City Pacific Limited

Townsville Ocean Terminal Project

Health & Safety

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Contents

Executive Summary

Hyder Consulting has conducted an assessment of the potential impacts on the health and safety of the local community within vicinity of the project site and the workforce employed in the construction and operation of the Townsville Ocean Terminal (TOT) Project pursuant to Section 4.14 of the Terms of Reference.

Existing community values for public health and safety have been identified within the project area are existing air, noise and traffic environments, existing health care services, emergency and disaster management services.

Potentially affected populations have been identified and include residences along proposed haul routes, the Loreto Home for the Aged, St Patricks and St Josephs schools and the Townsville CBD. Kindergartens and hospitals are located at much greater distances from the site and are not likely to be significantly affected.

Public health and safety impacts may include air and noise emissions, traffic increases, water quality impacts and natural hazards. Health and safety objectives

- Protection of the health and well-being of the community and individuals;
- Protection of the health and safety of the project workforce;
- Ensure establishment of hazard management and emergency procedures;

Specialist studies have been undertaken to determine the extent of impacts from these sources and mitigation measures have been incorporated into the project EMP. In addition, the Breakwater Cove Body Corporate will be required to prepare and implement a Disaster Action Plan for the site to provide emergency and evacuation procedures for future residences.

Impact mitigation measures to be implemented during construction include:

- Progressive stabilisation of disturbed areas within the site that are subject to wind-blown dust;
- Use of dust suppression techniques during earthworks and other ground-disturbing activities including water sprays, erosion control and removal of sediments from public roads; and
- Monitoring of air-borne dust at site boundaries and at sensitive receptors where required

- Implementation of control measures outlined in the Australian Standard *AS2436-1981: Guide to noise control on construction, maintenance and demolition sites*.

The requirements for the development of the Breakwater Cove precinct are outlined in the Port Protection Agreement between the State of Queensland, Port of Townsville and the Proponent. The Proponent will ensure that design standards are outlined in a Community Management Statement to ensure that amenity impacts from the lawful use and operation of the port are appropriately mitigated. Acoustic design standards for residences are outlined in the Building Code of Australia and include measures such as insulation of walls, windows, doors and ceilings. Other measures may include appropriate orientation of buildings away from the port and construction of acoustic barriers.

Monitoring, auditing and management measures are also proposed by specialist studies and are addressed in the EMP

The operator of the TOT facility will be required to prepare a site-specific Workplace Health and Safety Plan to ensure protection of employees and visitors to the ocean terminal. During the construction phase, the principal contractor will be required to provide a WHSP to ensure implementation of health and safety principles for all contractors engaged to work on the construction site.

An emergency response plan will be prepared in consultation with local emergency services prior to the commencement of operation of the TOT. Policing and management of large groups and security of public visitors to the TOT will be maintained by establishment of security procedures including crowd surveillance and control measures.

Disease vector such as mosquitos and biting midges are considered. There is the possibility during construction that pools of standing water may establish on the construction site. Mitigation measures will be implemented on pools that remain for more than 5 days to prevent the formation of mosquito breeding sites.

Monitoring regimes for air quality, noise emission and water quality are outlined in specialist consultants reports and are incorporated into the project EMP.

Overall it is considered that there are no potentially adverse issues of public health and safety that could not be mitigated for the construction and operation of the project.

1 Description of Environmental Values

This section identifies and describes the health and safety values of the existing environment that may be affected by the construction and operation of the TOT project including ambient air, noise and traffic environments. Potentially affected populations are identified with a focus on sensitive receptors in the vicinity of the project site.

1.1 Existing Air Environment

The existing air environment within the vicinity of the project site is influenced by a number of factors including the proximity to existing industrial areas and marine transport, loading/unloading and storage activities associated with the Port of Townsville.

Activities undertaken at the Port of Townsville include the export and import of bulk goods such as Nickel ore and sugar and the loading of general cargo and containers. Material loading and unloading occurs at 9 berths located within the port. Handling and storage of materials distributed through the port is also undertaken within the port precinct. These materials include sugar, copper ore, molasses, bitumen, oil and fuel storage, recycled metals and fertiliser products (Port of Townsville 2007).

The port precinct is linked to the Townsville State Development Area (TSDA) to the east of Ross River, which was established as part of the Queensland Government's strategy to ensure significant investment in new base metals processing industries and to facilitate economic growth and employment generation for the Townsville region and the State. This region lends itself to industrial development due to its close location to the Port of Townsville, and the availability of key infrastructure (Coordinator General 2006).

Emission of air pollutants from these sources is regulated by legislative instruments administered by the Environmental Protection Agency (EPA). The *Environmental Protection Policy (Air) 1997* (EPP Air) identifies environmental values to be enhanced or protected within Queensland. These values relating to air quality are:

> *"the qualities of the air environment that are conducive to suitability for the life, health and well-being of humans".*

The EPP Air specifies air quality indicators and goals to protect these environmental values and to achieve the object of the *Environment Protection Act 1994*. In addition the National Environment Protection

Measure (NEPM) specifies desired environmental outcomes for adequate protection of human health and well-being. The EPP Air air quality goals and NEPM standards for maximum levels of air pollutants to be achieved for the major pollutants identified for assessment within the project area are described in Table 4.13.1.

