
**TERMS OF REFERENCE FOR PREPARATION
OF AN ENVIRONMENTAL ASSESSMENT TO
SUPPORT THE PROPOSED DEVELOPMENT OF
INDUSTRY ON MIDDLE ARM PENINSULA**

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Purpose

The Middle Arm Peninsula has long been identified by the Northern Territory Government through Land Use and Planning documents as a potential site for industry development.

The Northern Territory Government intends to undertake a process of environmental assessment which will focus on the major issues that need to be managed for the overall development of Middle Arm to better inform the ongoing and future planning of the Middle Arm industrial area. It will provide an understanding of environmental risk; land capability; potential cumulative impacts and provide options for the management of potential risks.

This process does not imply blanket approval for particular industrial development on Middle Arm Peninsula; replace the need for individual proposals to be assessed under the *Environmental Assessment Act*; nor prevent the processes required by a particular proposal under the Act from being carried out to completion. It will complement individual assessments carried out over specific proposals and build an overall knowledge about the Peninsula.

The following terms of reference have been developed to inform the types of studies that need to be undertaken to assist the Department of Planning and Infrastructure in undertaking an environmental assessment process for the Middle Arm Peninsula industrial area, including access/service corridors.

1. Description of Works

The assessment will describe the types of industry that are anticipated to be developed on Middle Arm Peninsula as well as the infrastructure and associated development required to support industrial growth, and consider future requirements such as utilities and transport corridors. This includes the potential need to undertake dredging works, identification of spoil grounds, levelling of land, or land reclamation works to make the locality usable as an industrial estate.

The assessment will identify the environmental risks associated with the development of the Middle Arm Peninsula, including the social environment. An analysis of those risks will be undertaken and methods of controlling significant risks discussed. All aspects of the risk assessment should be accompanied by statements about levels of uncertainty and steps that may be taken to reduce or compensate for this uncertainty.

Information provided should permit the reader to understand the likelihood of the risk, its potential severity, and any uncertainty about the effectiveness of proposed controls.

2. Infrastructure Requirements

Environmental Objectives

To ensure that infrastructure requirements to support the development of Middle Arm are understood and adequately planned for in order to minimise further (or cumulative) environmental impact that may occur through ad hoc development.

Context

The development of the Middle Arm Peninsula as an industrial precinct will require substantial investment in new and upgraded infrastructure to support industry. Apart from infrastructure put in place to support the Darwin LNG plant at Wickham Point, the whole Peninsula could be viewed as a greenfields site.

Output

An assessment of current infrastructure capacity and the risk to the existing infrastructure from increased demand is to be undertaken to inform the infrastructure requirements needed to support development. This should include, but not be limited to:

- The likely wastes, including sewage, to be produced and the ability for the environment or infrastructure to receive, treat and dispose of industrial waste and what infrastructure is required to provide the capacity to deal with potential high level industrial waste;

- The transport requirements to support the proposed development of Middle Arm Peninsula, including:
 1. The ability for East Arm Port to support Middle Arm or the likelihood of further port facilities being developed on Middle Arm. Accordingly, the capital works required to develop Port facilities to support Middle Arm;
 2. Proposed access to and from East Arm Port and the Stuart Highway, including the proposed transporting of product – whether this is to occur via road, rail or pipeline under the harbour (or a combination). Accordingly, the capital works that are required to meet these infrastructure/ transport needs; and
 3. Transport for the workforce required during both construction and operational phases.
- The likely water requirements to support the possible industrial uses of Middle Arm Peninsula and an assessment of Darwin’s capacity to meet the need (including any associated capital works). This should include opportunities for:
 1. Reuse of plant process water;
 2. Stormwater harvesting and reuse;
 3. Potential for shared resources with other nearby or potential new industries at Middle Arm;
 4. Treatment and reuse of waste water;
 5. Stormwater drainage and/or detention systems (based on Water Sensitive Urban Design principles);
- The likely power requirements to support the possible industrial uses of Middle Arm Peninsula and an assessment of Darwin’s capacity to meet the need (including any associated capital works to meet power requirements);
- Infrastructure required for sewage disposal at Middle Arm Peninsula – including additional infrastructure to take, treat and dispose of or recycle trade waste and domestic waste water from the industrial development. Consideration should be given to the benefits of a central wastewater treatment plant that would service a number of businesses;
- Proposed asset corridors including storage infrastructure;
- The potential impacts of dredging that may be required to support development and consideration of the most appropriate methods of disposal of dredge material, including identification of possible spoil grounds; and
- The potential impacts on this infrastructure from sea level rise and storm surge, including cyclonic conditions.

