Supplier Document Cover Sheet

Project	41213 – Darwin Ship Lift Project	Total # Pages: (incl Doc Cover Sheet)	17

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	Signature		Signature		Signature	
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1	09/02/2024	Re-Issued for Use
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TOPO.

EROSION AND SEDIMENT CONTROL PLAN

DARWIN SHIP LIFT

CLIENT: Clough BMD JV

DOCUMENT NUMBER: 22-0063/R3016

VERSION: C

DATE: 09/02/24

1 SCOPE

Topo were engaged by Clough BMD JV to develop a CPESC certified Erosion and Sediment Control Plan (ESCP) for works associated with construction of the Darwin Ship Lift Project.

1.1. GUIDELINES

This ESCP has been prepared in accordance with the following documents:

- Environmental Assessment Act 1982
- Waste Management and Pollution Control Act 1998
- Soil Conservation and Land Utilisation Act 1969
- Best Practice Erosion and Sediment Control (IECA, 2008) and Appendix B (IECA, 2018)
- DIPL Standard Specification for Environmental Management (Version 2)

1.2. CERTIFICATION

I Tom Bailey certify that this Erosion and Sediment Control Plan (ref: R3016) has been prepared to satisfy the following requirements:

- The intent and minimum standards nominated within the IECA (2008) Best Practice Erosion and Sediment Control Guideline and relevant supporting Appendices (IECA, 2015).
- NT Government Environmental Approval EP2023/028-001 Condition 2-3
- Environmental Approval EP2023/028-001
- Australian Government EPBC Approval ref 2021/9068
- Environmental Approval EP2023/028-001

If implemented correctly, it will assist Clough BMD JV in meeting environmental obligations defined in the *Waste Management and Pollution Control Act 1998* (NT) and approvals identified above.

The ESC plan has been designed to minimise the impact for downstream/adjacent water quality and marine impacts.

CPESC 6374

1.3. REVISION

VERSION	DATE	AUTHOR	REVIEWER	APPROVED
A	27/09/23	T. Bailey		T. Bailey
B	30/10/23	T. Bailey		T. Bailey
C	9/02/24	T. Bailey		T. Bailey

2 PROJECT DESCRIPTION

2.1. LOCATION

The project is situated approximately 6.5 Kilometres (km) south-east of the Darwin Central Business District, on the East Arm Peninsula within Darwin Harbour. The site is approximately 700 m east north-east of the East Arm Wharf (EAW) and the Marine Supply Base (MSB), and west of the Darwin Business Park. Road access is provided by Berrimah Road, linking the site to the Darwin road network including the Stuart Highway and Tiger Brennan Drive. The project location is represented visually in Figure 1.

Figure 1 – Site Location (Source: AECOM)

2.2. PROJECT WORKS

Project works involve road and service upgrades and reclamation for the common user ship lift facility. The facility will include: a ship lift 26m wide, 103m long and 6m deep with lifting capability of 5,000 tonnes, four wet berths (wharves) and 20ha of hardstand for ship repair and maintenance works. Associated works include:

- Roadworks for upgrade of Berrimah Road
- Dredging (Cutter Suction and Backhoe+Barge)
- Piling (Marine and Land Based)
- Land Based Bulk Earthworks
- Imported Fill Reclamation
- Rock armouring
- Stormwater drainage and utilities installation
- Large scale pavements and hardstand areas
- Building works
- Electrical works
- Lines, signs and road furniture
- Security infrastructure

Works are expected to commence in 2023, with completion scheduled for 2025.

2.3. CLIMATE

The historic monthly rainfall for the region is presented below in Figure 2. The Darwin area experiences a tropical climate with distinctly wet summers and dry winters. The highest periods of rainfall are recorded in summer months, with the maximum mean monthly rainfall recorded in January (432 mm). Relatively low rainfall is recorded in the months of May to September, with the lowest mean rainfall month being July (1 mm).