Table 4.13.1: Air quality criteria specified by the EPP Air and the NEPM for protection of environmental values

Air Pollutant	EPP Air Goal	NEPM Standard
Nitrogen dioxide	150 µg/m^3 (or 0.16 ppm) - 1hour averaging period	0.12 ppm - 1hour averaging period 0.03 ppm - 1 year averaging period
Sulfur Dioxide	570 µg/m^3 (or 0.20 ppm) - 1 hour averaging period	0.20 ppm - 1 hour averaging period 0.02 ppm - 1 year averaging period
Particulate Matter (PM_{10})	150 µg/m^3 - 24 hour averaging period 50 µg/m^3 - 1 hour averaging period	50 µg/m3 - 1 day averaging period

The EPA currently monitors air pollutant levels at five sites within Townsville including one monitoring station within the Port of Townsville and one located within the Stuart Industrial Area. The results of EPA monitoring for 2005 showed that annual mean pollutant loadings were consistently below NEPM standards and EPP Air goals for NO_2 and SO_2. However, dust storms occurring in February caused exceedences of NEPM and EPP Air 24-hour criteria for PM_{10} (EPA 2005).

An assessment of the existing air environment in the vicinity of the project site and an evaluation of potential impacts on nearby sensitive receptors has been undertaken by Air Noise Environment Pty Ltd (ANE) as part of this EIS and the results are described in detail in Section 4.7. The results of the ANE assessment indicate that air quality within the project site is generally in compliance with regulatory criteria levels with the exception of air-borne dust emissions.

The Townsville Port Authority currently conducts monitoring of dust deposition within the port site. Results of this monitoring program indicate exceedences of the EPA dust deposition goal (total insoluble particles) within the port site itself. However, dust levels at the port boundaries were in compliance with the EPA goal. Dust deposition monitoring is being conducted for a period of 12 months within the project site and at nearby sensitive receptors to assess the potential impacts of dust emissions both internal and external to the project site.

1.2 Existing Noise Environment

Existing noise sources within the project area include activities associated with the Port of Townsville, vehicular traffic around the CBD and the Strand Parkland and periodic events held at the Breakwater Casino Entertainment Centre. Noise generating processes and equipment currently in operation at the Port of Townsville include:

- bulk loading and unloading of ships by use of mobile cargo handling equipment such as forklifts, tractors, cranes and front end loaders;
- motor vehicles associated with road transport and railway transport equipment;
- ship signals, PA system, ship repair workshop and slipway; and
- bulk goods storage and handling facilities.

(Port of Townsville 2003)

The environmental values relating to noise identified by the *Environmental Protection Policy (Noise) 1997* (EPP Noise) include:

- *'the wellbeing of the community or a part of the community, including its social and economic amenity; or*
- *the wellbeing of an individual, including the individual's opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise.'*

Schedule 1 of the EPP Noise provides planning levels for noise generated by public roads and railways when measured at noise sensitive places. These levels are provided in Table 4.13.2.

Table 4.13.2: Noise Planning Levels for Roads and Railways specified by the EPP Noise

Noise level criteria	State Controlled Road	Other Public Road	Railway
L10 (18 hour level)	68dB(A)	63 dB(A)	-
1 hour equivalent continuous A-weighted SPL 10pm-6am	60 dB(A)		-
24 hour average equivalent continuous A-weighted SPL	-		65 dB(A)
Single event maximum SPL	80 dB(A)		87 dB(A)

While noise levels for other activities are not specified by the EPP Noise, the EPA provide estimated maximum values of planning noise levels for noise emitted from commercial and industrial premises for various types of neighbourhood in their *Guideline Planning for Noise Control*. The planning levels for neighbourhoods typical of those found in the vicinity of the project site are provided in Table 4.13.3.

Table 4.13.3: Planning Noise Levels for Emissions from Commercial and Industrial Premises specified by the EPA

		Maximum hourly SPL ($L_{Aeq, 1\ hour}$)		
Category	**Neighbourhood Type**	**day**	**evening**	**night**
Z2	Negligible transportation, less than 80 vehicles per hour	50	45	40
Z3	Low-density transportation (< 200 vehicles/hour)	55	50	45
Z4	Medium density transportation (< 600 vehicles/hour) or some commerce or industry	60	55	50

An acoustic assessment of the major noise sources within vicinity of the project site has been conducted by Hyder Consulting as part of this EIS

including monitoring of noise sources and modelling of noise contours across the project site. The results of this assessment are described in detail in Section 4.9.

1.3 Existing Traffic Environment

The Port of Townsville is currently Queensland's third largest industrial port. Due to continued growth within the Port there has been an increase in commercial and heavy vehicle traffic. In response to the concerns of residents living in close proximity to the Port, the Queensland Government has conducted a review of the future growth of the Port. The review identified future road and rail access requirements to service this growth to the year 2025 (SD&I, nd). This has resulted in identification of future access corridors for the Port. These are generally located to the south of the Ross River within the State Development Area.

Vehicular access to the TOT project site will be via an extension of Entertainment Drive. The development will generate additional traffic consisting primarily of private vehicles travelling to and from the Breakwater Cove precinct. The TOT precinct will generate increased traffic from tourist transport within the region and traffic associated with servicing of cruise and naval vessels.

The community values which may be affected by the TOT project due to the increased traffic generation include:

- the safety of pedestrians and motorists;
- access to the northern and eastern areas of the CBD and nearby residences, retail outlets and commercial premises; and
- the amenity of local businesses and the community.

1.4 Existing Health Care Services

The Townsville region is well serviced by a comprehensive health care network including the largest hospital in provincial Australia. Health care facilities within the Townsville Health Service District include:

- The Townsville Hospital Complex, Douglas, Townsville: a 460-bed facility providing a comprehensive range of health care services including patient care, medical technology, mental health, specialist and allied health services;
- The Magnetic Island Health Service Centre, Magnetic Island: a primary health care facility providing clinical services to residents and visitors;

- Ingham Health Service, Ingham: a 30-bed facility providing acute patient care, outpatient clinic and general surgery; and
- Joyce Palmer Health Service, Palm Island: a 15-bed facility providing primary level acute care for non critically-ill patients.

(Queensland Health, 2006)

In addition two private hospitals are located in Townsville.