3. Air Quality

Environmental Objectives

The development of Middle Arm Peninsula should ensure that emissions do not adversely affect environmental values or health, welfare and amenity of people and land uses.

Context

A small-scale sampling study in 2001 showed that at that time, the Northern Territory had low ambient levels of most air pollutants. Results from the National Pollution Inventory (NPI) also show that emissions of most air pollutants are low in the Northern Territory. Fine particles from bushfire smoke are the major exception.

With the growth and promotion of industrial development emissions from industry will increase. Managing the impact from this increase before it becomes a problem has the best environmental outcomes.

Output

An assessment of current air quality and advice on management options for minimising impacts from the future growth of an industrial estate on Middle Arm Peninsula.;

The collection of meteorological data to enable future modelling of the impact of weather patterns on the movement of emissions.

4. Interconnectivity of Groundwater, Surface water and Darwin Harbour

Environmental objectives

The environmental objective of development should be to maintain the quality and quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected. In addition, it should be ensured that any waste water emissions potentially affecting water quality do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

Context

The Department of Natural Resources, Environment and the Arts holds information on groundwater and surface water resources, however the interconnectivity of these resources with each other and with Darwin Harbour at the Middle Arm site needs to be understood in order to inform appropriate management of development at the site.

Output

An assessment of the potential pollution pathways within and from Middle Arm Peninsula to regional groundwater systems, particularly those that connect to Darwin Harbour. This is to be done by developing a conceptual groundwater model (with the intention of this being upgraded over time as further results of ongoing monitoring are obtained) to describe the groundwater hydrology of the site (including delineation of aquifers, groundwater levels and seasonal fluctuation, recharge and discharge mechanisms, direction of groundwater flow);

An assessment of the potential for contamination of surface water bodies (including floodplains and wetlands) from both point and diffuse pollutant sources. This is to be done by developing a surface drainage map of the site, and if necessary surrounds, to identify the natural and altered surface water drainage and the surface water body(s) into which surface water from the site eventually drains;

An assessment of the potential waste water sources from likely developments at the site and the associated potential pollutants;

Suggested safeguards and management strategies that could be put in place to guide development on Middle Arm Peninsula to minimise the cumulative impacts of construction and operation on the hydrological and hydro-geological features of the locality. Estimates of uncertainty and steps that should be taken to deal with uncertainty should be addressed. In particular, provide details on the following:

- suggested measures to safeguard surface and groundwater resources including options for the appropriate treatment and disposal of construction and operational wastewater. Identify the preferred option and the selection criteria used; and
- suggested measures to safeguard downstream water quality, specifically in Darwin Harbour.

Develop a Water Management Plan for Middle Arm Peninsula which identifies potential impacts on surface and groundwater from nutrient enrichment, other contaminants and drainage, or extraction arising from industrial development and identify mitigation measures that could be applied. This is to be done in consultation with relevant stakeholders and is to take into consideration the work currently underway within NRETA on the Water Quality Protection Plan for Darwin Harbour.

5. Cultural and Archaeological Heritage

Objective

To assess the risk to cultural and heritage factors from the broad scale development of the Middle Arm Peninsula for industrial purposes.

Context

Darwin Harbour and its environs have a rich and diverse archaeological record. The results of a 2005 archaeological survey that focused on evidence

of pre-contact Aboriginal activity in the lower coastal areas of Darwin Harbour identified numerous stone tool sites and shell middens, providing invaluable evidence about Aboriginal occupation and activity. Historical sites, which pertain to non-Aboriginal events or contact events, are also present in the Darwin Harbour region.

Within the harbour itself are underwater historical sites of considerable significance such as shipwrecks and plane wrecks. Currently there are 10 such sites listed on the NT Heritage Register and more under assessment. Other underwater cultural heritage may include historic infrastructure like the remains of the submerged telegraph line or the WWII anti-submarine boom net.

Output

A Heritage Conservation Plan should be prepared. This Plan should outline proposals for the conservation and/or recording of both registered heritage/archaeological and unregistered sites. This is to be prepared in consultation with relevant stakeholders

Environmental Objective - Cultural Food Source

To determine the extent of potential impact on marine life food sources and identify the likely impacts on Aboriginal people dependent on those food sources, either directly or indirectly.

Context

The collection of traditional foods by Aboriginal people is crucial to their health and well being. Matters related to Aboriginal diets are to be incorporated into the collection of baseline data. This should include (but not be limited to) the monitoring of gathering and consumption of a wide range of local, traditional foods (eg mudcrabs and telescopium) from the immediate area as well as the wider region.