Tropical cyclones have a high occurrence of forming in Darwin's surrounding oceans during the wet season (November to April), and have the potential to result in strong to gale force winds, large wave heights and heavy rainfall along much of the coast of the NT.

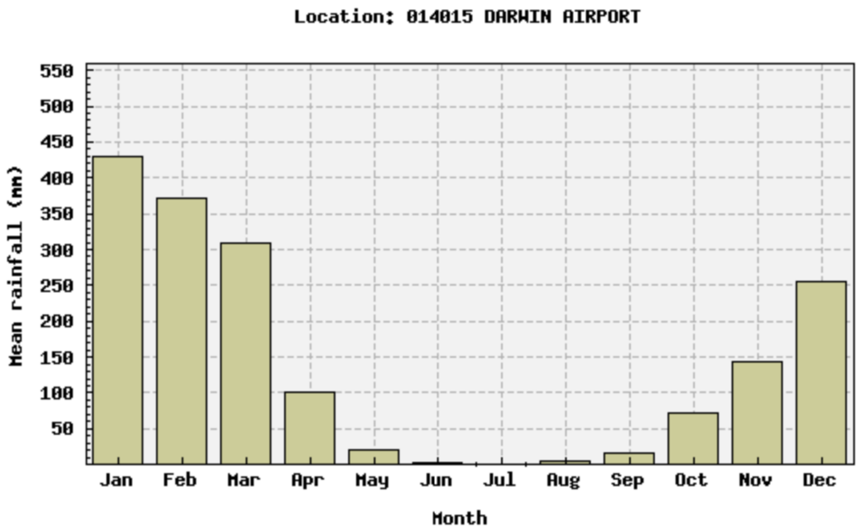

Figure 2 – Historic rainfall (Source: BoM)

2.4. TOPOGRAPHY AND DRAINAGE

Land elevation throughout the project is generally between 0.0m and 7.0m AHD with elevation greatest in the northern and north-eastern sections of the project area. The area is generally well-drained with moderately sloping terrain up to approximately 5 degrees grading to the southern sections of the project area (KBR 2018). Localised flooding has however been reported in the vicinity of the lower sheds. The project area located above HAT is approximately 4.2ha, with a further 15ha of rocky mud-flats in intertidal areas, and an isolated stand of remnant mangrove habitat. Marine areas consist of sandy substrate.

Existing drainage consists of roadside swales with culverts along Berrimah Road and a major channel running along the northern boundary of the landside site where a very large hardstand is located. An access road crosses from that hardstand area to the existing MUBRF to the east of the project, with significant associated drainage currently in place. Informal drainage is present within the landside area, draining east to the new MUBRF stormwater.

Topography and drainage across the project is presented in detail in Appendix A.

2.5. SOILS

Geology at the site is comprised of quaternary coastal alluvial sediments such as mud, silt and clays which overlay unconsolidated Cainozoic unconsolidated solids and laterites. Bedrock at the site is understood to be the Burrel Creek Formation which is Orosirian in age (Geological Map Series Sheet 5073). Through interviews conducted with persons knowledgeable with the site and its history, it is understood that much of the site is reclaimed land.

As reported in the project EIS by AECOM, the general hinterland landforms around Darwin Harbour comprise of dissected upland terrain, low strike-ridges and hills (approximately 15-40m high mostly along the southern coastline, formed on shales, siltstones and sandstones of the Proterozoic Burrell Creek Formation [BCF]) and intervening alluvial flats (Wood et al. 1985, Pietsch 1987, Burns 1997). Sediments of Cainozoic age cover most of the region and consist of Tertiary and Quaternary soils and laterite exposures. Quaternary sands, silty clay, laterites or ferruginous clayey sand are associated with drainage lines and low lying country (Pietsch 1987). East Arm comprises areas of high ground with tropical woodland vegetation surrounded by intertidal mangroves which are partially or completely inundated by water at high tide. Some minor hills and ridges occur over the higher elevations of woodland areas (Douglas Partner 2015). Land elevation ranges from 0-30 m (URS, 2011).

