



## DARWIN JOINT TERMINAL

### ENVIRONMENTAL ASSESSMENT REPORT AND RECOMMENDATIONS

By the Environment and Heritage Division  
Department of Lands, Planning and Environment

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## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>SUMMARY OF RECOMMENDATIONS .....</b>	<b>4</b>
<b>1 INTRODUCTION AND BACKGROUND .....</b>	<b>6</b>
1.1 Environmental Assessment Process .....	6
1.2 Environmental Assessment History.....	7
<b>2 THE PROPOSAL .....</b>	<b>7</b>
<b>3 ENVIRONMENTAL ASSESSMENT .....</b>	<b>9</b>
3.1 Introduction.....	9
3.2 Issues .....	10
3.2.1 Major Environmental Issues .....	10
3.2.2 General Issues .....	10
3.2.2.1 Environmental Management Plan.....	10
3.2.2.2 Site Design.....	11
3.2.2.3 Monitoring .....	12
3.2.3 Construction Issues .....	13
3.2.3.1 Air Quality .....	13
3.2.3.2 Noise .....	13
3.2.3.3 Surface Runoff and Erosion.....	13
3.2.3.4 Management of Acid Sulfate Soils.....	14
3.2.3.5 Introduced weeds, pests and diseases.....	14
3.2.3.6 Disposal of Construction Wastes.....	15
3.2.3.7 Biting Insects.....	15
3.2.3.8 Traffic.....	16
3.2.4 Operational Issues .....	16
3.2.4.1 Risk Management .....	16
3.2.4.2 Surface Runoff and Water Quality.....	16
3.2.4.3 Ongoing management of Acid Sulfate Soils.....	17
3.2.4.4 Spills and leakages .....	17
3.2.4.5 Waste Disposal.....	18
3.2.4.6 Air Quality .....	18
3.2.4.7 Noise .....	19
3.2.4.8 Biting Insects.....	19
3.2.4.9 Traffic.....	20
<b>4 CONCLUSION.....</b>	<b>20</b>

## **EXECUTIVE SUMMARY**

This report assesses the environmental impacts of the proposal to build and operate a terminal at East Arm Port in Darwin Harbour to receive, store and load out petroleum products. This facility is to be known as the Darwin Joint Terminal (DJT).

This Assessment Report reviews the Public Environmental Report (PER). It also relies on information, comments and advice provided by Northern Territory Government agencies and previous studies undertaken in the region.

Environmental Assessment is the process of defining those elements of the environment which may be affected by a development proposal and of determining the significance, risk and consequences of the potential impacts of the proposal.

### **Major Issues**

The principle environmental issues identified by the proponent and this assessment are:

- Air Quality.
- Noise.
- Surface Runoff and Erosion.
- Risk Management
- Spills and leakages.
- Management of Acid Sulfate Soils.
- Introduced weeds, pests and diseases.
- Waste Disposal.
- Biting Insects.
- Traffic.

The potential benefits associated with the proposal include:

- Relocation of the current tank farm at Francis Bay away from residential areas.
- Increased storage potential and ability to expand to meet Darwin's future needs.
- Placement of the terminal in an area specifically zoned for Industry.
- Removal of road trains from residential and city areas.

### **Conclusion**

It is considered that the environmental issues associated with the project have been adequately identified. Most of the issues have been resolved through this assessment process, while the remainder will be addressed through the Construction and Operational Environmental Plans.

Initially, the PER and recommendations detailed in this Assessment Report will form the basis for the Shell's management and monitoring commitments. The Environmental Management Plan will be a working document for the operation of the

facility and will require continual review and updating in the light of operational experience and changed circumstances.

In addition, there is a high probability oil/petroleum storage will be listed under Schedule 2 of the *Waste Management and Pollution Control Act* and as such it will become a licensable activity. If so it will be required to comply with any licence conditions as well as regulations set down by the act.

Provided that the environmental commitments and safeguards detailed in the PER are implemented, the recommendations in this Assessment Report are adopted and regular reviews and reporting are undertaken, long term environmental impacts should be minimised.

## **SUMMARY OF RECOMMENDATIONS**

### **Recommendation 1**

Shell shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards identified in the Darwin Joint Terminal Public Environmental Report (summarised in Table 1.2 of the PER) and as recommended in this assessment report. All safeguards and mitigation measures outlined in the PER are considered to be commitments by Shell.