- Mater Private Hospital, Pimlico, Townsville: a 165-bed acute care facility including intensive care, coronary care and cardiac surgery; and
- The Wesley Hospital, Hyde Park, Townsville: an 80-bed acute care facility with a 34-bed medical/surgical unit.

1.5 Existing Emergency Services

Townsville's local Queensland Ambulance Service is located at Hugh Street, Currajong; the Queensland Fire and Rescue Service is located at Morey Street, South Townsville; and Queensland Police have stations at Townsville City, Kirwan, Hermit Park, Stuart, Deeragun and Magnetic Island.

These services are supported by the Townsville City Council and Thuringowah City Council State Emergency Services (SES) Unit which has facilities at West End, Bluewater, Cungulla, Magnetic Island, Mt Spec and Rollingstone. The Townsville-Thuringowah SES has developed a Counter Disaster Plan to facilitate a coordinated response to cyclone, storm surge, flooding accidents and medical emergencies (Townsville City Council 2005).

1.6 Local Disaster Management

Townsville and Thuringowah City Councils have formed a Local Disaster Management Group have developed a Local Disaster Management Plan (LDMP) under Section 57 of the *Disaster Management Act 2003* to manage potential risks to the community during disaster events. This plan identifies the potential threats to communities within the local government areas as summarised in Table 4.13.4 below (TTLDMG 2005).

Table 4.13.4: Potential threats to communities in the Townsville and Thuringowah areas*

Threat	Description
Flood	Townsville is situated on a floodplain and is subject to extreme weather events. The LDMP identifies high probability and medium risk of disruption to road and rail transport and property damage due to flooding.
Cyclone, severe storm and storm tide	Storm tides associated with cyclones cause widespread damage to coastal areas in Townsville. The LDMP assesses this threat as high probability and high risk.
Earthquake and landslide	There is low occurrence of these events in Townsville. Although the LDMP assesses this threat as low probability, the risk to life and property is high.
Fire	The threat of fire in urban areas is predominantly associated with major building fire and has a low probability of occurrence, but is classified by the LDMP as a high risk threat.
Aircraft accidents	Aircraft accidents may occur in the Townsville area where flight paths are over residential and industrial areas. The LDMP identifies a low probability of occurrence of these accidents but a high risk.
Shipping accidents	These may occur within harbour channels used by cargo, passenger and naval vessels as well as recreational vessels, ferries and barges. These threats are rated as low probability and medium risk.
Industrial accidents	These accidents include explosion or chemical spills and are identified as low probability and high risk.
Road and rail accidents	High volumes of traffic (including heavy vehicles) exist on major roads in the area. The risk of accidents is assessed as medium probability and high risk.
Disease	The LDMP identifies a high probability and high risk of disease outbreaks given the proximity of Townsville to southeast Asia.
Oil Spills	Significant oil spills within Townsville harbour and shipping lanes would lead to environmental impacts on foreshore communities. The LDMP classifies such threats as low probability and low risk.
Space Debris	The risk of debris falling to earth from man-made satellites and meteors is low and identified by the LDMP as low probability of occurrence.
River Flooding	River flooding may be caused by breach of the Ross River Dam. The LDMP identifies this threat as a low probability. However the probability of occurrence is increased if heavy rain occurs during cyclone events and the threat represents a high risk to communities.

*Source: TTLDMG 2005.

The Townsville Thuringowah Local Disaster Management Group has operational systems for receipt and distribution of disaster event warnings and for alert, standby and activation of the Group in the event of an impending threat. The system for response during a disaster and recovery of damaged infrastructure and property is also coordinated by the Group (TTLDMG 2005).

1.7 Identification of Sensitive Receptors

1.7.1 Residential Areas

The nearest residential areas are located at The Strand (low to medium density) at Melton Hill (detached housing and dual occupancy) and within the Mariners Peninsula development (residential apartments) to the south and southwest of the project site. Areas of detached housing and mixed residential areas are also located to the southeast of the site on the eastern side of the Ross River. These residential areas may be potentially affected by air, noise and traffic impacts associated with construction and operation of the project.

1.7.2 Central Business District

The CBD precinct of Townsville is located approximately 700 metres southwest of the TOT project site. The nearest land uses to the project site within this precinct include areas zoned as 'tourist core' and 'entertainment core' under the Townsville City Plan 2005. To the east of the site, there is an industrial area associated with the Port of Townsville.

1.7.3 Educational Facilities

The nearest schools to the TOT site are St Josephs Primary School and St Patricks Secondary School. These schools are located on The Strand approximately 700 metres southwest of the project site boundary. Townsville Central Primary School is approximately 1 km west of the development. Townsville South Primary School is approximately 2km south southeast of the site.

There are two childcare centres located in the vicinity of the project site. The Kennedy Place Early Childhood Centre lies approximately 2 kms south west of the site and the Koolkuna Kindergarten and Pre School is approximately 2 kms south of the project site. Figure 1 illustrates the location of schools and child care centres in relation to the project site.

1.7.4 Health Care Facilities

The nearest hospital to the project site is the Wesley Hospital which is approximately 4km southwest of the site. The hospitals nearest to the site include:

- the Wesley Hospital Townsville, 9 Bayswater Rd Hyde Park located approximately 4 km southwest of site;
- the Mater Private Hospital, 21-37 Fulham Rd Pimlico located approximately 6 km southwest of site; and
- Townsville Hospital, 100 Angus Smith Drive Douglas located approximately 10km southwest of site.

The Loreto Home for the Aged is also located at 45 The Strand, North Ward and is approximately 400m west of the site along the coastal frontage. Figure 2 illustrates the location of hospitals and aged care facilities in relation to the project site.