Around the peninsula coastline, the mangroves merge into extensive tidal mudflats formed from marine alluvium and mud, clay and silt (Brocklehurst and Edmeades 1996). Sandy shelly chenier ridges and small areas of salt flats also occur (Pietsch 1987).

The Project area has two primary land systems as defined by the Land System Mapping from NTG:

+ Krans: This land system consists of plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products.
+ Littoral 1: This land system consists of tidal mudflats and coastal floodplains with channels and estuaries, subject to tidal inundation. Soils are usually poorly drained clays and muds.

Based on the 1:100,000 scale geological map of Darwin (NTG 1983), the Project area is underlain by metasediments belonging to the BCF. Quaternary age cover, comprising alluvium, unconsolidated sands, colluvium, and marine and estuarine sediments cover the BCF rocks.

The current seabed surface levels within the proposed dredging footprint range from +1.0 m LAT to -3.0 m LAT. The typical geotechnical profile of the unconsolidated surface materials to be dredged consists of sand and gravel surface sediments (with gravel potentially comprising shell fragments) with silt and clay content generally increasing with depth.

During sediment sampling undertaken at the site sample recovery of between 0.2 and 1.5 m was achieved before encountering consolidated material (AECOM 2020). These unconsolidated sediments are underlaid by a thin layer of 'stiffer' consolidated residual soils, typically silty sand / sandy silt, which are overlaying shallow rock material.

ASS commonly occur in Quaternary aged sediments of marginal marine or estuarine origin and are mainly confined to coastal lowlands. A review of the ASS Risk Mapping database (ASRIS 2017) classifies the area around the site as having a high probability of occurrence. Potential acid sulfate soils (PASS) is likely to occur within the intertidal flats associated with mangroves, the area between the mangrove line boundary and the proposed dredge area above the mean low tide, and subtidal zones that are permanently inundated estuarine or marine areas.

3 EROSION RISK ASSESSMENT

3.1. SOIL LOSS

An erosion risk assessment has been conducted using the Revised Universal Soil Loss Equation (RUSLE). The calculated soil loss is then used to determine the level of sediment control required, as well as stabilisation and staging requirements.

$$A = K \times R \times LS \times P \times C \qquad \text{Equation 1 (IECA 2008)}$$

Where:

- A is the predicted soil loss per hectare per year
- K is the soil erodibility factor
- R is the rainfall erosivity factor
- LS is the slope length/gradient factor
- P is the erosion control practice factor
- C is the ground cover and management factor

3.1.1. K-FACTOR – SOILS

The soil erodibility factor (K factor) is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. Soil texture is the principle component affecting the K factor, but soil structure, organic matter and profile permeability also contribute.

Based on the description discussed in section 2.5 and based on Table E5 Best Practice Erosion and Sediment Control (IECA, 2008) a K-factor of 0.030 was adopted for this risk assessment.

3.1.2. R- FACTOR – RAINFALL

The rainfall erosivity factor (R factor), is a measure of the ability of rainfall to cause erosion. It is the product of two components (1) total energy and (2) intensity for each rainfall event. R factors are published for a range of locations throughout Queensland, including Cairns, which is considered reflective of the Project. Reference to Table E1 of IECA (2008) indicates an annual R factor value of 4,245.

Monthly R-factors have been assessed to investigate impacts to seasonal variability using the closest known breakdown (Darwin).

Table 1 – Monthly Rainfall Erosivity

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1300	935	663	246	25.5	4.2	0	0	17.0	106	276	671

3.1.3. LS - SLOPE-LENGTH

Slope length and slope gradient have substantial effects on soil erosion by water. The two effects are represented by the slope length factor (L) and the slope steepness factor (S). In application of RUSLE the two are evaluated together as a numerical representation of the length-slope combination (LS factor).

Slopes across most of the existing land portion of the site rarely exceed 3% over no more than 50m. Slopes across reclaimed land work areas are even milder, rarely exceeding 1%. Slope lengths are greater however, but we've assumed a maximum fall of 80m before drainage must be installed. Corresponding LS factors therefore range from 0.19 to 0.52.