### **Recommendation 2**

An Environmental Management Plan that covers the construction phase of the DJT should be submitted to the Department of Lands, Planning and Environment (DLPE) for approval, prior to construction commencing.

### **Recommendation 3**

An Operational and Environmental Management Plan for the operational phase of the DJT should be submitted to the DLPE and the Work Health Authority (WHA) for approval prior to commencement of operations.

### **Recommendation 4**

Design approval must be sought from the Northern Territory Fire and Rescue Services prior to commencement of construction.

### **Recommendation 5**

It is recommended that air monitoring for Volatile Organic Compounds and associated toxins such as toluene, ethyl-benzene and xylene be included in the operational phase of the monitoring program.

### **Recommendation 6**

It is recommended that an Acid Sulfate Soil Management Plan be incorporated in the construction phase Environmental Management Plan.

### **Recommendation 7**

A wash down procedure for all vehicles entering the site, and an inspection and wash down procedure for all heavy machinery imported to the site is to be instigated.

### **Recommendation 8**

A waste management plan for the construction phase of the project should be developed as part of the overall Environmental Management Plan to the satisfaction of the DLPE.

### **Recommendation 9**

Shell should periodically produce a publicly available Risk and Environmental Assessment report for the DJT that details incidents, monitoring results, corrective measures and any amendments to procedures that may come out of a review.

### **Recommendation 10**

As part of the comprehensive Risk Management study of the DJT site, all potential scenarios for petroleum discharge from the DJT, the transfer pipeline and the transfer process should be investigated. It is incumbent on Shell to identify and document all the sensitive areas within Darwin Harbour such as aquaculture farms, water inlets, flora and fauna habitats and to have in place publicly accountable action plans to adequately address each scenario.

### **Recommendation 11**

Estimates of quantities of BTEX components released by the DJT should be provided to the DLPE.

### **Recommendation 12**

As this facility triggers National Pollutant Inventory (NPI) thresholds Shell should report the NPI emissions as part of the national program.

### **Recommendation 13**

It is recommended that Shell install a vapour recovery unit as part of the construction of the road gantry.

### **Recommendation 14**

Administration and workshop facilities should be adequately screened to ensure the buildings are biting midge proof.

# **1 INTRODUCTION AND BACKGROUND**

This report assesses the environmental impacts of a proposal by Sinclair Knight Merz (SKM) to build and operate a terminal at East Arm Port in Darwin Harbour to receive, store and load out petroleum products. This facility is to be known as the Darwin Joint Terminal (DJT) and it is located within the area covered by the East Arm Control Plan 1998.

SKM is acting on behalf of The Shell Company of Australia Limited (Shell), BP Australia Limited (BP) and Mobil Oil Australia Limited (Mobil) in assessing the impact of the DJT proposal. Shell has been appointed project manager for the construction of the DJT, and as such is the proponent for this project.

This Assessment Report reviews the Public Environmental Report (PER) submitted by SKM on behalf of the proponent. It also relies on information, comments and advice provided by Northern Territory Government agencies and previous studies undertaken in the region.

## **1.1 Environmental Assessment Process**

Environmental impact assessment is based on adequately defining those elements of the environment which may be affected by a proposed development, and on quantifying the significance, risks and consequences of the potential impacts of the proposal at a local and regional level.

The PER provides a description of the existing environment in the area and the proposed operations, and evaluates the environmental impacts and proposed mitigating measures to minimise the expected impacts.

This report will assess the adequacy of the PER in achieving the above objectives, and will evaluate the undertakings and environmental safeguards proposed by the proponent to mitigate the potential impacts. Further safeguards may be recommended as appropriate.

The safeguards may be implemented at various levels within the planning framework of a project. These include, but are not limited to:

1. Site selection;
2. Design and layout of facilities;
3. Management of construction activities;
4. Processes used in operations and facilities (i.e. inputs and outputs); and
5. Management of operations, processes and facilities.

The contents of this report form the basis of advice to the Northern Territory Minister for Lands, Planning and Environment on the environmental issues associated with the project.

## 1.2 Environmental Assessment History

SKM lodged a development application with the Department of Lands, Planning and Environment (DLPE) on 30 June 1999, proposing the development of the DJT at East Arm to replace the existing Shell, BP and Mobil terminals at Frances Bay. The development application was examined by the Environment and Heritage Division (EHD) of DLPE and it was considered that the environmental issues associated with the proposal warranted assessment under the *Environmental Assessment Act 1982* at the level of PER.

