DLP have proposed an expansion of EAW to accommodate the requirements of prospective wharf users, including commercial users and the Defence. The expansion will require dredging within Darwin Harbour to provide for effective and efficient vessel access and manoeuvring. The proposed expansion also involves the development of additional land at EAW by reclamation.

A draft DMP (AECOM, 2011) has been prepared to support environmental approvals for the proposed EAW expansion. This chapter summarise the content of the draft DMP; the complete document is included as **Appendix B**. It is envisaged that the draft DMP will be finalised with the appointment of a dredging contractor.

27.1 Introduction

A draft DMP (AECOM, 2011) has been prepared to support environmental approvals for the proposed EAW expansion. The draft DMP details the proposed dredging work and the measures recommended in managing its potential environmental impacts. The draft DMP specifically addresses:

- The probable dredging methods (capital and maintenance work)
- The quantity and characteristics of material to be dredged, and the disposal of unsuitable materials
- The reuse and / or disposal of dredged material, as well as disposal of unsuitable material offshore,
- The environmental management framework for the proposed dredging work, comprising the environmental management objectives, performance criteria, mitigation measures and reporting and monitoring requirements.

The purpose of this draft DMP is to provide a general framework for planning and implementation of dredging and spoil management activities in Darwin Harbour in relation to the EAW expansion works. It is prepared at a high level and refers to broad principles and objectives, nominating potential actions and equipment / plant for adoption.

Dredging as part of the EAW expansion project will be undertaken at three locations:

- Barge ramp and hardstand.
- MSB.
- Tug and small vessel berths.

A summary of the dredging work plan for each of these areas is presented below. Dredging will largely be undertaken using mechanical dredging for looser surface sediments and CSD for subsurface materials. The decision regarding whether to use two dredges (small and large) will be made based on availability and economic consideration; the level of environmental management and protection identified, however, will be maintained.

A Trailer Suction Dredge (TSD) is unlikely to be used at EAW as TSDs typically require a greater depth of water than other methods of dredging, and a TSD small enough to operate in the shallow waters in the vicinity of EAW is unlikely to be economical.

The dredging operations likely to be required are summarised in Table 27-1.



Area of Operation	Barge ramp and hardstand	MSB approach channel	Tug berths and approach channel
Vessel Type	Small CSD	Large CSD	Large CSD
Dredge Depth	-2.0 m CD	-7.7 m CD	-7.7 m CD
Estimated Dredge Volume (m³)	62,000	1,120,000	100,000
Dredging Duration (days)	42.8	63.1	5.6

Table 27-1 Summary of Dredging Operations required for the Proposed Expansion of Eaw

27.2 Geotechnical Information

Darwin 1:100,000 geological series sheets indicate that the EAW Dredge Areas are underlain by quarternary and tertiary aged sediments comprising unconsolidated silty clay, loose silty sand, ferruginous and clayey sandy gravel pisolitic and mottled laterite. Beneath these sediments are Proterozoic bedrocks from the BCF comprising metamorphosed sandstones, siltstones, and phyllites. Quartz veins are widespread.

The BCF has been investigated extensively for various structures in the Darwin area and the sedimentary beds comprise mainly siltstone with some sandstone and claystone. The rock strength varies from very low strength phyllites to very high strength quartz and quartz sandstones. Drill holes of these rock layers with boreholes drilled 1 m apart indicate very different rock strengths. The formation has weathered over time, and vertical and horizontal clay seams of 400 mm or greater exist with the strength of a stiff to very stiff clay soil. Most boreholes indicate that the BCF consists of lower strength meta-siltstones and clay seams. Only deep excavations strike high strength rock.

27.3 Dredge Material Disposal

Due to the low strength of the dredge material, the majority of the material dredged as part of the EAW expansion project would be disposed of offshore as much of the material is unsuitable for onshore disposal as fill due to its physical and geotechnical properties.

There are two deposition options considered for the disposal of the dredged materials; either 100% offshore disposal or 80%:20% offshore:onshore disposal. Onshore disposal to Pond K, immediately adjacent to the proposed Marine Base may be an option as it has been used historically for the disposal of maintenance dredge spoil from the city. The 80-20% option assumes that any material disposed of to shore will be high quality material suitable for onshore disposal.

In the case of offshore disposal, the resultant dredge spoil will be transported to grounds 35 km from Darwin Harbour using a 3,000 m³ capacity hopper barge at an efficiency of 80%. The location designated for offshore disposal of material from EAW will also receive material from other dredging projects in the area including INPEX (INPEX Browse, 2009).

27.4 Environmental Effects

Dredging activities result in a number of impacts on the marine environment. In some cases, impacts may be more relevant to particular dredging methods. Environmental issues that are typically relevant for dredging and reclamation projects include the following:

- Changes to water quality.
- Changes to coastal processes (waves and currents).
- Effects on marine ecology (flora and fauna).
- Mobilisation of sediment and pore water contamination.
- Introduction of marine pests.
- Impacts on cultural heritage values.
- Nuisance environmental effects (noise and air emissions).

27.5 Environmental Management

Section 5 of the AECOM (2011) draft DMP (refer **Appendix B**) contains the sub-plans that describe the specific management actions and preventative measures that will be implemented during construction works at the EAW, in order to minimise the risk of harm on environmental and heritage values and minimise impacts from dredge related activities.

The sub-plans outline specific objectives and performance indicators that can measure the relative success of an implemented plan. These sub-plans also specify specific monitoring and reporting requirements associated with the potential environmental impacts and associated risks. The results of the monitoring will be used to assess the effectiveness of management actions and site compliance with performance indicators. The DLP Project Manager will be required to report regularly on environmental performance, including incidents / complaints and corrective actions.

The management procedures outlined in this section may be subject to change following environmental assessment by governing bodies. Responsibilities allocated are indicative only and may change depending on the company structure of the construction contractor and/ or final proponent.



References

AECOM, 2011, Dredge Management Plan East Arm Wharf Expansion Project, prepared for DLP.

INPEX Browse, 2009, Icthys Gas Field Development Project Draft Environmental Impact Statement.

