion later.

Decommissioning Plan: As stated in **Section 4.9.1**, **Volume 1** of the Draft EIS, the Blacktip Project will be decommissioned in accordance with legislation and guidelines prevailing at the end of the project, and in consultation with relevant stakeholders and regulatory authorities. Decommissioning will require regulatory approval under PSLAMER and assessment under the EPBC Act, as outlined in **Section 4.9.2**, **Volume 1** of the Draft EIS. Decommissioning will be considered to the extent that is feasible during the detailed design phase.

A Decommissioning Plan will be drawn up (Blacktip Project Commitment No. 56, **Table 15-2** of the Draft EIS) which will address all onshore and offshore infrastructure. The first preliminary plan will be drafted during the construction phase and will require approval by regulatory authorities. Financial provisioning, timing and rehabilitation will be considered to the level of detail that is possible in the preliminary decommissioning plan and those plans that will follow suit.

Rehabilitation Management Plan: A detailed Rehabilitation Management Plan will be developed based on the Framework Rehabilitation EMP (**Table 15-15** of the Draft EIS). This will address rehabilitation of all temporarily disturbed sites onshore such as laydown areas, campsites and storage areas.

Wellhead Platform: Although not specifically stated in the Draft EIS, the Proponent commits to look at all reasonable decommissioning options, including the total removal of the wellhead platform, well in advance of decommissioning to ensure all relevant environmental implications have been adequately addressed in accordance with prevailing legislation. It is expected that the removal of the wellhead platform will be the reverse of installation: the topside connection cut; topsides lifted off, piles cut at seabed level and the jacket lifted. Removal of the proposed offshore installations as per the 'Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone' (IMO 1989) will be investigated along with other decommissioning guidelines and standards during development of the Decommissioning Plan.

Offshore Pipeline: In terms of removal of the pipeline along its complete length, it is believed that this option is feasible. However, a decision would need to be based on a robust risk assessment, which examines increased risk profile that results from removal of the pipeline versus it remaining in-situ. The industry standard practice for decommissioning similar pipelines in similar environments will also be considered in this assessment. This will be addressed as part of the Pipeline License approval process, which requires a Pipeline Management Plan that satisfactorily addresses the decommissioning proposal.

The current proposal for export pipeline decommissioning is that the pipeline will be cleared of residual hydrocarbons and pressurised with inert nitrogen gas to accommodate potential future use. The trenching, concrete coating and anti-corrosion coatings will ensure the long-term stability and useability of the pipeline. Should no further use of the pipeline be foreseen, it will be flooded with seawater to provide additional stability. Given the extensive trenching proposed over much of the pipeline and the natural backfill of the trench that will invariably occur over time, it is not currently considered environmentally desirable to attempt the removal of the pipeline.

Shore Crossing: The Proponent has conducted an extensive coastal erosion assessment study of North Yelcher beach (WorleyParsons 2004) to determine long-term mobility of the shoreline and erosional processes that may occur. The current trench design in the shore crossing area is based on installing the pipeline down to a level below this 'active' zone so the pipeline is not exposed on the beach in the long-term. To partially remove some of the pipeline, particularly at the shore crossing, is a hazardous activity and may result in a small amount of hydrocarbons escaping into this sensitive area as well as extensive civil and construction work which will also disturb the area.

7.7.1 Section 4.9.2 Offshore Approvals Framework

NTG 37: It is stated 'that the regulatory authority has prime responsibility for the coordination, consideration and approval of decommissioning activities under the P (SL) A.' (pp 131 Woodside, 2004). The regulatory authority is principally concerned with consideration of decommissioning options and acceptance/approval of decommissioning activities under the *Petroleum (Submerged lands) Act 1967* and its associated subordinate legislation. The role of the regulator in coordination of decommissioning extends to the timely provision of approvals to conduct the activity. Coordination of activities is the responsibility of the operator at the time of decommissioning.

NTG 37: The role of the regulator in coordination of decommissioning extends to the timely provision of approvals to conduct the activity. Coordination of activities is the responsibility of the operator at the time of decommissioning.

The Proponent acknowledges this comment.

7.7.2 Section 4.9.5 Export Pipeline

NTG 39: An option not discussed in the EIS is if other facilities built in the future are using the pipeline as a common carrier at the time of decommissioning the Blacktip facility. This is a distinct possibility given the interest in gas reserves within the Joseph Bonaparte Gulf and future gas supply requirements for Darwin/Northern Territory. Consideration should be given to this possibility and how decommissioning requirements outlined in the EIS may be impacted. The potential for the development of other petroleum facilities in the Joseph Bonaparte Gulf and their importance to the future energy demands for Darwin/Northern Territory is identified and acknowledged in dot points 2 and 3 on pp 136 Chapter 5 of the EIS.

NTG 39: Discuss the option of decommissioning the Blacktip facility if other facilities are using the pipeline as a common carrier.

The possible use of the pipeline as a future common carrier has to be determined by the Proponent as part of the economic assessment of the Blacktip development and the level of pre-investment it wishes to make in this regard. The Proponent does not believe that possible use of the pipeline as a future common carrier would affect the approved Decommissioning Plan apart from potentially the timeline for this.

The offshore export pipeline will transport Blacktip gas and may potentially transport third party gas under contractual arrangements with the Proponent. The Proponent will maintain the infrastructure while these contractual obligations are in place.

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8. Draft EIS Section 5 Alternatives

8.1 Section 5.1 Introduction

EPBC Matters

Discuss impacts on NES matters.

Discuss impacts on NES matters.

The NT Government Guidelines for the Draft EIS requested that, 'A comparative description of the impacts of each alternative on the matters protected by the Controlling provisions (under the EPBC Act) for the action' was provided in the Draft EIS.

Broadly speaking the potential impacts on matters protected under the EPBC do not vary significantly with each of the alternatives under consideration for the Blacktip Project. Both options initially under considerations (onshore versus offshore processing) required offshore infrastructure, pipeline to shore and some form of onshore infrastructure. The main difference between the alternatives considered was the condensate process and export options. Under the preferred alternative option (onshore processing) condensate is to be brought onshore, separated from the water and gas and exported by cargo tankers via a export mooring located approximately 3 km offshore. Under the offshore processing option condensate would have been separated from the gas offshore and exported from the wellhead platform to cargo tankers. Therefore the potential source of impacts on matters protected under the EPBC Act are restricted to the variations in condensate storage and export.

A number of alternatives were assessed in the Draft EIS including:

Wellstream Processing: As both offshore and onshore processing still require the construction of a pipeline to shore EPBC matters are still triggered.

Location of Production Wells and Wellhead Platform: The alternative offshore locations considered have no environmental sensitivities associated with them including EPBC matters.

Subsea Export Pipeline Route: The preferred route has no environmental sensitivities associated with it including EPBC matters.

Pipeline Shore Crossing: The pipeline landfall location selected is known to have nesting turtles but these are relatively few in number (tens). Cape Dombey was also assessed in terms of a pipeline landfall location. This location has a number of offshore reefs which would have resulted in a longer pipeline route.

Alternatives to Proposed Actions

OEH 62: Alternatives to proposed actions should be provided throughout. These include condensate storage, the degree of trenching along the pipeline route, produced water treatment and disposal, accommodation for those not stationed on the lay-barge, guaranteed access to groundwater and certainty in the extraction capability of the proposed aquifers.