1.8 Potentially Affected Populations

Mapping of the sensitive receptors surrounding the site indicates that the Loreto Home for the Aged is the nearest most sensitive receptor and is located approximately 400m from the project site. St Patricks and St Josephs schools are the next most sensitive receptors being located 700m from the site. The Townsville CBD is located approximately 700m from the site and will be affected by the increase in traffic flows generated by the TOT. Other sensitive receptors including kindergartens and hospitals are located at much greater distances from the site and are not likely to be significantly affected.

2 Potential Impacts and Mitigation Measures

This section identifies the potential impacts on existing health and safety values and describes the objectives and practical measures for protecting community and occupational health and safety values. In addition, measures for controlling disease vectors within the site are described.

2.1 Health and Safety Objectives

The objectives for mitigation of health and safety impacts during construction and operation of the TOT project include:

- Protection of the health and well-being of the community and individuals;
- Protection of the health and safety of the project workforce;
- Ensure establishment of hazard management and emergency procedures;

These objectives will be achieved by adherence to the mitigation measures proposed in the project EMP, which incorporates the recommendations of specialist studies and investigations. Specialist recommendations for protection of health and safety are based on relevant Australian and international standards and performance indicators.

2.2 Public Health and Safety

2.2.1 Air Quality

The primary sources of air pollutants in Australian cities are motor vehicle emissions, wood smoke (from domestic fireplaces and bushfires) and industrial emissions Dispersion of these pollutants within an area is influenced strongly by meteorological conditions such as wind speed and direction (Kjellstrom et al 2002).

The predominant air pollutants within the project area identified by the ANE air quality assessment include fine particulate matter and gaseous pollutants such as nitrogen dioxide and sulphur dioxide which may be generated by earthworks and construction machinery, construction traffic, traffic associated with operation of the TOT, marine vessels berthed at the TOT and on-board generators.

Health effects associated with these substances include eye irritation, upper respiratory tract infection and exacerbation of cardio-respiratory

diseases. Those most at risk of these effects include people with respiratory diseases such as asthma and elderly people (Kjellstrom et al 2002).

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a gaseous air pollutant produced as a result of vehicle exhaust emissions and other fuel combustion processes (Greenfacts.org 2006). The primary sources of nitrogen dioxide emissions identified for the TOT include motor vehicle traffic, material transport including road and rail and marine craft.

Studies on human populations indicate that long-term exposure to NO_2 levels may cause a decrease in lung function and may increase the risk of respiratory symptoms such as acute bronchitis (WHO 2003).

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colourless gas or liquid produced by burning of fossil fuels (coal and oil) and the smelting of mineral ores (aluminum, copper, zinc, lead and iron) that contain sulfur. Locomotives, large ships, and some non-road diesel equipment currently burn high sulfur fuel and release SO_2 into the air (DEH 2005). The primary emission sources of SO_2 for the TOT, as for NO_2, are likely to include motor vehicle traffic, terminal operation vehicles and marine craft using the terminal and marina areas.

Exposure to SO_2 may cause a burning sensation in the nose and throat and may result in breathing difficulties (ATSDR 1999). Long term exposure to SO_2 can cause changes in lung function and may aggravate existing heart disease. Asthmatics may be sensitive to changes in respiratory effects due to SO_2 exposure at even low concentrations (DEH 2006a).

Particulates

Particulates or particulate matter (PM) are small particles of solid or liquid suspended in a gas. These particles range in size from less than 10 nanometres to more than 100 micrometres in diameter (EPA 2006a). Combustion processes using coal and other fossil fuels, such as power generation, industrial operations and motor vehicle fuels, emit most of the particulate matter in urban areas. Other noticeable sources of particulates include agricultural burning practices (e.g. burning of sugar cane prior to harvesting) and emissions from domestic solid fuel heaters and woodstoves (EPA 2006a). The primary sources of particulates identified for the TOT include construction activities, vehicular traffic, terminal operation vehicles and marine craft using the terminal and marinas.

Particulates can be a health hazard due to their small size. Respirable particles (PM_{10}) are capable of penetrating deep into the lungs (CSUN 2002). Exposure to particulates have been linked with acute short-term symptoms such as headache, dizziness, light-headedness, nausea, coughing, difficult breathing, tightness of chest, and irritation of the eyes and nose and throat (FCPC 1998).

Diesel engines in particular emit large quantities of particulate matter and diesel exhaust is considered a potential human carcinogen. Studies of humans routinely exposed to diesel fumes indicate a greater risk of lung cancer. For example, occupational health studies of railroad, dock, trucking, and bus garage workers exposed to high levels of diesel exhaust over many years consistently demonstrate a 20 to 50 percent increase in the risk of lung cancer (UCSUSA, 2005). Long-term exposures can lead to chronic, more serious health problems such as cardiovascular disease, cardiopulmonary disease, and lung cancer (Monforton 2006).

Industrial Emission Controls

Existing ambient levels of air pollutants are not expected to increase significantly as a result of operation the TOT Project and potential impacts are expected to be minimal. Mitigation of air quality impacts from industrial sources is most effective when controlled at the source of emissions. This may include regular maintenance and repair of operational equipment, modification of equipment and processes to reduce emissions

Recommendation for minimising air emission impacts from industrial sources are outlined in the Air Quality Impact Assessment.

Project Emission Controls

Construction activities may result in localised, short-term impacts on ambient air quality in the vicinity of the site, predominantly through airborne dust emissions. Operation of the TOT may result in airborne pollutants generated from marine vessels and from loading/unloading operations. These impacts will be minimised by adherence to the mitigation measures outlined in the EMP provided in Chapter 5.

The EMP has been developed in compliance with the *Environmental Protection (Air) Policy 1997* (EPP Air) and aims to minimise air-borne pollutants being transported from the site. Impact mitigation measures to be implemented during construction include:

- Progressive stabilisation of disturbed areas within the site that are subject to wind-blown dust;

- Use of dust suppression techniques during earthworks and other ground-disturbing activities including water sprays, erosion control and removal of sediments from public roads; and
- Monitoring of air-borne dust at site boundaries and at sensitive receptors where required.