3.1.4. COVER (C) AND PRACTICE (P) FACTORS

Within RUSLE, the C and P factors are used to describe management of the site with respect to reducing soil loss. The C factor measures the combined effect of all the interrelated cover and management variables adopted over the site. It also represents non-structural methods for controlling erosion (i.e. covering exposed areas with various erosion control products to minimise raindrop impact or stabilisation by temporary or permanent vegetation). Soil loss estimates have adopted a default C value of 1.0, representing an exposed surface with no ground cover.

The P factor measures the combined effect of all support practices and management variables. P factor is reduced by practices that reduce both the velocity of runoff and the tendency of runoff to flow directly downhill. It also represents structural methods for controlling erosion. An industry accepted default value of 1.3 (compacted and smooth) has been adopted as per Table E11 of IECA (2008) for all construction areas.

3.1.5. ESTIMATED SOIL LOSS

Estimated soil loss ranges from 30t/ha/yr for runoff from the reclaimed laydown areas to 90t/ha/yr for runoff from land based work areas.

Annual soil loss estimates are presented in Table 2.

Table 2 – Annual Soil Loss Estimate (t/ha/year)

Area Description	Area (ha)	R	K	Slope Length (m)	Slope (%)	LS	P	C	A (t/ha/yr)
Existing Lands	4.11	4245	0.03	50	3.0	0.52	1.3	1.00	86
Reclaimed Pads	13.2	4245	0.03	80	1.0	0.19	1.3	1.00	31

It should be noted that the soil loss estimate is not considered representative of actual annual soil loss at the site and should be used rather as indicator of potential erosion risk. If at any time circumstances affecting the above factors should change, a reassessment should be conducted immediately. Obviously, RUSLE assessments are not appropriate for marine works such as dredging.

3.2. MONTHLY EROSION RISK

Seasonal risk ratings are presented in Table 3, based on the Monthly Rainfall Erosivity and Table G.2 of IECA 2008. Where possible, high risk land disturbance activity (such as stripping) should be scheduled for months of Very Low (VL) erosion risk.

Table 3 – Monthly Erosion Risk

LOCATION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site	H	H	H	M	VL	VL	VL	VL	VL	M	M	H

H = High, M = Moderate, L = Low, VL = Very Low erosion risk.

4 SEDIMENT CONTROL

The sediment control standard is typically determined using Table 4.5.1 (IECA, 2008) which defines the sediment control standard based on catchment area and soil loss rate. The revised Table 4.5.1 (IECA, 2008) provided in Appendix B (IECA, 2018) as Table B1 is provide below as Table 4. The revised table includes an additional area limit trigger of 1 hectare to increase the sediment control standard for large sites with an estimated soil loss exceeding 75 t/ha/yr.

Table 4 – Sediment Control Standard (Table B1 Appendix B IECA 2018)

AREA LIMIT (m^2)	SOIL LOSS RATE LIMIT (T/HA/YR)		
	TYPE 1	TYPE 2	TYPE 3
1000	N/A	N/A	All cases
2500	N/A	> 75	75
> 2500	> 150	150	75
> 10000	>75	N/A	75

Based on Table 3 (IECA, 2018) the work area on existing land triggers Type 1 sediment control, whilst the large, flat laydown areas on reclaimed land require only Type 3 sediment control.

A single, Type B has been prescribed for installation in the existing landside area. This basin has been designed to achieve 80% hydraulic effectiveness in accordance with Appendix B (IECA 2018).

4.1. SEDIMENT BASIN OPERATION

4.1.1. AUTOMATED DOSING SYSTEM

The majority of landside site runoff will be treated with via a single Type B basin, through the use of automated coagulant/flocculant dosing. Given the catchment areas and nature of the site it is recommended flow activated dosing system be installed.