OEH 62: Alternatives to proposed actions should be provided throughout.

The Proponent acknowledges this comment. Where possible practical alternatives have been considered and presented in the Draft EIS. The majority of Alternatives were presented in **Section 5**, **Volume 1** of the Draft EIS. However, where options are still under consideration these are discussed throughout **Volume 1**.

8.2 Section 5.3 Wellstream Processing

Onshore as Opposed to Offshore Processing

NLC 14: The EIS compares the technical arrangements for both onshore and offshore processing but does not compare the two options from an environmental impact perspective.

NLC 14: Compare onshore and offshore processing from an environmental impact perspective as well as a technical perspective.

There is only one feasible processing option from a technical and economic perspective for the Blacktip Project; this the preferred option (onshore processing) which is presented in the Draft EIS. Therefore comparing alternative processing options from an environmental perspective is immaterial. The Proponent believes that the focus should be on achieving the best environmental outcome from the preferred option.

OEH 63: The need for an onshore flare is questioned if off-shore gas processing is undertaken (Section 5.3.1). The flare could potentially be positioned on the wellhead platform, eliminating the need for a 64ha compression station site.

OEH 63: The need for an onshore flare is questioned if offshore gas processing is undertaken.

The size of the onshore compression station is not determined by the flare. The primary function of the flare is as the 'last line of defence' to protect equipment from overpressure. As such the flare needs to be located relatively close to the equipment that it protects; a flare 110 km away on the wellhead platform could not protect the onshore compression station.

8.2.1 Section 5.3.4 Summary

NTG 40: From an environmental risk perspective offshore processing of wellstream fluids would be the preferred option. Discharge of PW at the wellhead platform would pose reduced risk to the nearshore marine environment due to the physical separation of chemicals of concern relative to sensitive environmental receptors. Processing and storing condensate offshore also minimises risks associated with oil spills in the nearshore environment. If processing were to take place offshore the costs associated with condensate processing and storage offshore would be offset by the reduced requirement for processing infrastructure onshore and further reductions in costs and disturbance related to the swamp mooring. Risk is further reduced by removing any events related to unplanned hydrocarbon discharges into the marine environment.

Though modelling (Appendix J) has indicated that the impacts of PW on the nearshore environment are acceptable, it is not critical that PW be discharged at the nearshore location. The main driver in relation to the onshore processing option is project economics. A rational on the weighting's given to the selection criteria should be provided within the text. PW contains more constituents of concern than hydrocarbons. Process chemical and potential radioisotopes will also entrained in PW. It is requested that further consideration be given to the impacts of the nearshore PW pipeline outfall in the long term? This should include potential for bioaccumulation in lower trophic levels and the potential for tainting of traditional subsistence fisheries.

NTG 40a: Provide a rational on the weighting's given to the selection criteria for processing of well stream fluids within the text.

Full offshore processing of condensate and gas is prohibitively expensive, as the cost associated with processing condensate offshore is not offset by the reduced cost of the onshore facilities. Therefore the processing option presented in the Draft EIS is the only economically feasible alternative option to the selected case. As discussed in the Draft EIS the re-injection of the condensate is unacceptable to the regulators, and so this option was eliminated.

The reader is also directed to the response to Question **NLC 5f** for information on the composition and impacts from PW.

NTG 40b: Provide further consideration to the long term impacts of the nearshore PW pipeline.

PW Characteristics: The Proponent has been operating on the Australian North West Shelf and in the Timor Sea since 1984 and has an in-depth knowledge on the characteristics, toxicity, fate and potential long term impact of PW discharged to the marine environment. IRCE (2004) presents a summary of Woodside's present understanding of PW.

One of the major advantages for Blacktip is that treatment of the PW will be onshore meaning that there will not be the space restriction of an offshore facility. It is not possible to design the treatment plant until the exact characteristics of the PW from the wellstream are known.

Based on knowledge of other PW in the region and also worldwide, it is likely to contain trace concentrations of:

- dissolved petroleum hydrocarbons;

- phenols;
- organic acids;
- heavy metals;
- radioisotopes;
- residual process chemicals.

Dissolved Petroleum Hydrocarbons: Dissolved oil in PW is made up predominantly of:

- aliphatics;
- BTEX compounds;
- low molecular weight PAHs.

Due to their solubility, these components will dilute readily into the receiving water and be dispersed by the ambient currents. They are also volatile and given the opportunity will preferentially partition into the gaseous phase, which means that they will evaporate on contact with the atmosphere. They do not adsorb strongly to suspended particles so are unlikely to be transported to the seabed.

PAHs are the petroleum hydrocarbon of greatest environmental concern in PW because of their toxicity and persistence in the marine environment (Neff 1987). The wide range of solubilities and partition coefficients exhibited by the different PAHs means that they exhibit a wide spectrum of behaviour (Neff, 2002). Lower molecular weight PAHs (naphthalene, alkylnaphthalenes, fluorene and phenanthrene) are soluble and therefore end up in the produced formation water. Higher molecular weight PAHs are less soluble and are expected to remain in the oil phase and should not be discharged with the PW. Studies undertaken by Woodside only ever detected low concentrations of napthalene (0.670 mgL^{-1}), phenanthrene (0.0180 mgL^{-1}) and fluorene (0.021 mgL^{-1}). Biodegradation half lives range from 1.5 days for naphthalene, 17 days for two to three ring PAHs and 350 days for more than four ring PAHs (Johnsen et al. 2000).

Bioaccumulation Potential: Aliphatic hydrocarbons and BTEX compounds have a very low potential for bioaccumulation. In contrast, there is moderate potential for the low molecular weight PAHs to bioaccumulate. However, concentrations of PAHs in the receiving waters for Blacktip with dilute rapidly and remain low enough to prevent this occurring.

Phenols: PW may contain high concentrations of phenol and alkyl phenols. Phenol is a natural ingredient of the ocean being synthesised by a wide variety of plants and microbes. It is also a product of plant material degradation. These compounds are highly soluble and will dilute and degrade rapidly following discharge of PW to the ocean. The combination of dilution, bio– and photo-degradation and evaporation will produce a rapid decline in dissolved phenol concentrations in the water column with distance from the PW discharge. It is unlikely that marine organisms would encounter concentrations above the toxic threshold. Phenol does however have the potential to impart taint and odour to edible tissue at relatively low concentrations. It is shown in **Table 14**

that concentrations likely to be found in the receiving waters for Blacktip will be below the level likely to cause taint.

Organic acids: Organic acids biodegrade rapidly in the ambient sea water and so are unlikely to be important contributors to toxicity of PW in the ambient environment (Neff 2002). However, many studies attribute the acute toxicity of PW to organic acid concentrations (Denmark 2001). These studies use ecotoxicology results from freshwater species which have high toxicity values. These high values are likely to be due to a pH effect rather than the actual toxic effect of the compound. Natural seawater is a buffer solution and acidity will be quickly neutralised. Organic acids are therefore not considered to be toxic in the marine environment.

Heavy Metals: Heavy metal concentrations are generally low in PW and are generally present as dissolved mineral salts. Reservoir water is anoxic and the metal ions are typically in low oxidation states. However, when brought to the surface and exposed to the atmosphere they oxidise. The metal oxides then combine with anions such as sulphides, carbonates and chlorides and form insoluble precipitates.