Output

Data on the collection and use of marine life as a food source through consultation with relevant Aboriginal communities and Traditional Owners such as those of (but not limited to) the Larrakia Nation and the Northern Land Council.

7. Amenity

Environmental Objectives-Visual

To minimise the visual impact of industrial development at Middle Arm Peninsula from key vantage points within Darwin (including residential areas, the city, tourist points and Mandorah).

Output

An assessment of the potential visual impact on Darwin of industrial development on Middle Arm Peninsula. The assessment should propose methods by which the visual impact of development can be minimised when viewed from specific vantage points (including, but not limited to Darwin CBD; Stokes Hill Wharf and the Darwin City Waterfront development; residential areas of Tipperary Waters, Bayview, Woolner, Stuart Park and proposed for Berrimah; and Mandorah).

Environmental Objective-Noise

To minimise the impact of noise disturbance of industrial development at Middle Arm Peninsula to surrounding land uses including future land uses.

Outputs

An assessment of the potential for noise disturbance and preparation of a Noise Management Strategy which includes a review of current ambient noise and likely noise outputs from industry. The strategy should identify and suggest noise limits for development at Middle Arm and include analysis of meteorological data to determine the potential impact areas, and accordingly inform future planning for growth areas to ensure potential sensitive land uses do not encroach on the industrial activities.

Consideration must be given to potential noise impacts on areas such as Darwin Harbour (including, but not limited to, Darwin CBD; Stokes Hill Wharf and the Darwin City Waterfront development; residential areas of Tipperary Waters, Bayview, Woolner, Stuart Park and Palmerston)

Environmental Objective-Recreation

To assess the impact on existing recreational uses and opportunities in the area for Darwin residents and visitors now and into the future

Context

Recreational use of the Middle Arm area includes a number of activities both on and off the water in the vicinity of the proposed industrial estate. Currently the area, particularly the near shore and mangroves, is used for recreation and food gathering by the local indigenous communities, recreational fishermen and small boats. Vicarious appreciation of the location as a pleasant outlook from the land and water is also identified as an important value.

Output

Identification of potential impacts on road and harbour traffic, including recreational boating, cruise and industrial shipping and the formulation of potential management strategies to guide the future development of the Peninsula.

8. Marine Environment

Environmental Objective

The assessment is to determine the potential impact of industry on the various marine/estuarine habitats around Middle Arm Peninsula.

Context

To assist in the management of the marine/estuarine environment of the Middle Arm area, baseline data is required. Key parameters to be sampled should include:

- Water quality (including nutrients, phytoplankton, total suspended solids, and physico-chemical parameters);
- Rainfall (to determine the affect of rainfall on nutrient loading); and
- Benthic Primary Producer communities such as mangroves, corals, seagrass and inter-tidal mudflats (to field validate BPP Habitat mapping).
- Habitat mapping of the Middle Arm marine/estuarine environs is to determine both the spatial and temporal extent of important habitats. Field validation of mapping technique/s should occur to a suitable scale, both in space and time.
- Mapping/sampling of substrate communities such as sponges and non-scleractinian coelenterates and substrate burrowing communities

Output

A 'base-line' profile of the Middle Arm Peninsula marine/estuarine environment within the context of Darwin Harbour. An assessment of risk to the marine/estuarine environment in the Middle Arm Peninsula locality from the development of an industrial estate on Middle Arm Peninsula and suggested measures for minimising that risk. Risks to consider include:-

- Impacts of night lighting on turtles and night birds.
- Potential for introduction and establishment of marine pests and/or aquatic pathogens, such as toxic dinoflagellates.
- Impacts of dredging, land reclamation, port operation etc on water quality, mangrove habitats, aquatic flora and fauna, drainage systems etc.
- Impact on species/ communities/habitats of local/regional/national significance, including turtle, marine snake, cetaceans, and dugong species, rare vegetation types, and coral reefs.
- Impacts of waste water on water quality and consequently on marine life, including fish, coral communities and habitat.

Consideration should be given to the selection of specific biota characterised as useful indicators of environmental stress that can be monitored by the individual developments to determine impact.

The more iconic, and rare and threatened species, both resident and migratory, listed under NT and Commonwealth legislation, should also be identified and described for the area and their significance and extent assessed.

9. Greenhouse Emissions and Climate Change

Environmental objectives

The environmental objectives of any development should be to minimise greenhouse gas emissions to the greatest extent practicable through the utilisation of best practice technology and processes, and to ensure that planning appropriately considers any potential impacts of climate change.