The Minister for Lands, Planning and Environment accepted the EHD's recommendation and on 21 July 1999 directed that a PER be prepared for the proposal.

Draft guidelines for the preparation of a PER were advertised for public comment and circulated to NT Government advisory bodies for comment on 26 July 1999. Amendments to the guidelines were re-issued on 28 July 1999 after discussions with the proponent. Final guidelines were prepared taking into account the comments received from government agencies. No public comment was received. The Minister issued the final guidelines and a direction to the proponent to prepare the PER on 1 September 1999.

The PER was submitted on 17 November 1999 and placed on public review for 4 weeks from 21 November to 18 December 1999. It was also circulated to government advisory bodies for review and comment. Comments have been received by the EHD and are incorporated in this report. No public comment was received on the PER, and no enquires were made.

## 2 THE PROPOSAL

The Northern Territory Government announced in August 1992 that additional port facilities would be built at East Arm in Darwin Harbour. Expansion of the port has been a long-term goal of the Northern Territory Government since self-government was achieved in 1978. The East Arm Port is being constructed in stages and will ultimately have the potential to handle projected volumes of general cargoes, livestock and bulk materials for at least the next fifty years.

Bulk petroleum shipments are currently received at the Fort Hill Berth, with product stored at and distributed from the Shell, BP and Mobil terminals at Frances Bay. The proposed DJT at East Arm will replace the three existing terminals and will be capable of handling the bulk fuel requirements for Darwin and a large proportion of Territory markets. It will be designed to grow with the Territory and will be a purpose-built facility appropriately designed and constructed to suit the needs of the users.

The site is strategically located near the new East Arm Port, which will have bulk oil tanker berthing facilities and dedicated receipt pipelines from the wharf to the terminal. It is also located adjacent to the proposed Alice Springs to Darwin railway line. Allowance has been made for the future construction of a dedicated siding and rail tank car loading gantry.



The construction of the new terminal at East Arm and the removal of the old terminals will allow land at Frances Bay to be redeveloped for the uses proposed in the Central Darwin Land Use Objectives 1996. With the relocation of the oil company Fort Hill Wharf and tank farm activities, it is expected that oil company road train movements will be significantly reduced within the city area. This will have traffic safety and residential benefits.

The Northern Territory Government is preparing the East Arm site for the proponent. This preparation includes the necessary subdivision, earthworks and off-site stormwater drainage, and connection of services. The Northern Territory Government will also provide the oil berth, the wharf/terminal supply pipelines and other ancillary works. The proponent will provide the DJT and will operate the integrated oil berth, wharf/terminal pipeline and terminal system.

The 20 ha site will provide adequate space for the immediate and future storage and distribution needs of the three oil companies.

A total of 11 tanks will be constructed initially. The terminal layout plan allows for construction of at least 2 additional tanks in the future to meet potential market demands. The basis of the design for tankage is the year 2006 off-takes, and has regard for stock cover and product supply logistics. The total storage capacity is 135 Ml of bulk fuel. The total actual and estimated throughput for the years 1996 and 2006 are 606 and 797 Ml, respectively.

The largest tanks to be constructed will have height/diameter dimensions of 22/36 m, respectively. Tank separation will conform to the relevant Australian Standards (AS 1940). Separation distances are 1.5 times the diameter of the tanks, having regard to risk management and the ability to reduce the need for ancillary fire equipment.

The gantry/distribution area will ultimately allow for the transport of fuel by road trains and rail. Road access will be provided to Berrimah Road to Department of Transport and Works Construction Agency requirements. The gantry/distribution area will also incorporate offices, a control room, a workshop, firewater tank and pump house, storage areas and other ancillary facilities.

All fuel circulation pipelines within the site will generally be constructed above ground.

The site will be secured with security fencing and complemented by security guard patrols. Vehicle and personal access will be by security key card. Site lighting will be provided and emergency security lighting will be provided in the event of a power failure.

The major components of the project are listed below:

1. Bulk product tank farm (11 Storage tanks) and associated bunding.
2. Above ground pipe work.
3. The gantry/distribution area.
4. Hardstand area.
5. Drum filling and storage area.

6. Stormwater drainage system (surface and sub-surface).
7. On-site Fire System.
8. Site Access (with possible future rail access).
9. Site office and amenities.