Recommendation for minimising air emission impacts as a result of the project are outlined in the Air Quality Impact Assessment.

2.2.2 Environmental Noise

The primary sources of environmental noise within communities are transportation sources such as road, rail and air traffic and industrial sources. The effects of these noise sources on human health and well-being has been reviewed by the Australian Government Department of Health and Ageing (EnHealth Council 2004).

These effects include reduced performance and learning, sleep disturbance, annoyance, stress, cardiovascular health and mental well-being. The extent to which these effects are experienced by individuals is dependant on the duration and characteristics of the noise. Those most susceptible to health effects from environmental noise include children, the elderly and those with pre-existing physical and mental conditions (EnHealth Council 2004).

Industrial Noise

The Townsville Port Authority currently undertakes noise monitoring within the port and at adjacent sites. This monitoring program was implemented in 2001 to monitor compliance with legislation and guidelines and to identify sources of excessive noise within the port. This allows assessment of the effectiveness of noise control measures and assists in determining additional strategies required for noise impact mitigation (Port of Townsville 2006).

Urban encroachment in areas adjacent to the port has resulted in increased sensitive receptors being located in near vicinity of port activities. Any development in close proximity to the Port will be required to implement mitigation measures to ensure that residential amenity is not impacted and port activities can continue to be undertaken in compliance with existing approvals and environmental standards.

The requirements for the development of the Breakwater Cove precinct are outlined in the Port Protection Agreement between the State of Queensland, Port of Townsville and the Proponent. The Proponent will

ensure that design standards are outlined in a Community Management Statement to ensure that amenity impacts from the lawful use and operation of the port are appropriately mitigated. Acoustic design standards for residences are outlined in the Building Code of Australia and include measures such as insulation of walls, windows, doors and ceilings. Other measures may include appropriate orientation of buildings away from the port and construction of acoustic barriers.

Traffic Noise

Road and rail access routes used by the port and other commercial and industrial premises in the vicinity are identified as 'freight networks' by Townsville City Council's City Plan 2005. Future access for road and rail traffic will be provided by the proposed Eastern Access Corridor providing direct connection between these commercial and industrial areas and the TSDA. Development of alternative transport routes for access to these areas will improve the safety and amenity of residential areas located within existing transport corridors (Coordinator General 2006a).

During construction traffic will increase along Boundary Rd, Bundock St, the Strand and Sir Leslie Thiess Drive. Residents along these roads may be impacted by increases in traffic noise. Mitigation measures implemented during construction will include time restrictions on transportation by heavy vehicles and installation of temporary traffic control devices as required.

Following completion of construction, noise generated from traffic on the developed public roads should be in accordance with the planning levels set out in Schedule 1 of the Environmental Protection (Noise) Policy (1997).

Construction Phase Noise

During construction, short-term increases in noise-generating activities may occur. These activities will be controlled by the conditions of future development approvals and by adherence to the measures outlined in the EMP provided in Chapter 5. Construction noise impacts can be mitigated by control measures outlined in the Australian Standard *AS2436-1981: Guide to noise control on construction, maintenance and demolition sites*. Such measures include:

- fitting of mufflers and noise-attenuating devices to construction equipment;
- siting noisy equipment and activities away from noise-sensitive areas;
- regular maintenance of stationary and mobile equipment;
- screening of noisy equipment and activities; and

- increasing the distance between noise sources and receptors.

Construction noise impacts are also mitigated by restriction of construction working hours. In Queensland, building works is controlled under Part 2A of the Environment Protection Amendment Regulation (No. 2) 1999 which states:

> *'6W – a builder or building contractor must not carry out building work on a building site in a way that makes or causes audible noise to be made from the building work*
>
> *(a) on a Sunday or public holiday, at any time; or*
>
> *(b) on a Saturday or business day before 6.30am or after 6.30pm.'*

It is expected that construction working hours will be specified in future development approvals for construction of the TOT and Breakwater Cove precincts.

2.2.3 Traffic

The impacts of traffic growth in the existing road network surrounding the TOT site may result in the following:

- increased delays at intersections and within road networks;
- slower traffic speed for vehicles on roads in the port area and on access routes;
- increased probability of accidents on the site's access roads as volumes increase;
- increased emissions of particulates in the air and increased noise impacts;
- reduction in the general amenity of the Townsville CBD area due to increased vehicle movements;

To protect community health and safety values from increased traffic and the impacts identified above, the TOT development has been designed in such a way as to allow for the safety, mobility and access needs of residents and visitors. In order to protect the health and safety of the community from traffic impacts, traffic management objectives include:

- no-worsening of transport efficiency as determined by the change to travel time of motorists and operating costs of transport infrastructure;

- no-worsening of road safety as determined by the occurrence and severity of accidents on the roads approaching the TOT site; and
- compatibility with strategic planning incentives such as maintaining compatibility between local and regional traffic flows, maintaining urban amenity and meeting future transport needs in and around the project site.

2.2.4 Water Quality

Stormwater

Stormwater run-off generated from land development projects can affect public health and safety by increasing non point source pollutants and degrading surface waters. Stormwater run-off quality can be polluted by organic and inorganic matter such as petroleum products, solid waste, chemicals and paints, soaps and laundry waste, pesticides, herbicides or fertilizers, degreasers, solvents, lawn clippings, silt and sediment, and other construction emissions (City of Orlando, 2006). These pollutants in stormwater have the capacity to adversely affect public safety, groundwater resources, recreation areas and aquatic habitats.

Stormwater management systems may also create habitat for disease-carrying mosquitoes and other vectors. Stormwater treatment devices such as detention basins, retention ponds and below-ground devices frequently hold standing water for more than 3 days, potentially creating mosquito breeding habitats (CDC, 2005).