Dilution in the receiving environment reduces them to background levels and well below chronic toxic thresholds. When they form precipitates, there is the potential for build up in the sediments, however, the quantity will be so low and the spread across the seabed so wide that the environmental impact will be insignificant.

Radioisotopes: Upon discharge of PW to the ocean, radium is rapidly co-precipitated with barium sulphate. Radium concentrations in ambient water near PW discharges are rarely higher than background levels. Toxic concentrations are well above the saturation concentrations of radium in sulphate-rich seawater. Marine animals are highly tolerant to low-level radiation as might occur in the traces of radium isotopes in the vicinity of PW discharges. Radium, because of its low concentration in solution in seawater, has a low bioavailability to marine organisms. There is also no evidence that radium accumulates in sediments or marine animals (molluscs, crabs and fish) living in the vicinity of offshore PW discharges (Neff 2002).

The Brookhaven National Laboratory performed a human health risk assessment for radium in PW discharged to the northwestern Gulf of Mexico. It concluded that radium in PW represents a minimal risk to even the most sensitive workers (platform crew and recreational fishermen) who consume fish from the vicinity of PW discharges (Brookhaven National Laboratory (1992) cited in Neff (2002)).

Process Chemicals: The process chemicals that may be added at the gas plant are:

- corrosion inhibitor;
- methanol/Mono Ethylene Glycol;
- demulsifier/coagulant.

Both the corrosion inhibitor and the methanol are water soluble so the majority of these additives will end up in the PW discharge. On discharge to the marine environment, dilution will be the main factor reducing concentrations.

Corrosion Inhibitor: Corrosion inhibitor will be added to the produced fluids in order to protect the production system from corrosion. **Table 7** provides a list of corrosion inhibitors recommended from a detailed study aimed at selecting environmentally acceptable chemicals for Blacktip (de Reus 2004).

Table 7 also includes their dose rate and hazard quotient (HQ) for each chemical. The hazard quotient, calculated using the CHARM model, provides an indication of the likelihood of adverse effects occurring due to the use and discharge of the chemical under a realistic worst-case scenario. An environmental effect can be expected if the HQ is greater than one. As seen in **Table 7** the HQ ranges from 0.045 to 0.977. All four chemicals are therefore environmentally acceptable.

- **Table 7 Recommended Corrosion Inhibitor Chemicals**

Supplier	Inhibitor	Dose rate (L/day)	HQ (hazard quotient)
Baker Petrolite	CRW-85155	50	0.977
Champion-Servo	CK-981	25	0.239
Champion-Servo	CK-988	100	0.045
Nalco	EC-1440A	50	0.130

Methanol/Mono Ethylene Glycol: Methanol will be injected upstream of the chokes on the offshore platform to prevent hydrate formation on cold start-ups. The injection rate will be around 20–40 L/hr for a short duration (hours).

Methanol (or possibly Mono Ethylene Glycol) may also be injected at the onshore plant in the gas processing facility for hydrate control. This would likely be injected only occasionally upstream of the Low Temperature Separator (LTS) and so some will remain in the liquid leaving the LTS and end up in the condensate processing train, and therefore the water treatment process.

Methanol is miscible in water, non-carcinogenic and poses little long term risk to the environment. It is, however, a strong reducing agent and, in the short term, has the potential for depleting oxygen in the receiving waters.

Demulsifier/coagulant: Demulsifier/coagulant will be injected in the water treatment facility to aid in the operation of the gas flotation unit. Most, if not all, of this will be removed as skimmings from the unit and will therefore not enter the PW.

8.3 Section 5.6 Pipeline Shore Crossing Location

NTG 41: Page 142 (and Appendix B). 'No offshore reefs'. This statement is contradicted by the finding of coral (specifically gorgonians) assemblages at site Pipeline 11 (Section 7: 177; Appendix B: 37). The fact that more were not collected reflects the use of an inadequate hard bottom-sampling device. A rock or scallop dredge should have been used. The report states (Page 141-2) that the proposed shore crossing site offered:

"… the most flexibility in the event that minor deviations to the off-shore components are made. Wadeye offers a better alignment than the Trans Territory Pipeline and the shorter off-shore route with no off-shore reefs".

This is contradictory as the EIS indicates that the **WALPINHTHI REEF** may be endangered by trenching activities and mooring anchors. The report should list the efforts made to avoid damage to the **WALPINHTHI REEF** site when the shore crossing location was decided upon.

NTG 41a: The statement 'No offshore reefs' is contradicted by the finding of coral (specifically gorgonians) assemblages at site Pipeline 11.

The finding of two small gorgonian corals (<20 cm) is not evidence of an offshore reef for two reasons.

Firstly, gorgonians belong to the order Alcyonacea, which includes soft corals, and are not reef building corals. Reef building corals, order Scleractinia, possess zooxanthellae (symbiotic unicellular algae) which enable the corals to develop a calcium carbonate skeleton and form reefs. By contrast, gorgonians possess a skeleton made of a protein called gorgonin which is not capable of building reefs. Refer to response **NTG 71** (**Figure 12**, **Section 14.1**) for a photograph of a gorgonian coral.

Secondly, the small gorgonians recorded from site Pipeline 11, located approximately 4 km offshore from the shore cross location (**Figure 1**, **Volume 2 Appendix B**) were found in coarse, sandy sediments attached to small rocks (refer to **Appendix C** 'Sediment Particle Size Distribution' in **Appendix B**, **Volume 2** of the Draft EIS). The gorgonians were not attached to a hard seabed or reef. Unlike reef building corals, most gorgonians do not possess zooxanthellae so they do not require clear water and sufficient light to support zooxanthellae. As a result, many gorgonians occur in deep or turbid water and a number occur on sandy sediments attached to small rocks.

Benthic grabs operate using two metal jaws that take a bite out of the seafloor sediments and enclose the sample, which is then winched back to the boat for processing. While a grab is an inadequate hard bottom-sampling device because the jaws can not penetrate hard substrates, a grab is an appropriate device for sampling soft sediments such as those found at site Pipeline 11 where the gorgonian coral was found. Hard bottom-sampling devices (including rock or scallop dredges) ideally would have been used to sample the nearshore reef and are discussed further in the response to **NTG 106h** (**Section 20.2**).

In summary, there are two types of reefs: coral reefs made by corals and rocky reefs where hard substrates occur. The Walpinhthi Reef and the nearshore reef are not 'environmentally sensitive' coral reefs but are rocky reefs (refer to response to **NTG 106h** (**Section 20.2**). The finding of two small gorgonian corals during the survey does not support evidence of either type of reef (coral or rocky) as gorgonians are not known to comprise reef building species and the collected specimens were living on sandy sediments. The presence of the nearshore rocky reef was not confirmed until the results of the geotechnical and geophysical investigations were completed late in 2004 (Fugro 2004) (refer to response to **NTG 106g** (**Section 20.2**). Therefore at the time of writing the Draft EIS the statement that 'No Offshore Reefs" were present along the preferred alignment was understood to be correct. This statement should now be updated to reflect the more recent survey information to state, 'Wadeye offers a better alignment with the TTP, and a shorter offshore route with no offshore coral reefs and a single nearshore rocky reef'. Even with the presence of this nearshore rocky reef the Wadeye alignment is still significantly better than the Cape Dombey alternative (p.142), as the latter is characterised by several offshore reefs.