Shell plans to commence on site works in the third quarter of 2000 and will continue through until the first quarter of 2002. The site will be operational by May 2002.

### **3 ENVIRONMENTAL ASSESSMENT**

#### **3.1 Introduction**

The information provided in the PER has been assessed and then used, along with submissions from advisory bodies to determine the adequacy of the information provided by the proponent and the accuracy and acceptability of predicted impacts and safeguards. Comments and recommendations, based on submissions and comments from Government advisory bodies, are then made.

It is acknowledged that during implementation, flexibility is necessary and desirable to allow for minor and non-substantial changes to the proposals outlined in the PER and examined as part of this assessment. It is considered that subsequent statutory approvals for this project could make provisions for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

It is important for interpretation purposes that the recommendations (in bold) are not considered in isolation, as the text identifies concerns, suggestions and undertakings associated with the project.

Safeguards and mitigation measures undertaken by the proponent in the PER are summarised in tables 1.1 and 1.2, and page 49 of the PER. All safeguards and mitigation measures outlined in the PER are considered to be commitments by the proponent.

Subject to decisions that permit the project to proceed, the primary recommendation of this assessment is:

#### **Recommendation 1**

**Shell shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards identified in the Darwin Joint Terminal Public Environmental Report (summarised in Table 1.2 of the PER) and as recommended in this assessment report. All safeguards and mitigation measures outlined in the PER are considered to be commitments by Shell.**

## **3.2 Issues**

### **3.2.1 Major Environmental Issues**

The principle environmental issues identified by the proponent and this assessment are:

#### Construction Phase

1. Air Quality.
2. Noise.
3. Surface Runoff and Erosion.
4. Management of Acid Sulfate Soils.
5. Introduced weeds, pests and diseases.
6. Disposal of Construction Wastes.
7. Biting Insects.
8. Traffic.

#### Operational Phase

1. Risk Management.
2. Surface Runoff and Water Quality.
3. Ongoing management of Acid Sulfate Soils.
4. Spills and leakages.
5. Waste Disposal.
6. Air Quality.
7. Noise.
8. Biting Insects.
9. Traffic.

### **3.2.2 General Issues**

The proponent has sufficiently addressed all the issues detailed in the PER Guidelines issued to the proponent on 21 July 1999. Overall the PER was well written and easy to follow.

There are a few issues with the PER that are not directly related to the environmental impact of the proposal at the construction and operational stages, but are important in the context of this Assessment report. These are as follows:

#### **3.2.2.1 Environmental Management Plan**

An integral part of the environmental management of the DJT site will be the preparation and implementation of a comprehensive Environmental Management Plan (EMP), and how it interacts and operates with any site management plans.

Plans will need to be developed for both aspects of the project, the construction and the operation. Each of these plans will require approval by DLPE prior to the commencement of construction and operation.

The plans will detail a management system that is equivalent to the ISO14000 standard. Key elements of this system have been identified on page 45 of the PER. One aspect that has not been identified but is important in the whole process is the reporting procedure of the system. Reporting on the effectiveness of the system should be undertaken to management and this should be reviewed periodically by the DLPE.

The EMP will also need to identify a specific contact officer and contact details, as these were not identified within the PER.

### **Recommendation 2**

**An Environmental Management Plan that covers the construction phase of the DJT should be submitted to the DLPE for approval, prior to construction commencing.**

### **Recommendation 3**

**An Operational and Environmental Management Plan for the operational phase of the DJT should be submitted to the DLPE and the Work Health Authority (WHA) for approval prior to commencement of operations.**

This management plan should incorporate, but not be limited to, aspects such as Risk, Fire and Emergency Services Response, Oil Spill Response, Monitoring and Environmental Management. As Shell will operate the berth facilities and transfer pipelines, these areas should also be covered in the Operational and Environmental Management Plan. The plan should be routinely reviewed by Shell, and any major amendments should be submitted to the DLPE and the WHA for approval.

Both management plans should incorporate the matters raised in this assessment report relevant to construction and operations.

#### **3.2.2.2 Site Design**

Given the potential hazards associated with a fuel tank farm of this size, the media and public focus on such facilities, and the potential for the site to be exposed to adverse weather such as cyclones, storm surge, torrential rain and severe lightning, a high standard of site design and construction is imperative.

The PER indicates that the DJT will be designed and constructed to the relevant Australian and International Standards, incorporating the most recent available data and recommended practices. Given the unique location of Darwin and its history of severe weather, Shell should implement Best Practice in the design and construction of the site.