A Stormwater Management Plan (SMP) has been developed for the site. The impacts on health and safety which can result from polluted stormwater will be controlled and mitigated through the regulation of stormwater runoff quantity and quality and by the use of best management practices proposed in the SMP. Stormwater run off from the project site will be discharged into the canal network or directly into Cleveland Bay following suitable treatment within the site and achievement of the designated water quality objectives for the site.

Wastewater

It is proposed that the sewage and grey water reticulation system for the project site will be connected into the existing Townsville sewage treatment facilities. Therefore, at this stage there is no plan to treat any wastewater from the development on site as it will be pumped to an external treatment facility.

Ship's Ballast Water

Discharge of invasive species in ship's ballast water may result in impacts on native fish and other aquatic organisms, degradation of aquatic ecosystems, amenity impacts on recreational waterbodies and damage to boat engines and steering equipment.

Australia introduced mandatory ballast water management requirements in 2001 which are enforced under the *Quarantine Act 1908*. Australian ballast water management requirements are consistent the with International Maritime Organisation guidelines for minimising the risk of translocation of harmful aquatic species in ships' ballast water. The Australian Quarantine and Inspection Service (AQIS) is the lead agency for the management of ballast water taken up overseas. All international trading vessels are required to manage their ballast water in accordance with AQIS requirements.

2.2.5 Public Safety during Construction

To maintain site security and ensure public safety during the construction phase, the site will be secured by fencing, hoarding or other suitable barrier to prevent unauthorised entry to the site. Security barriers will be constructed so as to prevent climbing.

Adequate lighting, safety signage and traffic controls will be provided in accordance with Townsville City Council requirements and relevant Australian Standards. All temporary lighting or traffic control devices will be approved by Council prior to installation. Security lighting and surveillance systems will be in place to ensure security of the site when not in operation.

All hazardous substances will be properly stored in secured locations and adequate signage installed to warn of the location of dangerous goods. Signage will also be erected on the site perimeter fence/hoarding to inform of any security measures and advise of a 24 hour contact name and number.

Any damage to footpaths, roadways, stormwater drains or other public infrastructure that is caused by construction activities will be immediately repaired to prevent impacts on pedestrians, cyclists or motorists. Existing bicycle paths, pedestrian paths and site access points will be maintained unless otherwise permitted and will be free of any tripping hazards.

2.2.6 Public Safety during Operation

Public safety will be promoted through incorporation of Crime Prevention through Environmental Design Principles (CPTED). CPTED strategies are incorporated into the site design to allow for casual surveillance and management of access to various land uses.

The following safety and security factors have been incorporated into the site layout to ensure safety of residents and visitors to the site during operation:

- maximising clear sightlines and appropriate lighting of public areas to provide opportunities for casual surveillance;
- minimising entrapment spots and isolation of public areas including carparks and open space areas;
- location of compatible activities together to avoid isolation of public uses and placement of activity generators to promote casual surveillance; and
- use of signage and barriers to clearly define ownership and intended uses.

Liaison with the Queensland Police Service and relevant emergency service agencies will be undertaken from time to time in relation to crime prevention.

2.2.7 Cumulative Impacts on Public Health

The impacts of air emissions from the project in combination with existing and future Port of Townsville emissions is being undertaken by ANE to determine potential health impacts at nearby residential areas. Existing air emissions from the Port were monitored during baseline studies and the potential emissions due to increased visitation by cruise and naval vessels has been determined by pollution dispersion modelling. The results of this study are presented in the Air Quality Impact Assessment.

Noise monitoring has been conducted to establish baseline noise levels at the site and surrounding areas. The potential increase in noise levels due to visiting cruise and naval vessels and future Port expansions has been assessed by modelling of noise levels across the site. The results of this study are presented in the Noise and Vibration Assessment.

2.3 Occupational Health & Safety

The occupational health and safety of employees at the TOT project is regulated under the Queensland *Workplace Health and Safety Act 1995* (WH&S Act) and the *Workplace Health and Safety Regulation 1997*. The objective of the WH&S Act is to prevent death, injury or illness being caused as a result of workplace activities.

The operator of the TOT facility will be required to prepare a site-specific Workplace Health and Safety Plan (WHSP) to ensure protection of employees and visitors to the ocean terminal. During the construction phase, the principal contractor will be required to provide a WHSP to ensure implementation of health and safety principles for all contractors engaged to work on the construction site. Occupational health and safety hazards associated with the TOT project are outlined below.

2.3.1 Hazardous Substances and Dangerous Goods

Hazardous substances and dangerous goods may be stored at or transported to and from the project site. These materials will be managed in accordance with the *Hazardous Substances Regulation 1997*, the *Dangerous Good Safety Management Act 2001* (DGSM Act) and the *Dangerous Goods Safety Management Regulation 2001* (DGSM Reg).

The requirements for hazardous or dangerous cargoes are detailed in the *Transport Operations (Marine Safety) Act 1994* and the *Transport Operations (Marine Safety) Regulation 1995*. The Australian Standard AS3846, *The Handling and Transport of Dangerous Cargoes in Port Areas*, documents the requirements and recommendations for safe handling and transport of dangerous goods in port areas. The standard provides the minimum acceptable safety requirements for port facilities and their operating practices. The operator of the TOT will implement these requirements for handling and transport of such substances.

Dangerous goods and combustible liquids stored and handled at the project site will be recorded within a register, providing product names of all stated dangerous goods and combustible liquids stored and handled at the terminal accompanied by the current Material Safety Data Sheet (MSDS) for each of those goods. The availability of each relevant MSDS for the hazardous substance or dangerous good on site will provide workers and emergency personnel with procedures for safe handling or working with that substance and includes information such as physical data, disposal, protective equipment, and spill handling procedures.