4.1.2. COAGULANT/FLOCCULENT

Due to time constraints no jar tests have been undertaken to determine the optimum coagulant or flocculant for site soils. The sediment basin sizing has been undertaken based on a settlement rate of 150mm in 15 minutes for the Type B sizing. Confirmation of the suitability for site soils to achieve this settlement rate through jar tests is required to ensure the basins do not need to increase in size. 150mm is considered a fast settlement rate to reduce basin volume requirements. Jar tests are to be undertaken with the Floc Report provided in Appendix B and are to be completed prior to basin construction.

4.1.3. DEWATERING

A Type B basin is to be dewatered prior to rainfall, however can remain full during dry weather. On longer duration projects it is acceptable to not dewater Type B basins as confidence is gained in performance with the displacement of the clean standing water by inflow during events. Where large traditional (Type D) basins are used these are to be treated and dewatered within 5 days of cessation of a rainfall event.

4.1.4. PERFORMANCE ASSESSMENT

A Performance review of the sediment is to be undertaken following rainfall in accordance with Figure 3 and Appendix C. Water quality discharge criteria for sediment basins is as follows:

+ Suspended solids - <50 mg/L for rainfall events up to the sediment basin design rainfall event
+ Turbidity – project specific correlation between turbidity and TSS to be established (use 50 NTU at start of project if no correlation)
+ pH – 6.5 to 8.5

Note, this preliminary criteria may be modified by water quality objectives developed specifically for the project.