Australian Standard 1170.2 provides for construction to withstand a Category 4 cyclonic wind such as Cyclone Tracy. Darwin was recently under threat of a Category 5 cyclone with winds of up to 340 km/h (94 m/s) with the passing of Cyclone Thelma in December 1998. Similar intense systems have been recorded elsewhere in Australia and around the world in the past few years. For such a hazardous installation, the prevailing standard may not be appropriate.

Adequate access for Emergency Services in and around the DJT should be incorporated in the design. It is recommended that the Northern Territory Fire and Rescue Services (NTFRS) should be consulted on any plans to ensure appropriate access is achieved, and suitable water pressure is available on site to assist in fire fighting.

#### **Recommendation 4**

**Design approval must be sought from the Northern Territory Fire and Rescue Services prior to commencement of construction.**

#### 3.2.2.3 Monitoring

Environmental Monitoring is vital in determining the environmental impact of a project. The information gained over time will be invaluable in assessing the long-term impact of the proposal on the surrounding environment as well as providing trends and immediate triggers for remedial work should environmental pollution occur.

The PER outlines an extensive monitoring program that covers the following aspects:

##### Construction Phase

- Dust.
- Noise.
- Acid Sulphate Soil Potential.
- Surface Water Discharge.
- Mosquito Breeding Sites.

##### Operational Phase

- Stormwater Discharge.
- Groundwater.
- Noise.
- Mosquito Breeding Sites.

Given the sizeable quantities of Volatile Organic Carbon (VOC) expected to be released from the DJT (approx. 585 tonnes/year), it is recommended that some form of air monitoring also be included in the Operational Phase of the monitoring program.

#### **Recommendation 5**

**It is recommended that air monitoring for Volatile Organic Compounds and associated toxins such as toluene, ethyl-benzene and xylene be included in the operational phase of the monitoring program.**

The monitoring program will be developed in conjunction with the DLPE and should be an integral part of the Environmental Management Plan. Details including sites,

parameters, frequency and detection limits should be included. Periodic reviews of the data and the program should also be undertaken with the DLPE.

There is a high probability the site will be listed under Schedule 2 of the *Waste Management and Pollution Control Act* and as such it will become a licensable activity. If this is the case, periodic reporting of monitoring results to the DLPE will be recommended as a condition.

### **3.2.3 Construction Issues**

The Northern Territory Government is preparing the site. This preparation includes the necessary subdivision, earthworks and off-site stormwater drainage, and connection of services. The Northern Territory Government will also provide the oil berth, the wharf/terminal supply pipelines and other ancillary works.

Shell plan to commence on site works in the third quarter of 2000 and will continue through until the first quarter of 2002.

#### **3.2.3.1 Air Quality.**

In constructing any large scale facility such as the DJT, dust will be generated due to the movement of vehicles on what is essentially clay fill. To avoid issues associated with wet season runoff, such as erosion and turbid runoff into Darwin Harbour, it is suggested that the major earthworks be carried out in the dry season. This will, however, increase the potential for dust and impacts on Air Quality.

The PER commits to implementing appropriate dust control measures should dust levels prove to be an issue. Shell should be more proactive on the issue and implement a dust management plan that ensures dust does not become an issue. Periodic watering of construction roads and earth materials is seen as a more effective method than attempting to predict conditions when dust is likely, or acting after high levels of dust are observed.

#### **3.2.3.2 Noise.**

The East Arm Port facility and associated industrial areas are sufficiently far away from residential areas that construction noise will not be an issue.

On site exposure to noise, however, will be significant for workers and contractors during construction. Shell should liaise with the Work Health Authority (WHA) to ensure that appropriate Occupational Health and Safety practices are implemented on site in regards to noise.

#### **3.2.3.3 Surface Runoff and Erosion.**

Construction operations have the potential to impact on both surface and groundwater resources. Surface water resources can be contaminated through surface runoff. Contaminants could potentially include spilt petroleum products from construction vehicle refuelling and suspended material from soil erosion. Groundwater resources can potentially be impacted by the infiltration of contaminants into the soil.

Contaminants may include petroleum products and soluble compounds leached from site materials.

The off-site discharge of surface drainage could act as a vector for the movement of contaminants from the terminal facility into the broader environment, including the adjacent mangrove areas and the waters of East Arm. Siltation of mangrove areas, increased turbidity and sedimentation in the waters of East Arm could result.