As outlined in the response to **NLC 15** (**Section 10.2.2**), the epibenthic ecology of intertidal and nearshore reefs in the Joseph Bonaparte Gulf is considered to be depauperate.

Sampling methods are discussed in response to **NTG 106g** (**Section 20.2**).

NTG 41b: List the efforts made to avoid damage to the Walpinhthi Reef site when the shore crossing location was decided upon.

The Draft EIS states that there exists the potential to disturb the Walpinhthi Reef during nearshore pipelaying and shore pull, and that consultation will be undertaken with traditional Aboriginal owners regarding appropriate mitigation measures. Earlier statements indicated that no sites will be disturbed. The inconsistency reflects the uncertainty regarding the scope of Walpinhthi Reef.

Walpinhthi Reef was originally identified by the traditional Aboriginal owners and custodians of the site, in consultation with the NLC anthropologist. The agreement in relation to reporting between the Blacktip Project and NLC was that only the AAPA would receive the anthropologist's report. Consequently, a detailed discussion of the site characteristics of Walpinhthi Reef is not possible here.

The original survey by the NLC of Walpinhthi Reef identified an exclusion zone that applied to the nearshore survey work. There was some technical uncertainty in relation to the actual high point of the reef and the reef's edge, therefore an appropriate exclusion zone was determined largely in relation to the proximity within which the survey vessel could safely approach the reef.

The proposal for the laybarge and shore crossing activities shows a typical anchor pattern. Two of the anchor sites in this configuration lie within the exclusion zone initially identified by the NLC for all offshore surveys (**Figure 4-8**, **Volume 1** of the Draft EIS). The extent of the exclusion zone is under discussion between the NLC, AAPA and the Proponent. A revised exclusion zone will be agreed by all parties before pipelay operations commence.

The laybarge anchors need to be laid in the sandy bottom and reef structures are strictly avoided, so there is a mutual need to avoid reefs from both technical and environmental perspectives. The final anchor configuration will not be known until the laybarge contract is finalised and the laybarge Captain has examined the work at the time of construction. Final identification will also be subject to the prevailing environmental conditions. However, it is the Proponent's view that the work will be able to be carried out with no impact on Walpinhthi Reef.

8.4 Section 5.9 Condensate Treatment and Export

NTG 42: There is no mention here of considering sacred site concerns, eg the WALPINHTHI REEF sacred site. There is no mention of alternative routes that could avoid any possible damage to the site. Such alternatives and the reasons why they were rejected require discussion.

NTG 42: Consider sacred site concerns, eg the Walpinhthi Reef and discuss alternative routes that could avoid any possible damage to the site.

The selection of the pipeline route was subject to a number of constraints including cultural, environmental and engineering limitations, but in particular there were constraints related to the protection of another sacred site. If the pipeline route was located further north of the current location, it would move closer to a submerged rock, offshore from the sacred site known as Maning. It may then be necessary to blast this rock to lay the pipe and this may cause a higher potential risk to Maning and the onshore zone.

The NLC has now provided its report to the AAPA in relation to sacred sites and the Proponent, the NLC and the AAPA have entered into tripartite discussions regarding Walpinhthi Reef and the conditions, if any, which would be applied to an Authority Certificate. It is expected that these will be resolved ahead of construction.

The construction and operation of the offshore mooring facility does not impinge on the exclusion zone initially identified and so is not expected to impact on Walpinhthi Reef, except in the case of a broader environmental incident, in which case a broader area than Walpinhthi Reef may be affected. Mitigation strategies for such events are included elsewhere in the Draft EIS and in response to **ECNT 13** (**Section 14.9.1**).

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9. Draft EIS Section 6 Waste & Emissions Inventory

9.1 Section 6.2 Waste Inventory

OEH 38: Limitations of the Wadeye landfill should be discussed and the Supplement should quantify the likely volume of non-recyclable wastes and their nature given these limitations.

OEH 38: Discuss the limitations of the Wadeye landfill and quantify the likely volume and nature of non-recyclable wastes.

A new waste management facility will not be constructed. The suitability and capacity of the Port Keats (Wadeye) Landfill Disposal Facility to accept Blacktip Project waste will be investigated prior to construction commencing. The Wadeye landfill facility will be used if possible. Thamarrurr Regional Council has expressed interest in allowing the project access to the waste facility. If the project does not have access to the Wadeye facility, then the waste will be backloaded to Darwin for disposal. Selection of appropriate waste facilities to handle Blacktip waste will be undertaken in consultation with the relevant landfill operator(s), local council and OEH.

Port Keats Landfill Disposal Facility does not accept hazardous waste so this waste will be backloaded to Darwin for disposal or transported interstate, depending on the listed waste.

A detailed Waste Management Plan (WMP) will be specifically developed to address the construction, operation and decommissioning waste issues associated with the onshore and offshore components of the Blacktip Project.

A step-wise approach, in accordance with the Waste Management Hierarchy (reduce, reuse, recycle, recover), will be implemented as follows:

- prevention and reduction;
- reuse;
- recycle and recovery;
- treatment;
- disposal.

Woodside has committed to implementing waste management practices and principles during all phases of the Blacktip Project through Commitment No 1 and 57 (**Section 15**, **Volume 1** of the Draft EIS). These commitments will be incorporated into the plan.

The WMP will provide an overarching framework for management of all waste across all phases of the development. The WMP will be developed further following award of contract for construction activities in 2nd Quarter 2005. A series of subsequent plans will be developed by the individual contractor(s) representing each phase of the project – site preparation, construction,

commissioning, operation and decommissioning. The plan will be updated with available information on waste streams and waste quantities, as and when they become available and as the individual contractors are engaged by the Proponent.

Waste management issues include:

- Disposal and storage of construction waste, excess materials and packaging.
- Disposal and storage of domestic, green, liquid and hazardous waste.
- Inappropriate waste management, has potential to:
  - generate leachate resulting in contamination of groundwater and surface water and ecosystems;
  - spread of disease for example through the introduction of vermin posing a risk to human health;
  - leading to contamination of groundwater and surface water, which could adversely impact local;
  - spread of litter and odour;
  - creation of fire hazards.
- Absence of recycling markets in the Wadeye area, and considerable distance from those located elsewhere for example in Darwin.
- Absence of designated hazardous waste facility in Northern Territory.
- Remoteness of the project location and access to waste facilities and waste contractors.

9.1.1 Section 6.2.1 Waste Inventory

Section 6.2.1.1 Non-Hazardous Solid Waste

NTG 43: It is stated that the "exact quantities of waste are not known at this stage and will be dependent on the numbers of personnel involved and the approach taken for construction". Notwithstanding, there is no guarantee that the Thamarrurr Community Government Council's solid waste dump has the capacity nor the management to receive waste from the project site. The proponent may need to construct a new waste management facility for its exclusive use or consider negotiating with Wadeye Council to joint manage a shared facility. Waste management facilities must not cause a nuisance under the *Public Health Act.*

NTG 43: The proponent may need to construct a new waste management facility for its exclusive use or consider negotiating with Wadeye Council to joint manage a shared facility.

Refer to response to **OEH 38** above.