Any fuel storage tanks installed at the TOT will be required to comply with the Australian Standard AS 1940:1993 *The Storage and Handling of Flammable and Combustible Liquids*. This standard specifies requirements for security, bunding, signage, fire protection and handling of fuels.

Adequate signage providing visual warning of the hazards associated with dangerous goods present at the TOT will be displayed if stated dangerous goods or combustible liquids are stored in tanks, or if the volume exceeds the quantity specified in Schedule 1 of the DGSM Regulation.

2.3.2 Staff Training

The occupational health and safety of employees will be protected by the implementation of effective and appropriate induction and/or training programs. An induction program will be conducted to ensure that all new workers receive basic information on common hazards, first aid and evacuation procedures in addition to other workplace policies and procedures. Contractors working for, or on behalf of TOT project, will also be required to undertake a general induction to ensure that they remain safe while working at the site.

2.3.3 Hearing Protection

Excessive noise is assessed by the length of time of exposure to the noise and the loudness of the noise. Continuous exposure to noise above 85 decibels during an eight hour day is considered to be excessive noise. The noise of a heavy truck is about 85 decibels, while a jet taking off is about 120 decibels (DIR&E, 2005).

Exposure to excessive noise in the work environment may cause a number of physiological and psychological responses. Noise can have the following effects:

- annoyance and speech interference;
- interference with concentration and thought processes;
- reduced immune response; and
- heart disease.

These effects may occur with exposure to both high and low level noise in the workplace. With frequent exposures, this can lead to loss of hearing. Low level noise experienced by the individual as annoying or as interfering with activities or concentration can cause stress and similar health effects as high level noise.

Personal hearing protectors will be used when levels of excessive noise cannot be reduced by using other control measures. Workers will be supplied with personal hearing protectors appropriate for the work conditions.

Administrative noise control measures will be used during operation of the ocean terminal facility when it is not possible to reduce noise exposure through engineering noise control measures. These may include:

- notifying employees in advance when elevated noise levels will occur so that they can limit their exposure to it;
- keeping people out of noisy areas, i.e. the terminal berth, if their job does not require them to be there;
- sign-posting noisy areas and providing quiet areas for food and rest breaks; and
- limiting the time workers spend exposed to elevated noise levels by moving them to quiet work areas before their daily noise exposure levels are exceeded.

Equipment maintenance and servicing programs will be developed as machines and equipment maintained in good condition will reduce noise. This may include modifications or additions such as noise mufflers, vibration isolators, or duct silencers.

2.3.4 Port Access

In order to ensure the health and safety of the ocean terminal workforce, access will be limited to the site and adequate security measures will be in place. For safety reasons the wharf area will not be a public space and only those authorised to work or visit the area will be allowed entry.

2.3.5 Vehicles and Equipment

Employees will be protected from accidents that may result from vehicle and equipment movements at the ocean terminal. Speed limits will be determined and strictly adhered to when vehicles are driving through operational areas. Heavy cargo handling equipment (e.g. forklifts and mobile container cranes) will be operational at the TOT during loading and unloading of the cruise and naval vessels. Cargo handling equipment has restricted visibility and other vehicles will be required to pull over, give way or stop to ensure maximum clearance.

Vehicles which have to enter operational areas will use extreme caution and it is recommended that they be equipped with a flashing hazard light on

top of the vehicle. Parking will be confined to designated parking areas and vehicle access to berths will be by designated access ways. Vehicles will not be permitted entry to the terminal operational area without the prior consent of the Terminal Supervisor.

2.3.6 Severe Weather Events

Severe weather conditions can impact on the health and safety of the project workforce and may include events such as cyclones, severe storms, storm surge or high winds. At present, Townsville Port Authority, in conjunction with the Regional Harbour Master, is responsible for coordinating activities in preparation of, during and after a cyclone or other severe weather condition (Port of Townsville, 2006a). Precautions to be implemented during extreme weather events will include:

- a nominated emergency coordinator will be trained in emergency control and will be responsible for monitoring the whereabouts of all persons on site;
- all personnel will be trained in emergency evacuation procedures; and
- periodic emergency evacuation procedure drills will be conducted.

2.3.7 Access and Walkways

Currently the Port of Townsville has yellow painted walkways located on all berths, pathways and around the port area to help staff and guests move safely through operational areas (Port of Townsville, 2006). Employees, shipping agents, crew and visitors are encouraged to use these walkways at all times when moving through an operational area/berth. Safety directions are also given by berth operators. The Townsville Ocean Terminal will develop a similar system to ensure walkways and paths in and around the terminal area provide safe passage for employees and all other persons.

2.3.8 Fire Safety

Adequate and effective emergency response systems and services will be developed for the ocean terminal to minimise any potential consequences of a fire to the health and safety of employees. It is anticipated that a response to fire within the project site will be coordinated by the Queensland Fire and Rescue Service permanent station at Morey St Townsville, approximately 1km south of the site.

This would be backed up by the Rural Fire Brigade situated approximately 30 km northwest of Townsville. The terminal will have a fire main system in order to allow staff to carry out an initial response if safe to do so. For a marine fire, the tugs at Townsville Port can provide a major fire fighting resource through the provision of water pumps/cannons on the tugs.

Precautions to be implemented to mitigate the adverse impacts on workers' health and safety in the even of a fire will include:

- representative staff members will be trained in the use of first aid including the location of fire alarms and fire extinguishers, their uses and operation;
- emergency facilities (e.g. fire fighting equipment, portable spill containment devices, first aid equipment) will be located where required, installed correctly, regularly maintained, and access maintained; an
- local emergency services will be kept informed of changes to the TOT that could affect their call out procedures.