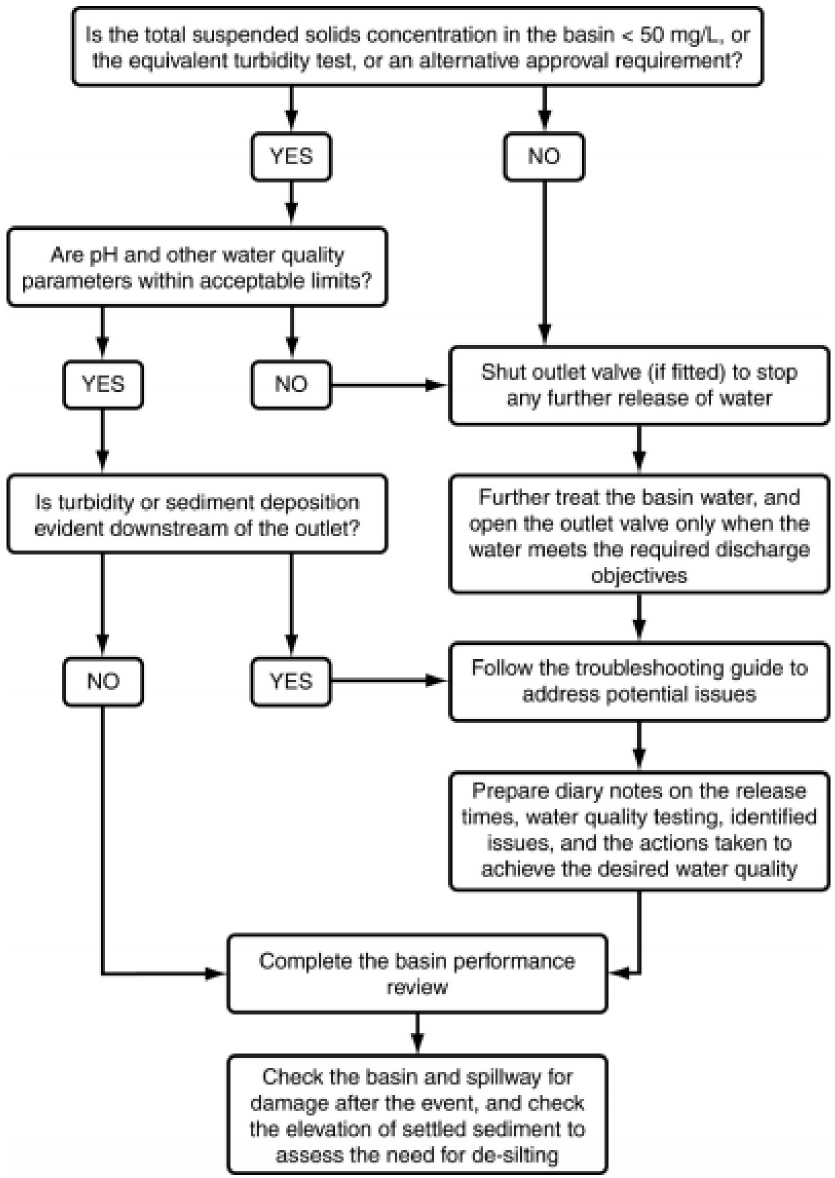

Figure 3 – Basin Performance Assessment Process (Source: IECA 2018)

5 EROSION CONTROL

The minimum erosion control requirements for various risk ratings in accordance with IECA (2008) guidelines are presented in Table 5.

Table 5 – Minimum erosion control requirements according to IECA (2008) - adapted from Table 4.4.7

EROSION RISK RATING	SOIL LOSS RATE (T/HA/YEAR)	ADVANCE LAND CLEARING ALLOWED (WKS WORK)	MAX DAYS TO STABILISATION (DAYS - % COVER)	STAGED CONSTRUCTION AND STABILISATION OF EARTH BATTERS >6H:1V	STOCKPILES STABILISED
Very Low	0 to 150	8	30 (60%)		
Low	150 to 225	8	30 (70%)		
Moderate	225 to 500	6	20 (70%)	✓	
High	500 to 1500	4	10 (75%)	✓	✓
Extreme	> 1500	2	5 (80%)	✓	✓

In addition to these requirements, erosion controls shall include:

- Establishing stabilised entry/exit points where works intersect roadways or access tracks
- Utilising existing tracks wherever possible
- Establish exclusion zones to prevent over-disturbance, and restrict stripping to approved areas only
- Stabilise diversion bunds and temporary drainage features with nominated measures
- Stage topsoil stripping to coincide with areas of active earthworks only
- Minimise occurrence and duration of stockpiling
- Carry out dust suppression and monitor air quality during high winds, noting that some works may be discontinued if excessive dust is observed
- Roughen earthworks areas, including batters
- Progressively stabilise steep batters if practical, using temporary erosion control (binders and blankets) or by expediting final treatment
- Retain existing ground cover in drainage lines as long as possible, restricting disturbance to immediately before active works
- Expedite construction works in drainage lines, monitoring weather forecasts and maximising production during dry weather
- Implement temporary erosion control (erosion control mat) prior to rainfall if permanent treatments are not complete

Given the stark wet-dry season rainfall variability all efforts should be afforded to achieving ground cover using permanent treatments in the maximum area possible prior to the wet season.

6 DRAINAGE CONTROL

Drainage control considers three main principles; diverting external flow before it enters site, directing site runoff to an appropriate sediment control, and ensuring runoff is conveyed in a non-erosive manner.

Flow diversion for flat sites is typically achieved using topsoil bunding or excavated catch drains. Given that 'topsoil' is being stripped on site this may be windrowed to form diversion bunds. The flowpath of these bunds is to be stabilised with soil binder or geotextile prior to rainfall. Internally, runoff will be allowed to sheetflow to proposed sediment controls, or be diverted to the sediment basin using diversion bunds.

Temporary drainage has been designed in accordance with Table 6.

Table 6 – Drainage Design Standards

Reference	Drainage Feature	Anticipated Design Life (Months)			
		<3	3 - 12	12 - 24	>24
Best Practice Erosion and Sediment Control (IECA, 2008)	Temporary Drainage Structures	2yr ARI		5yr ARI	10yr ARI
	Emergency Spillways	10yr ARI	20yr ARI	50yr ARI	
	Temporary Culverts	1yr ARI			

7 DREDGING AND RECLAMATION

The Dredging and Dredge Spoil Placement Management Plan prepared by AECOM as part of the project Environmental Impact Assessment process provided two options for the management of dredging and reclamation.

Option 1: using a CSD to remove the unconsolidated material to settling ponds, then a BHD to remove the consolidated stiff clays and rock for land reclamation.