Section 6.2.1.2 Liquid Waste & Refer to S.4.8.9

NTG 44: Will the drainage management system address the risk of cross-contamination between wastewater and potable water. Will there be different coloured pipework, different types of taps, installation of back flow prevention devices, and a risk management strategy? DHCS Environmental Health Darwin Rural would be interested in seeing further documentation of the drainage management system once it is developed.

Any industrial waste should not be discharged to an onsite wastewater disposal system. Oil/grease removal systems should comply with Power and Water Corporation's *Guidelines for On-site Pretreatment.*

NTG 44: Will the drainage management system address the risk of cross-contamination between wastewater and potable water?

Waste water and potable water systems are completely separate systems. The piping will have colour banding to indicate the service of the system. There will not be taps on the wastewater system.

All domestic sanitary waste/wastewater disposal systems will be installed, operated and decommissioned in accordance with DHCS Environmental Health Darwin Rural requirements. The NT DHCS Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent will be adhered to.

Trade waste will be handled in accordance with the PowerWater's Trade Waste Management System Guidelines for On-site Pre-treatment. Trade waste will not be allowed to cause a public health nuisance as per the Public Health (Nuisance Prevention) Regulations. Trade waste will not be discharged into a packaged treatment plant or septic tank unless it is generated from a commercial kitchen and has been treated in accordance with PowerWater's Guidelines for Pre-treatment.

Contaminated Water

OEH 40: The disposal strategy for any water unsuitable for the PW treatment system is required.

OEH 40: The disposal strategy for any water unsuitable for the PW treatment system is required.

All water will be treated to a standard where by it can be discharged via the PW or by the open drain systems. Contaminants not suitable for treatment or discharge by the drainage systems (for example, chemicals as a result of spills) will be contained and removed off site for appropriate treatment and disposal.

ECNT 5: Woodside has not yet decided where the packaging and general construction waste will go. It has not assessed if Wadeye landfill has sufficient capacity. Very little detail about the hazardous waste generated in construction phase is provided, especially the quantities of waste (6.2.1.3 Hazardous Waste, p156). Hazardous waste will 'most likely' be returned to Darwin in the commissioning phase (p158). This needs to be clarified before any approvals are given for this project to proceed.

ECNT 5a: Consider the disposal of general construction waste and assess the capacity of the Wadeye landfill to accept this waste.

ECNT 5b: Very little detail about the hazardous waste generated in construction phase is provided, particularly the quantities of waste.

The Port Keats Landfill Facility will be used wherever possible. Thamarrurr Regional Council has expressed interest in allowing the project access to the waste facility. If the project does not have access to the Wadeye facility, then the waste will be backloaded to Darwin for disposal.

It is not possible at this stage to provide an exact figure on the types and volumes of waste to be generated during the construction phase. Waste that may be classified as hazardous under the stringent waste handling procedures used by the Proponent include: paints, cleaning chemicals, mineral synthetic fibres (used for insulation) and liquid fuels. All products brought on site will be entered into a waste management register and have a Materials Safety Data Sheet (MSDS) prepared which will detail the volumes of each product, a description of its hazardous content and a description of the handling and disposal procedures to be adopted.

No hazardous waste (classified as such by the Proponent or by NT/WA Waste Regulations) will be disposed of at the Wadeye landfill. All hazardous waste will be handled by licensed waste contractors who will be responsible for the transportation and disposal of the waste.

Unless otherwise approved by the OEH, commercial waste including the following will not be disposed of at landfill sites as prescribed under Section 5.10 of the *Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory* (DIPE 2003):

- "dangerous goods" under the provisions of the NT Dangerous Goods Act
- any material scheduled as a "listed waste" under the NT Waste management and Pollution Control (Administration) Regulations (Appendix B).

Consultation will be undertaken with the OEH and DHCS regarding disposal of hazardous waste prior to construction commencing. In the event that hazardous waste disposal at Shoal Bay is not available, arrangements will be made with licensed hazardous waste contractors for appropriate inter-state disposal at licensed disposal facilities. The NT DIPE 'Tracking System Procedures for the Transport of Controlled Wastes between States and Territories' will be adhered to.

'Schedule 2 Listed Waste' containers will be clearly labelled with information as follows: Schedule 2 listed waste; name of the waste; type of hazard; facility name and address; date of waste accumulation.

Used oils and greases will be segregated from other waste and disposed of by recycling if possible. Drums and containers will be recycled or disposed of in accordance with NT Government requirements.

The reader is also directed to the response to **OEH 38** (**Section 9.1**).

Section 6.2.1.3 Hazardous Waste

OEH 36: Describe the system on the wellhead platform for blocking the overboard drains to prevent an oil spill.

OEH 36: Describe the system on the wellhead platform for blocking the overboard drains to prevent an oil spill.

The wellhead platform will have a closed drains system. Only open drains (non-hazardous) will be directed overboard. The reader is also directed to the response to **OEH 47** (**Section 7.6.1**).

OEH 41: Details of the expected quantities of contaminants remaining after PW treatment and how these contaminants will be disposed should be described.

OEH 41: Describe the expected quantities of contaminants remaining after PW treatment, and how these contaminants will be disposed.

Liquid residue from the PW treatment system will be stored on site and periodically removed by vacuum truck for disposal.

6.2.3.2 Liquid Waste

NTG 45: It is stated that the 'largest volume of liquid waste will arise from the Produced Water Facility which discharges approximately 3 km offshore'. What is the composition of the produced water, particularly microbiological quality? This is important in assessing potential algal blooms and shellfish contamination. Shellfish maybe consumed by the Wadeye Community or be harvested for commercial sale.

NTG 45: What is the composition of the PW, particularly with regards to microbiological quality?

The exact composition of Blacktip PW will not be known until the commencement of production because PW varies depending on reservoir characteristics. Nonetheless, much is known about the composition of PW from all around the world, including northern Australia, which is summarised in detail in **Section 2.2** of **Appendix J**, **Volume 2** of the Draft EIS and more briefly in **Section 11.18**, **Volume 1** of the Draft EIS.

In terms of microbiological quality, PW is water that has been trapped in the hydrocarbon reservoir for millions of years. As a result, PW does not have oxygen available to support aerobic biological activity. Anaerobic sulfate-reducing bacteria can survive in the production process. These bacteria generate hydrogen sulfide, which is highly corrosive to metal surfaces. For this reason, the control of these bacteria in the pipeline is critical to the safety and longevity of the production process and is achieved by the application of biocides. Anaerobic bacteria cannot survive in the presence of oxygen so any sulfate-reducing bacteria which survives in the PW will be killed when the PW is re-oxygenated prior to discharge, or upon entry to the marine environment via PW discharge. Therefore, as PW contains no aerobic microbiological activity and cannot support anaerobic

bacteria once oxygen is introduced, the discharge of PW physically cannot introduce exotic microbes into the marine environment of the Joseph Bonaparte Gulf.

Algal blooms can occur naturally; however elevated nutrient concentration is the key element increasing the risk of algal blooms in the aquatic environment (ANZECC 2000 p.3.3–28). PW often contains nutrients that could potentially enhance the activity or abundance of indigenous marine microbes including cyanobacteria (blue green algae) and dinoflagellates (which can cause algal red tides). Cyanobacteria and dinoflagellates can cause shellfish contamination.