Shell has committed to using good construction practices that minimise the environmental impact of waste effluent generated on site. These will include surface drainage systems that divert runoff away from disturbed areas, and silt traps to minimise off-site sediment discharges.

As in section 3.2.3.1, it is suggested that where possible, major earthworks should be conducted in the dry season. Attempts should be made to rehabilitate the disturbed areas prior to the onset of the wet season.

#### 3.2.3.4 Management of Acid Sulfate Soils.

Acid sulfate soils are wet anaerobic soils which, when exposed to oxygen have the potential to form sulfuric acid. This lowers the pH levels and mobilises metals in the soil creating an acid leachate with elevated metal concentrations. The acid leachate also has the potential to accelerate corrosion and undermine foundations and pipe work.

Previous assays of the DJT site have shown it to contain potential acid sulfate soils (PASS).

Although the NT Government is preparing the site for the construction of the DJT, there is still the potential for acid sulfate soils to be exposed if excavations occur during construction that are deeper than the cover provided in the site preparation.

Shell will confirm the presence and depth of PASS and on that confirmation will develop and implement an acid sulfate soil management plan.

#### **Recommendation 6**

**It is recommended that an Acid Sulfate Soil Management Plan be incorporated in the construction phase Environmental Management Plan.**

#### 3.2.3.5 Introduced weeds, pests and diseases.

The DJT site will service a large regional area. With this, the potential for weeds, pests and diseases to be introduced into the Darwin area through traffic movements is significant, particularly during the construction phase where heavy earthmoving equipment will be sourced from around the Territory and interstate.

It is essential that prior to operation on site, any introduced machinery is washed down and inspected to ensure no weeds or pests are present.

#### **Recommendation 7**

**A wash down procedure for all vehicles entering the site, and an inspection and wash down procedure for all heavy machinery imported to the site is to be instigated.**

The Department of Primary Industry and Fisheries and the Northern Territory Parks and Wildlife Commission should be consulted on the best approach to prevent the importation of weeds, pests and diseases.

#### 3.2.3.6 Disposal of Construction Wastes.

For a large construction site such as the DJT, waste management during the construction phase is an important component due to the large volume of solid waste that will be generated. Significant amounts of waste oils and solvents will also be generated and will require recycling or disposal.

Shell has committed to seeking approval from the DLPE for disposal of all waste materials.

### **Recommendation 8**

**A waste management plan for the construction phase of the project should be developed as part of the overall Environmental Management Plan to the satisfaction of the DLPE.**

Territory Health Services (THS) should be consulted in relation to the provision of ablution facilities during construction, and the removal and handling of associated sewage and sullage.

#### 3.2.3.7 Biting Insects.

Due to the DJT sites proximity to known breeding habitats for biting midges and mosquitoes, biting insects will be a problem during construction and will remain a problem throughout the operational phase for those personnel working in and around the facility.

All collection points for water created during construction will become potential breeding sites and further exacerbate the problem. Shell have indicated that they will undertake measures to control or eliminate these potential breeding sites, and undertake regular inspections to ensure potential habitat areas are kept in check.

Shell should liaise with the Medical Entomology Branch of THS throughout the construction and operation of the site on issues of Biting Insects.

Workers at the facility should be informed of the potential pest problem and encouraged to use personal protection measures when biting insect numbers are high. Reference should be made to the Territory Health Services THS publication "Personal Protection for Mosquitoes & Biting Midges in the NT" when formulating policy on Biting Insects.



### 3.2.3.8 Traffic.

During construction of the site, traffic entering and exiting the site from Berrimah Road will temporarily increase. Movement of large vehicles and loads is expected throughout the construction phase.

As the DJT site is part of the East Arm Precinct, and the site has major arterial access. Traffic movements should not be adversely effected. There are no residential areas that will be affected by the proposal.

## 3.2.4 Operational Issues

The DJT site will be owned and operated by the joint proponents. The Northern Territory Government will construct and own the supply pipeline as part of the port infrastructure and lease this back to the joint proponents to manage. Operation is expected to commence in May 2002.

### 3.2.4.1 Risk Management

Recent media and public awareness and scrutiny of large petroleum companies and their associated infrastructure have ensured that this will be a high profile site in Darwin. Shell will need to ensure that the risks associated with this facility are all manageable, and will need to be pro-active in ensuring that the public and media are confident that the site is and will remain safe for the life of the Terminal.