Option 2: using a BHD to mix all dredged material and utilise for land reclamation required for construction of the Project.

Further information on these options may be found in the DDSPMP (refer Section 2.0).

Following publication of the Draft EIS, as part of the ongoing refinement of the Project construction methodologies, it was determined that:

+ Prior to any reclamation activity occurring, a rock revetment will be constructed at the seaward extent of the reclamation area.
+ The rock material to be used within the revetment will be screened to remove the majority of fine materials prior to its placement into the marine environment.
+ Geofabric will be placed in a manner to effectively mitigate the extent to which any fines can penetrate through the revetment.
+ Dredged material will subsequently be placed on the landward side of the revetment.
+ Silt curtains will be deployed wherever there may be the potential for fines from within the placed dredged material to migrate into the surrounding marine waters.
+ Runoff from the reclamation area will be managed (e.g. through the deployment of silt fences and silt curtains) to ensure that it does not result in elevations in turbidity seaward of the revetment.

Two potential construction strategies were proposed to develop the reclaim area:

1. The rock revetment will be developed to fully enclose the reclaim area prior to the placement of dredge spoil within the bund wall.

2. The rock revetment will be constructed such that it mostly encapsulate the reclaim area, with an opening along the western side to allow barges to enter the reclaim area to deposit the dredged material. The opening will have silt curtains across its width to minimise suspended sediment entering the harbour.

A turbidity trigger level of 100 mg/L (140 NTU) has been set at a distance of 150 m down-current from the operating dredge, the pipeline, or the seaward edge of the reclamation area. Detailed response requirements associated with exceeding this trigger are included in the DDSPMP, including reporting and following management measures:

1. Dredging and reclamation activities are situated close to shore, at locations which are afforded some protection from the effects of tidal currents.
2. During CSD operations, the feed of sediments into the suction pipe is maximised by its location directly behind the cutter head. This minimises the release of sediment into the water column surrounding the dredge. When dredging unconsolidated materials the cutter will be disengaged for much of the time, while dredge pumps will operate at the maximum speed possible.
3. During BHD operations, the bucket will be raised through the water column at a speed that minimises the loss of material from the bucket. The dredged material will be placed into barges from which there will be no overflow of entrained water or porewater. Silt curtains will be deployed along the seaward edge of the reclamation area and runoff from the area will be managed to minimise the entry of sediments into the marine environment.

Consideration of trends in the water quality data collected during the monitoring program will be used to adaptively manage the dredging operations to minimise the potential for water quality trigger levels to be exceeded. The monitoring will provide advanced warning of any impending trigger level exceedance, allowing precautionary corrective actions to be implemented before the trigger level is exceeded. For example, observations during monitoring will indicate the times within the tidal cycle when the migration of dredge-generated plumes towards South Shell Island is highest; maintenance or relocation of the dredge can then be scheduled to coincide with those times.

The controls proposed herein are recognised as demonstrating Best Practice Erosion and Sediment Control. The IECA guidelines do however provide limited guidance for marine works such as dredging and reclamation. This aspect of the work is guided by the project EIS which provided the above options, understood to represent general environmental duty. As described in the EIS, sediment transport modelling was undertaken to predict the potential extent and concentration of turbid plumes generated by dredging activity. The modelling suggested that zones of impact and influence were restricted to the project footprint for most of the time and unlikely to extent to the nearest sensitive hard coral and filter feeder communities at South Shell Island.

8 ROLES AND RESPONSIBILITIES

Table 7 outlines the responsibilities of project personnel in respect to ESC.