While there is no data available on nutrient concentrations in the PW from the Blacktip Field, Woodside has measured nutrient concentrations in the PW from its other facilities in northern Australian (IRCE 2004a-e). In these samples, total nitrogen levels ranged from 11 to 28 mg/l, or less than 30 times above the ANZECC (2000) default trigger value for tropic marine waters. The ANZECC default trigger value is the level applicable at the end of a discharge mixing zone, not at the end of the pipe or discharge location. In the case of the Blacktip PW discharge, total nitrogen concentrations will be below the ANZECC trigger value levels within 5 m of the discharge point, indicating that the zone where elevated nutrients occur is limited and localised to the discharge mixing zone. Additionally, the discharge occurs subtidally where light levels are low. By the time the PW plume hits the sea surface and is exposed to light levels high enough for algal growth the discharge has received over 700 dilutions (**Appendix J**, **Volume 2** of the Draft EIS), reducing nutrient levels to background levels and minimising the risk of an algal bloom. Furthermore, the Blacktip PW discharge location is characterised by large tides, strong tidal flows and very turbid water, which further reduce the likelihood of algal blooms (ANZECC 2000 p.3.3–28). Therefore, the discharge of PW should not further increase the risk of algal blooms or shellfish contamination in the Joseph Bonaparte Gulf.

6.2.3.3 Hazardous waste

NTG 46: Once it is determined how the silica gel will be replaced, then DHCS Environmental Health Darwin Rural requests details particularly with regard to the transport of the hazardous waste.

NTG 46: Provide details on how the silica gel will be replaced, particularly with regard to the transport of the hazardous waste.

The silica gel degrades over time and so the system will be overhauled every three years. The silica gel contained within the process vessels is in the form of beads and the primary cause of degradation is the breakdown of these beads into dust. Periodically the silica gel and dust will be removed from the process and separated probably through sieving. The original intact silica gel together with a make up of new silica gel will then be returned to the process vessels, the resulting dust will be removed from site.

The resulting dust will then be disposed of offsite under the appropriate legislation or returned to the manufacturer for recycling. Silica gel is a relatively inert, non-flammable substance and the

major hazards associated with its handling and removal are related to localised dust generation. All removal, transportation, and reprocessing will be carried out by an approved supplier.

All hazardous waste will be stored, transported and handled in accordance with the *Waste Management and Pollution Control Act 1998 and Regulations*. NT commercial waste contractors who collect, transport, store, re-cycle, treat or dispose of listed hazardous waste are required to be licensed under the *Waste Management and Pollution Control Act*. Licencees are required to submit data on the types and quantities of waste handled each year, as part of their licence conditions.

9.2 Section 6.3 Atmospheric Emissions

Air Emissions

NTG 116: Modelling of emission concentrations in vicinity of the gas plant during worst case operational scenario i.e., a gas release equating to substantial loss of containment. Under this scenario what is the risk to the township of Wadeye? The following are issues, which require further clarification:

- establish the meteorological conditions which represent the worst case scenario for the Wadeye township if loss of containment occurred and control of critical systems could not be regained;
- timeframe in which control of the facility could be re-established if critical equipment failed; and
- are manual overrides i.e., hand operated isolation valves to be installed in the processing system as an emergency redundancy measure?

It is noted that Table 16.1 identifies that hydrocarbon leak/fire/explosion and condensate tank fire has been considered in the preliminary safety assessment. However, pp 521 establishes that formal safety assessments are yet to be conducted for the proposal including fire and explosion analysis.

NTG 116a: From modelling of emission concentrations, what is the risk to the township of Wadeye under worst case operational scenario?

The risk arising due to hydrocarbon release, minor or catastrophic, is calculated in the preliminary QRA. The results are presented as risk contours to show the risk to life both on and off site. These are detailed in response to **NLC 52** (**Section 19**).

A catastrophic failure of hydrocarbon gas containment would result in some emission of flammable hydrocarbon gas. The inventory available to any release is minimised by the safety systems in place (emergency shutdown and isolation) and as such would have no direct impact on the township at Wadeye.

The smoke emissions from a major hydrocarbon fire may have potential for impact at Wadeye. This would only be likely to occur in the worst case fire scenario, due to catastrophic failure of a condensate storage tank and subsequent fire. In this case, the fire duration has been calculated as being approximately 4 hours, assuming no effective intervention occurred. An automatic fire protection system has been designed to account for the potential for such fire events, thus reducing the potential fire duration. The likelihood of a catastrophic failure of the condensate tanks is

extremely low, For example, the likelihood of a fire due to a release from 70 mm leak in the condensate storage and export system is approximately 1 in 2000 years.

NTG 116b: What are the meteorological conditions which represent the worst case scenario for the Wadeye township?

The worst case would be wind blowing due east, from the site towards the township. The reader is also directed to response to **NLC 52** (**Section 19**).

NTG 116c: What is the timeframe in which control of the facility could be re-established if critical equipment failed?

NTG 116d: Are manual overrides, i.e. hand operated isolation valves, to be installed in the processing system?

Safety Equipment: Safety critical equipment is 'fail safe'. The plant is provided with an automated shutdown and isolation system. Therefore, any failure of critical equipment or any unplanned deviation from normal operating conditions will result in shutdown and isolation of the system. Even in the event of failure of critical equipment, control of the plant is not 'lost'.

The onshore gas plant is a minimal manning facility, therefore, human intervention is not relied upon for safety critical tasks. Exposure of operations personnel to any potential risk scenario has been minimised by the automation of emergency and safety critical equipment. The shutdown, isolation and depressurisation of the processing facilities are automatically initiated and designed so as to minimise the duration of any release and prevent the escalation of events. The emergency depressurisation (blowdown) of the process facilities to the flare is designed to reduce the pressure to 7 barg within 15 minutes.

Safety Assessments: Preliminary safety assessments were carried out in the early project phases, this will be followed up with the Formal Safety Assessments carried out during detailed design, as the design is finalised. This is to ensure that the formal safety assessments and operations safety cases reflect the "as-built" facilities.

NTG 47: Will there be any health impact on the Wadeye Community from the atmospheric emissions from the plant? What do people do if they claim that they are being affected by emissions from the plant? What mechanisms will be in place to monitor and assess complaints?

NTG 47a: Will there be any health impact on the Wadeye Community from the atmospheric emissions from the plant?

NTG 47b: What do people do if they claim that they are being affected by emissions from the plant?

NTG 47c: What mechanisms will be in place to monitor and assess complaints?

Atmospheric emissions from the onshore gas plant are very unlikely to cause any health impact on the Wadeye Community as the low level of emissions and distance from the community will result in negligible emissions at the Community.

If people from the Wadeye Community believe that they are being affected by emissions from the plant, there will be mechanisms in place to record and resolve their concerns. This mechanism will include:

1) A Complaints Hotline ("1800" number) and Complaints Register would be set up specifically for complaints in relation to environmental impacts from the plant including impacts from air emissions.
2) A plant site representatives will be available to manage community concerns including:
   - registering the complaint in the Complaints Register;
   - acting on the complaint immediately;
   - following up on the complaint within a reasonable time to determine the state of progress of the complaint and the perceived or real impact.

Monitoring of the community health statistics, through collaboration with the existing agencies and organisations responsible, will be undertaken to ensure that any long-term health effects of the Proponent's operations are detected.

9.2.1 Section 6.3.1 Greenhouse Gas Emissions

OEH 48: Draft EIS discussion suggests that "offshore [gas] emissions will be minimal compared with onshore emissions" (Section 11.21). Emissions should be quantified in the Supplement.