The Risk Assessment Matrix put forward by Shell for this site is comprehensive and seems to have addressed, at a preliminary level, every potential hazard that could cause an environmental impact. Further comprehensive risk assessments will need to be undertaken at the final design stage, prior to commencement of operations, and continually throughout the operation of the site to ensure risk is kept to a minimum.

Shell should seek review and input from the NTFRS, WHA and the DLPE in relation to any risk assessments undertaken. In particular the NTFRS may have concerns in relation to access and fire fighting supplies.

## **Recommendation 9**

**Shell should periodically produce a publicly available Risk and Environmental Assessment report for the DJT that details incidents, monitoring results, corrective measures and any amendments to procedures that may come out of a review.**

### 3.2.4.2 Surface Runoff and Water Quality.

The Darwin region is exposed to intense rainfall throughout the wet season. These events frequently produce large flash floods and excess quantities of runoff that are not readily experience in other parts of Australia. The proposed site is also located adjacent to Darwin Harbour and sensitive mangrove communities. Given this and the nature of the product being stored on site, water management will be a critical aspect in the environmental management of the DJT.

The DJT will consist of large areas of hardstand and roof surfaces. This will produce a large increase in stormwater runoff quantities and velocities above those expected in a

typical catchment of this size. This runoff will potentially contain many contaminants including petroleum hydrocarbons, oils and solvents.

Shell has committed to providing first flush containment of runoff from those areas where accidental petroleum contamination may occur, and oil/water separation pits for those areas where continuous petroleum contamination will occur (such as bunded tank areas, drum filling, road gantry etc.). First flush containment catches the initial and most contaminated runoff before the heavier rains dilute and flood the system. Oil water separation pits remove petroleum contamination from the surface of the water for further treatment and disposal. All systems involve underflow extraction of clean water.

Velocities of stormwater runoff will be high at times and have the potential to scour at discharge points. Particularly where mangrove flats are being used for discharge. To avoid significant scouring, energy dissipation in the form of blocks or rip rap should be considered at stormwater discharge locations.

#### 3.2.4.3 Ongoing management of Acid Sulfate Soils.

Although acid sulfate soils are likely to be encountered only in the construction phase, there is the possibility through the life of the DJT that extra construction activity or maintenance may uncover acid sulfate soils. Management of acid sulfate soils should therefore be included in the EMP. Contractors undertaking works on site should be made aware of the possibility of encountering these soils if excavations are to be undertaken.

#### 3.2.4.4 Spills and leakages.

Darwin Harbour has many commercial and recreational beneficial uses. Many of these uses are within the vicinity of East Arm and the DJT. Given the recent spill in Sydney Harbour, the main public focus on the facility will be its potential to impact on Darwin Harbour from spills and leaks into the harbour.

The DJT will house refined petroleum products rather than thicker unrefined crude oil. These refined products have a low persistence (one to 3 days) in the sea. However they have a high aquatic toxicity and a spill can have a serious impact on marine life, particularly in the intertidal zone.

There are 3 main areas of risk where spills and leaks could impact on Darwin Harbour. The wharf terminal during docking and transfer operations, failure of the transfer pipeline between the wharf and the DJT, and the failure of containment of fuel spills on site combined with stormwater discharge.

### **Recommendation 10**

**As part of the comprehensive Risk Management study of the DJT site, all potential scenarios for petroleum discharge from the DJT, the transfer pipeline and the transfer process should be investigated. It is incumbent on Shell to identify and document all the sensitive areas within Darwin Harbour such as aquaculture farms, water inlets, flora and fauna habitats and to have in place publicly accountable action plans to adequately address each scenario.**

In assessing the various scenarios for petroleum discharge, Shell should consult with DLPE who are currently working on the Darwin Harbour hydrodynamic model. This model will be invaluable in determining the spread of any spill and providing varying scenarios for differing tidal ranges and discharge points.

Investigations into the recent oil spill in Sydney Harbour have recommended that booms as a safety precaution should be placed to contain any vessel at berth. Shell should consider this approach for Darwin Harbour in consultation with the Darwin Port Corporation. Oil spill contingency planning should be carried out in consultation with the Port Corporation and the NT Marine Pollution Committee.

#### 3.2.4.5 Waste Disposal.

Waste disposal will only be required for the sludge and waste oil that is collected in the drainage treatment system, and any sewage and sullage collected within the septic system.