2.3.9 Ergonomics and Manual Handling

Loading and unloading material to and from the cruise ships and naval vessels will generally be conducted by a mechanical forklift or conveyor system. However, there may be some tasks which require employees at the ocean terminal to engage in manual handling.

Workers are at a higher risk of injury if the workplace activities require them to bend, reach or work with their arms above shoulder height repeatedly or for long periods; or to stretch when reaching forward or twist the spine, particularly while holding a load (NT Worksafe, 2004).

To avoid workers suffering from the injuries described above training is to be provided to ensure staff are protected against workplace injuries. Tasks will be designed in such a way that manual handling involves carrying smaller loads; reducing carry distances and heights; reducing unnecessary lifting, excessive pushing, pulling or carrying; and developing material flows which avoid double handling.

2.4 Policing and Management of Visitors to the TOT

An emergency response plan shall be prepared in consultation with local emergency services prior to the commencement of operation of the TOT. A means of communication with terminal visitors shall be established to allow public announcements and conveyance of directions. A central

communication area shall be established to allow communication by emergency services. A plan shall be provided to all security and emergency personnel identifying the building layout, entrances and exits, restricted access areas, first-aid points and any potential hazards.

Security personnel shall be employed for control of access, control of vehicle traffic, conducting security searches and assisting emergency services. Security personnel shall be stationed at strategic observation points including monitoring of security surveillance cameras. Personnel shall be adequately trained in emergency and evacuation plans, protocols for raising alarms and engaging emergency services.

In the event that a larger than usual crowd is expected, local fire and rescue services, ambulance services and local hospitals shall be advised of the nature of the event and expected crowd numbers. Additional security personnel shall be on stand-by and police services advised.

In order to maintain crowd control, the operator shall pre-establish maximum crowd numbers and this shall be monitored by security personnel. Designated entrances shall be clearly signed and provide for disabled and emergency access and are to be kept clear of other activities. Check-in and security control points should be positioned separate to the entrance points so as not to affect crowd movement. Effective use of barriers should be considered if required to direct crowd movement and prevent congestion of thoroughfares.

2.5 Disease Vectors

2.5.1 Mosquitoes and Biting Midges in North Queensland

Mosquitoes breed in salt, brackish or fresh water and prefer standing (stagnant) water to lay their eggs. Midges breed in substrate generally associated with wetlands such as intertidal areas and the sides of streams and rivers.

Mosquitoes lay eggs on the surface of water, on damp ground, on vegetation at the edge of water holes, on the damp edges of natural containers such as tree-hole cavities or rock pools, and man-made containers such as tyres or rainwater tanks. Urban development close to the breeding sites of mosquitoes or biting midges raises issues relating to public health and comfort. Poorly planned development may create breeding habitat for insect pests.

There are more than 25 common species of mosquitoes in North Queensland with many capable of transmitting diseases such as Ross River Virus, Barmah Forest Virus, Encephalitis and Dengue Fever.

2.5.2 Townsville City

Townsville City is characterised predominantly as a coastal savannah landscape incorporating low lying tidal and fresh water wetlands. The tidal wetland areas are inundated on a regular basis throughout the year when tides rise higher than 3.48m with the fresh water areas best described as ephemeral wetlands. Both landscapes are capable of supporting extensive mosquito populations during summer (due to tidal action and wet season activity), and to a lesser extent in the drier winter months.

In Queensland the dengue virus can be transmitted by the *Ae. aegypti* mosquito This species is adapted to urban environments and commonly finds habitat in residential areas including backyard rubbish sites and breeds primarily in artificial containers holding water inside and outside the home.

2.5.3 Mosquito and Biting Midge Management during Construction

There is the possibility during construction that pools of standing water may establish on the construction site. Measures will be taken to ensure any pools do not remain for more than 5 days to prevent the formation of mosquito breeding sites. If sediment traps are to be used they will be designed so that they are free draining within a period of 5 days after flooding and are maintained by silt and vegetation removal. In the case where sediment traps or pools have to remain for more than 5 days, mosquito and midge mitigation measures will have to be implemented.

2.5.4 Mosquito and Biting Midge Management during Operation

Water holding devices

Following construction there is the potential for mosquito breeding sites to be established in any water holding device such as buckets, pot plant bases, blocked roof gutters, drains, and certain plants. This poses no additional risk than other developments in the Townsville region and can be managed in accordance with the Queensland Government's Mosquito Management Code of Practice and the Townsville City Council's Mosquito Management Plan. Standard measures will be implemented if rainwater tanks are to be installed. These will be adequately screened to prevent the entry of mosquitoes.

Landscaping

Appropriate landscaping is proposed to be provided within the proposed development to prevent the creation of any areas capable of ponding water for more than three days. This will include appropriate contouring of landscaped surfaces to allow efficient runoff of stormwater into nearby drains. Appropriate vegetation will be chosen to minimise the potential for provision of mosquito breeding sites. Plants with leaf axils that hold water, such as *Bromeliad species,* should be avoided.

The Body Corporate is to be encouraged to advise residents of suitable vegetation selection to minimise mosquito breeding.

2.6 Recycled Water

The Breakwater Cove precinct will be connected to the Townsville municipal potable water supply. Water will be supplied to each lot and each super yacht berth. It is proposed that all sewage and grey water generated in Breakwater Cove will be connected into Townsville's existing sewage treatment facilities with adequate sewage pumping capacity provided for the projected maximum demand. Recycled water is not envisaged to be used in the Breakwater Cove Precinct and therefore the potential for the use of recycled water to cause infection by the transmission of bacteria and/or viruses is negligible.

2.7 Monitoring, Auditing and Management of Impacts

Monitoring regimes for air quality, noise emission and water quality are outlined in the project EMP. Health and safety management measures for construction and operation of including auditing requirements are also provided in the project EMP.

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ATTACHMENT A: SENSITIVE RECEPTOR LOCATION MAPS