OEH 48: Quantify the offshore [gas] emissions.

Greenhouse emissions from the wellhead platform are summarised in **Table 6-5** of the Draft EIS. Wellhead platform emissions represent 0.1% of the total operation phase greenhouse gas emissions. The reader is also directed to the response to **ECNT 4** below.

ECNT 4: 90,000 tonnes pa of greenhouse emissions will be produced during the normal operations phase. But there is no estimate of flare emissions during commissioning and the early phase of operations which 'will be significantly higher' (6.3.1. Greenhouse Gases, p161). 4.5Mtpa of greenhouse emissions will result from Blacktip gas and condensate being used as a fuel source by Alcan and other consumers. Considering 2.2Mtpa of this will result from Alcan's alumina refinery expansion (refer to the Alcan EIS 2004), most of the remaining emissions will result from the consumption of condensate overseas. This is highly significant and represents a 0.6Mtpa increase in Alcan's current emissions as well as a substantial increase in the NT's contribution to global greenhouse emissions. The greenhouse benefits of this project are being overstated in the Executive Summary (pES2). The EIS also states that if required, potential climate change impacts will be investigated in the Greenhouse Gas Management Plan (12.6.1. Greenhouse Gases, p427). This should indeed be a prerequisite and is currently a glaring omission.

ECNT 4a: There is no estimate for greenhouse emissions from flaring during commissioning and the early phase of operations.

ECNT 4b: Potential climate change impacts should be investigated in the Greenhouse Gas Management Plan.

Commissioning is a necessary process and it is always difficult to estimate emissions from commissioning at this early stage. A preliminary estimate is that the emissions in the first several months will be 10–25% more than the normal emissions. Woodside will do everything reasonably possible to limit this amount as any gas that might be flared during commissioning is a resource that can be sold.

The expansion of the Alcan facilities does not form part of the Blacktip EIS and so has not been addressed here. As stated in the Draft EIS the Blacktip Project will enable the conversion of the Alcan plant from high sulphur fuel oil to natural gas which will result in a significant reduction in greenhouse gas per tonne of alumina produced.

Further details including climate change and specific mitigation measures will be provided in Greenhouse Gas Emissions Management Plan to be prepared for the project.

9.3 Section 6.4 Noise

NLC 41: Page 163. There are references to the Tchindi Camp Ground as a reference point for Aboriginal camping and potential noise impact. This place is an artefact of non-Aboriginal map making. The focus on this locality is highly artificial in regards to Aboriginal land use and EIS impact assessments. Yek Maninh use and camp along the length of their coastline, not just at the TCG. Any conclusions based on the assumption the EIS or readers may make from the EIS that the TCG is where Aboriginal people may be impacted by the project operation is misleading.

NLC 41: The Yek Maninh people use and camp along the length of their coastline, not just at the TCG. The focus on this locality is artificial in regards to Aboriginal land use and EIS impact assessments.

More detailed noise modelling (including analysis of octave band noise levels) based on the plant items proposed to be installed at the gas plant is presented in ERM (2004).

The noise data presented in ERM (2004) indicates that a noise level of 85 dB(A) will be achieved 1.5 m from all plant and equipment. Based on these noise levels, and the modelling results presented in the Draft EIS report, predicted noise levels along the coastline would be less than 21 dB(A). These levels are well below the measured night time background of 28 dB(A) (LA90) as presented in **Table 3.1**, **Appendix A**, **Volume 2** of the Draft EIS.

The reader is also directed to the response to **NLC 16.2** below.

NLC 16.2: Item 6.4 of the Draft EIS at page 163 makes references to the Tchindi Camp Ground as a reference point for Aboriginal camping and potential noise impact. This place is an artefact of non-Aboriginal map making. The focus on this locality is highly artificial in regards to Aboriginal land use and EIS impact assessments. Yek Maninh use and camp along the length of their coastline (inclusive of Yelcherr Beach and Injun Beach, not just at Tchindi). Any conclusions based on the assumption from the EIS that the TCG is where Aboriginal people may be impacted by the project operation is misleading.

Page 2 of Appendix A (Environmental Noise Assessment) advises of the limitations of the conclusions drawn in the event of changes in project parameters, including "changes in the proximity to sensitive human receptors". As indicated above, it is an error to assume Tchindi Camp Ground as anything other than a name on a map and that Injun Beach and Yelcherr Beach and associated mangroves are frequented for hunting and gathering purposes and camping during such activity throughout the year. It is these closer localities when occupied or 'in use' that are the sensitive human receptors for the purposes of appropriate conclusions about noise impacts during construction and operation. Injun beach is less than 1km from the plant site boundary and within the 30-36dba noise contour and Yelcherr within the 24-26 contour.

Traditional Aboriginal owners have commented to the NLC that: "we use Yelcherr all the time…some of us had even been thinking of setting up a tourist operation…we've even talked of moving here ourselves more permanently".

Section 6.4, page 164 of the Draft EIS states that there will be a minimum level of noise during general day to day operations. However at page 167 it states that during normal operations noise levels at the plant boundary will not exceed 82 dB(A) i.e. this is noisy and means the amenity of the surrounding countryside will impact on local users. 82 dBA is the upper limit of noise that people can work in without hearing protection.

NLC 16.2: Discuss the potential noise impacts on of Yelcherr Beach and Injin Beach.

More detailed noise modelling (including analysis of octave band noise levels) based on the plant items proposed to be installed at the gas plant is presented in ERM (2004).

The noise data presented in ERM (2004) indicates that a noise level of 85 dB(A) is to be achieved 1.5 m from all plant and equipment. Based on these noise levels, and the modelling results presented in the report, predicted noise levels at the boundary of the site are a maximum of 70 dB(A). This is significantly lower than the 85 dB(A) noise level estimated for the site boundary for the purposes of the Draft EIS. As a result, the predicted noise levels and noise contours (**Figure 12-1**, **Volume 1** of the Draft EIS) should be adjusted by a correction of minus 15 dB(A).

For the additional receptors identified, this would result in Injin Beach being within the 15–21 dB(A) noise contour and Yelcherr Beach within the 9–11 dB(A) contour. These are well below the measured night time background of 28 dB(A) (L_{A90}) as presented in **Table 3.1**, **Appendix A, Volume 2** of the Draft EIS.

Noise levels in closer proximity to the plant boundary will be higher; however, the closest receptors (identified in the comments as Yelcher and Injin) have been considered above.

NTG 48: All readings within the report have been taken in the db(A) scale with readings as high as 120 db(A) (similar to a jet aircraft). Whilst the db(A) scale is chosen to reflect neighbourhood or nuisance noise levels (because it best reflects the hearing range of the human ear) it is not suitable on its own for addressing potential noise induced hearing loss. What would normally be required is for a complete Octave Band frequency analysis to be undertaken. This would indicate levels within all frequencies and may in fact reveal levels far exceeding 120db when all octave bands are considered. With levels of 120db(A) being expected during pipe venting and even levels of 117db(A) being expected from generators, sound levels are an important consideration and Octave Band analysis should be conducted to give a more realistic picture.

NTG 48: Octave Band analysis of sound levels should be conducted to give a more realistic picture.