Waste oil and sludge will be disposed of by an approved waste contractor to an approved waste disposal site. Shell should consult with the DLPE in regards to appropriate waste disposal and general on site Waste Management.

Septic system effluent disposal will be in accordance with THS requirements. Shell should be aware that the current requirements are detailed in the Territory Health Services' *Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent*.

#### 3.2.4.6 Air Quality.

The main air quality issue during the operation of the DJT will be VOC emissions to the atmosphere from storage and handling facilities. VOC emissions will exceed 585 tonne per annum (t/a) by 2006 from the DJT site with 523 t/a emitted from the road gantry alone. With these emissions come specific air toxins, particularly benzene plus small amounts of toluene, ethyl-benzene and xylene (commonly know as BTEX).

Shell has addressed the VOC/photochemical smog aspects of these air emissions, however estimates of the BTEX components have not been addressed.

### **Recommendation 11**

**Estimates of quantities of BTEX components released by the DJT should be provided to the DLPE.**

Facilities in the Northern Territory that exceed certain activity thresholds are required to report emissions to air, land and water on an annual basis. These emission reports will be provided to the Commonwealth for inclusion in a public database. This database is know as the National Pollutant Inventory (NPI).

### **Recommendation 12**

**As this facility triggers National Pollutant Inventory (NPI) thresholds Shell should report the NPI emissions as part of the national program.**

The highest proportion of VOC emissions are from the road gantry (~89.5%). Shell has committed to designing the gantry to allow for future installation of a vapour recovery unit to minimise VOC emissions. The establishment of this recovery unit will make a significant contribution to the reduction of VOC emissions and associated toxins.

### **Recommendation 13**

**It is recommended that Shell install a vapour recovery unit as part of the construction of the road gantry.**

There is a high probability oil/petroleum storage will be listed under Schedule 2 of the *Waste Management and Pollution Control Act* and as such it will become a licensable activity. As part of any licence to operate, a vapour recovery unit will be made mandatory.

#### **3.2.4.7 Noise.**

The East Arm Port facility and associated industrial areas are sufficiently far away from residential areas that noise will not be an issue.

Occupational Health and Safety noise levels will be consistent with good industry practice and WHA regulations.

#### **3.2.4.8 Biting Insects**

As mentioned above, the DJT sites proximity to known breeding habitats for biting midges and mosquitoes will be a problem throughout the operational phase for those personnel working in and around the facility.

All collection points for water created around the site will become potential breeding sites and further exacerbate the problem. Shell have indicated that they will undertake measures to control or eliminate these potential breeding sites, and undertake regular inspections to ensure potential habitat areas are kept in check.

Shell should liaise with the Medical Entomology Branch of THS throughout the construction and operation of the site on issues of Biting Insects.

Workers at the facility should be informed of the potential pest problem and encouraged to use personal protection measures when biting insect numbers are high. Reference should be made to the THS publication "Personal Protection for Mosquitoes & Biting Midges in the NT" when formulating policy on Biting Insects.

Normal fly screening does not screen midges affectively and in this area this could create a biting midge problem within buildings and workshops.

### **Recommendation 14**

**Administration and workshop facilities should be adequately screened to ensure the buildings are biting midge proof.**

#### 3.2.4.9 Traffic.

During the operation of the DJT a maximum of 80 tankers will visit the site per day. Although this is a sizeable amount of large haulage traffic, arterial access to the site is good and does not currently involve travel through residential areas. Shell have committed that all traffic movements will be via the designated arterial roads and road train routes.

## 4 CONCLUSION

It is considered that the environmental issues associated with the project have been adequately identified. Most of the issues have been resolved through this assessment process, while the remainder will be addressed through the Construction and Operational Environmental Management Plans.

Initially, the PER and recommendations detailed in this Assessment Report will form the basis for the Shell's management and monitoring commitments. The Environmental Management Plan will be a working document for the operation of the facility and will require continual review and updating in the light of operational experience and changed circumstances.

In addition, there is a high probability oil/petroleum storage will be listed under Schedule 2 of the *Waste Management and Pollution Control Act* and as such it will become a licensable activity. If so it will be required to comply with any licence conditions as well as regulations set down by the act.

Provided that the environmental commitments and safeguards detailed in the PER are implemented, the recommendations in this Assessment Report are adopted and regular reviews and reporting are undertaken, long term environmental impacts should be minimised.