Context

Broad industrial development of Middle Arm will contribute to Northern Territory and national greenhouse gas emissions, with the scale of emissions dependant upon the specific nature of industry proposed. The NT Strategy for Greenhouse Action 2006 states Government's objectives of minimising greenhouse gas emissions from the supply and use of electricity and from industry and waste. It should be noted that with the impending introduction of an emissions trading system in Australia expected to cover energy and industrial process emissions, industry proposed for the site may be liable under this system for greenhouse gas emissions generated, incurring costs for greenhouse gas emissions associated with their operations. National targets for this system are yet to be confirmed.

Consistent with current national policy directions emphasising measures complementary to emissions trading, industrial development at the middle arm area should complement its compliance with an emissions trading scheme with utilisation of best practice technology and processes. This will minimise greenhouse gas emissions with the additional benefit of minimising costs.

Updated climate change projections for Australia were released by the CSIRO and Bureau of Meteorology in October 2007. Decisions made in the near term about medium to long term infrastructure should take into account projected climatic changes. Planning for future developments will require an assessment of vulnerability of the proposed site to climate change impacts, and risks posed to development on the site.

Output

Tracking of cumulative effects over time as industry develops. This will be undertaken in the context that individual industry proponents will have to comply with Northern Territory and Federal policy and legislation and that over time technologies for minimising emissions will change.

An assessment of the risks that climate change poses to development on the Middle Arm Peninsula.

10. Biting Insects

Environmental Objective

To ensure that new mosquito and midge breeding sites are not created as a consequence of development. The assessment is to determine the extent of biting midges and mosquitoes, particularly disease carrying mosquitoes.

Context

The Middle Arm Peninsula is subject to high levels of biting pests such as midges and mosquitoes and has an unknown quantity of breeding sites for pest and disease carrying mosquitoes. Development has the potential to create (or reduce) new breeding sites, therefore biting insect assessment will be required for this process and future individual proposals. It is expected that any development design will be in accordance with existing guidelines for management of biting insects.

Output

A baseline study of biting insect populations during both the dry and wet seasons and suggested management strategies for minimising the impact of biting insects.

11. Land Capability

Environmental Objective

To ensure that studies have been completed to demonstrate the capability of Middle Arm Peninsula to support the type and intensity of development that is proposed.

Context

Soils, landforms and geology are intrinsic components of ecosystems that determine the profiles of land and can be used to determine future uses. Understanding the land and proposed uses should determine land capability.

Output

- Detailed maps showing topography, bathymetry, geology, soil and land capability;
- Geotechnical survey/information (soils and marine sediments considering acid sulfate soils, background contaminants and physical characteristics);
- A description of geological/geomorphological characteristics including seismic stability and existing levels of erosion;
- An assessment of possible impacts of development to landform including impact of artificial structures;

- An assessment of limiting properties of landform considering erosion, rehabilitation, acid generation etc; and
- Suggested management/ mitigation measures to oversee the development of Middle Arm Peninsula to address landform limitations, specifically foreshores, erosion and sediment control, and acid sulphate soils.

12. Sustainable Development

Environmental Objectives

The industrial development of Middle Arm is to occur in an environment that encourages and enforces sustainable initiatives. Development should be done in such a way that protects local environments through sensitive design and careful planning; encourages the sustainable uses of resources through minimising the production of waste and encouraging operating systems that are energy and water efficient; institutes the practice of extended producer responsibility (product stewardship); and demands best practice in cleaner production.

Context

The key environmental problems and risks in traditional site running practices for industrial areas involve degradation of land and water and the waste of energy resources.

Industrial ecology recognises the pattern of relationships between various industrial activities, their products, and the environment. The challenge of industrial ecology is to reduce the overall environmental burden of an industrial system. The evolution of the industrial system from a linear system, where resources are consumed and damaging wastes are dissipated into the environment, to a more closed system, like that of ecological systems, is a central concept to industrial ecology. A cyclical (closed) system decreases the amount of waste material and waste energy that is produced and that leaves the industrial system.

Output

An assessment of measures that may be taken to promote the sustainable development of an industrial estate at Middle Arm Peninsula based upon the concept of industrial ecology.

13. Administration

The Department of Planning and Infrastructure (DPI) will be the lead agency for carrying out the environmental assessment process. To administer the process a working group of officers from DPI and the Department of Natural Resources, Environment and the Arts (DNRETA) will be formed.

Copies of the final terms of reference will be posted on the DPI website at: [http:// www.nt.gov.au/lands/](http://www.nt.gov.au/lands/)