Octave band data and total sound pressure levels for individual sources was not available for consideration in the Draft EIS due to the stage of the design. Further detail of the specific plant items is now available, and more detailed noise modelling (including analysis of octave band noise levels) is presented in ERM (2004).

The noise data presented in ERM (2004) indicates that a noise level of 85 dB(A) is to be achieved 1.5 m from all plant and equipment. Based on these noise levels, and the modelling results presented in the report, predicted noise levels at the boundary of the site are a maximum of 70 dB(A). This is well within the time weighted occupational exposure limit of 85 dB(A).

In relation to hearing damage associated with peak noise levels, the occupational exposure limit for prevention of hearing damage is a limit of 140 dB(C). The short term peak noise levels from flaring would be well within this limit based on the stated noise emission of 120 dB.

9.3.1 Section 6.4.3 Construction Phase Noise Emissions

Offshore Noise Emissions

ECNT 11: Noise offshore at the Jack-up could reach 182 db and be detected up to 30km away (6.4.3. Construction Phase Emissions, p165). This seems very excessive and is likely to be of detriment to marine mammals. The area is potentially dolphin and whale habitat (7.3.7. Whales and Dolphins, p195-196). Noise associated with the laying of the pipeline at sea has not even been modelled yet as the exact equipment and vessels that will be used are not currently known. Dugong are known to inhabit areas closer to shore (7.3.6. Dugongs, p194).

ECNT 16: The EIS states that 'source levels of the highest components of humpback whale song are 192 dB re 1 Pa2, above the levels generated by drilling and support vessels, indicating that noise generated by drilling will not have an impact on whales' (11.22. Noise and Vibration, p382). This does not necessarily follow logically. What about the duration of the noise?

ECNT 11: Discuss the likely offshore noise impacts to marine mammals from the Jack up rig.

ECNT 16: Discuss the impacts of noise generated by drilling on whales, particularly on the duration of the noise.

As discussed in **Section 11.22**, **Volume 1** of the Draft EIS noise emissions can affect marine fauna in various ways, such as attraction or avoidance behaviour, increased stress levels, hearing impairment and pathological damage. Disturbances associated with the Blacktip Project will be localised, therefore the effect on marine mammals, turtles and fish is expected to be slight, particularly as mobile animals will temporarily avoid the development area if disturbed. Further information regarding noise levels, duration and impacts is presented below.

Pressures associated with sound levels in water are not directly comparable to the pressure of sound levels in air. Correcting for the difference in reference level and the specific acoustic impedance, 62 dB must be added to measurements in air to compare with measurements taken in water (Gausland 2000). For example, a sound measured at 90 dB in water will generate the same pressure on an ear as a sound measured at 28 dB in air.

The value of 182 dB was generated by a rig support vessel (which is similar to a tug) actively holding position next to a drilling rig. This is an infrequent activity, most commonly associated with the transfer of cargo between vessels and the drill rig that would not continue for more than a few hours. In contrast, the noise from the rig whilst drilling was measured at 146 dB, and the noise when the drill rig was not drilling was measured at 117 dB. As a guide, background noise (no drilling activity) during dead calm conditions was measured at 90 dB, and at 110 dB under 17–33 knot winds. These measurements were collected by McCauley (1998) in the vicinity of a drill rig located in the Timor Sea. While the underwater noise generated from the drill rig in the Timor Sea could be detected 20–30 km away, high noise levels (defined by the 120 dB level by McCauley (1998)) only extended to approximately 3–5 km from the drill rig.

It is unlikely that cetaceans will be exposed to noise levels that could cause harm, regardless of the length of noise duration, for the following reasons:

- Noise levels during all drilling related and pipe-laying activities, including when a vessel is actively holding position, are below the source levels generated by a variety of whales and dolphins, as described in **Table 8**.

- **Table 8 Source Levels**

Species	**Max. Source Levels (dB)**	**Reference**
Humpback whale	192	McCauley (1998)
Southern right whale	187	Richardson et al. (1995)
Blue whale	188	Richardson et al. (1995)
Fin whale	186	Richardson et al. (1995)
Bottlenose dolphin	218–228 [1]	Richardson et al. (1995)
Activity	**Max. Source Levels (dB)**	**Reference**
Support vessel actively holding position	182 dB	McCauley (1998)
Drilling activities	146 dB	McCauley (1998)
Drill rig whilst not drilling	117 dB	McCauley (1998)

Note 1: Echo location source level

- The noise generated by drilling and associated activities is continuous for the duration of the drilling programme and originates from a fixed location. As the source location of noise will not change, cetaceans will not be suddenly or unexpectedly exposed to high noise levels.
- Whales and dolphins are capable of avoidance behaviour such as route alterations, and can utilise the 'sound shadow' near the ocean surface. For example, avoidance behaviour has been demonstrated for humpback whales exposed to seismic airguns. McCauley et al. (2000) observed that humpback whales take avoidance manoeuvres >4 km from a seismic source. (Sound pulses generated by seismic airguns produce sounds in the order of 220–240 dB, substantially greater than that measured from the drilling rig).
- The area exposed to high noise levels is limited.
- Whale and dolphin abundance in the Joseph Bonaparte Gulf is low, the region is not a whale breeding ground and does not support known migration routes (**Section 7.3.7, Volume 1** of the Draft EIS). Therefore it is highly unlikely that medium to large populations of whales or dolphins will be exposed to increased noise levels.
- Dugongs are present in the Joseph Bonaparte Gulf and will move through the project area but are not expected to occur in the deeper water at the wellhead platform. Dugongs generally avoid boat traffic and are expected to practice avoidance behaviour and swim away from loud sound sources. The construction of the pipeline is likely to have no detectable effect on the dugongs in the area.

It is not necessary to model the noise associated with the laying of the pipeline because noise emissions from pipelay activities will be substantially lower than the noise generated by drilling activity or seismic surveys, as discussed above (**Table 8**). The laybarge will generate minimal noise, as it has no propulsion system. The laybarge can therefore be considered similar to a jackup rig when it is not drilling, which generated noise at 117 dB. The laybarge's anchors will be positioned by anchor handling tugs and the barge will be supplied with pipe by supply vessels. During loading/unloading operations, these vessels will be moored directly to the laybarge and will not need to actively hold position for any length of time. These vessels will only generate noise levels typically associated with the passage and manoeuvring of vessels, as found in harbours and ports around the world. In summary, pipelay operations are expected to produce sound levels typically below 120 dB, with occasional higher peaks associated with supply boat and anchor handling tug activity.

9.3.2 Section 6.4.4 Operation Phase Noise Emissions

NLC 42: Page 164- states that there will be a minimum level of noise during general day to day operations. However at page 167 it states that during normal operations noise levels at the plant boundary will not exceed 82 dB(A) i.e. this is noisy and means the amenity of the surrounding countryside will impact on local users. 82 dBA is the upper limit of noise that people can work in without hearing protection.

NLC 42: Revise consideration of noise impacts during day to day operations and their impacts on amenity of the surrounds and locals.

The noise modelling presented in the Draft EIS shows that the surrounding users will not be adversely impacted. Furthermore, the more detailed noise modelling completed by ERM (2004) confirms that noise levels at the site boundary will be 70 dB(A) or less. Hence, based on the more detailed project information now available, the Draft EIS noise assessment significantly over-estimates the potential noise levels at the nearest receptors to the site.