Table 7 - Roles and responsibilities

ROLE	RESPONSIBILITY
Project Manager	+ Overall responsibility for environmental compliance (including ESC implementation)
Construction Superintendent/Manager	+ Notify the Environmental Manager immediately of any non-compliance with ESCP; + Provide resources to ensure installation, maintenance and operation of ESC devices on ground.
Site Supervisor/Foremen	+ Ensure ESC measures are installed prior to commencing any disturbance activities; + Conduct site inspections as required to ensure ESC measures are operational and in good order; + Monitor daily rainfall; + Notify Environmental Advisor when runoff generating rainfall occurs in the previous 24 hours; + Treat, test and dispose of captured runoff as per operation procedures;
Environmental Manager/ Advisor	+ Conduct site inspections and audits as required; + Prepare audit reports based in inspections; + Provide advice, as required regarding ESC site improvement. + Conduct in-situ monitoring as required; + Collect and submit samples to laboratory as required; + Collate results and prepare reports as required; + Maintain current records of rainfall, water quality, treatment practices, discharge activities.
All Personnel	+ Report any damage to ESC devices and any potential or actual environmental harm in line with Duty to Notify under the requirements of the *Waste Management and Pollution Control Act 1998 (NT)*

9 SITE INSPECTION AND MONITORING

Site inspections and monitoring is to be undertaken in accordance with Sections 6.17 and 7.4 of the Best Practice Erosion and Sediment Control Document (IECA, 2008) as detailed below. When a site inspection detects a notable failure in the adopted ESC measures, the source of this failure must be reported, investigated and appropriate amendments made to the site and the ESCP.

ESCPs should be considered live documents that in some instances will require review and updating as site conditions change, or if the adopted measures fail to achieve the required treatment standard.

Best practice site management requires all ESC measures to be inspected at the following frequencies and include the following checks as a minimum:

Daily site inspections (during rainfall)

+ All drainage, erosion and sediment control measures
+ Occurrences of excessive sediment deposition (whether on-site or off-site)
+ All site discharge points (including dewatering activities as appropriate)

Weekly site inspections (even if work is not occurring on-site)

+ All drainage, erosion and sediment control measures

+ Occurrences of excessive sediment deposition (whether on-site or off-site)
+ Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements
+ Litter and waste receptors
+ Oil, fuel and chemical storage facilities

Prior to anticipated runoff producing rainfall (within 24 hours of expected rainfall)

+ All drainage, erosion and sediment control measures
+ All temporary flow diversion and drainage works

Following runoff producing rainfall (within 18 hours of rainfall event)

+ All drainage, erosion and sediment control measures
+ Occurrences of excessive sediment deposition (whether on-site or off-site)
+ Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements

The findings of ESC site inspections and monitoring will be documented as per the CEMP reporting requirements for compliance and non-compliance reporting.

APPENDIX A

EROSION AND SEDIMENT CONTROL DRAWINGS

APPENDIX B

FLOC REPORT (TO BE PREPARED)

Floc Performance Report

BASIN IDENTIFICATION CODE/NUMBER: ....

SITE / PROJECT: ....

PREPARED BY: .... **DATE:** ....

Chemical name:	Soil description:					
Dose rate:	0.00 Control					
Starting pH						
Starting turbidity						
Clarity[1] after 5 mins (mm)						
Clarity[1] after 15 mins (mm)						
Clarity[1] after 30 mins (mm)						
Clarity[1] after 60 mins (mm)						
Final pH						
Final turbidity						

Chemical name:	Soil description:					
Dose rate:	0.00 Control					
Starting pH						
Starting turbidity						
Clarity[1] after 5 mins (mm)						
Clarity[1] after 15 mins (mm)						
Clarity[1] after 30 mins (mm)						
Clarity[1] after 60 mins (mm)						
Final pH						
Final turbidity						

Note:

[1] For the purposes of a floc report, 'clarity' is defined as a level of turbidity that is likely to meet discharge requirements at a depth from the water level surface in the beaker. Clarity can be estimated visually or with the use of a turbidity meter.

APPENDIX C

BASIN PERFORMANCE REPORT

BASIN PERFORMANCE REPORT

Site / basin identification: ____________________ Inspector: ____________________

Date / time: ____________________ Recent rainfall: ____________________

Water quality in basin: NTU: ________ pH: ________ Water level in basin: ____________________

Issue Item		Potential Issue / Action Required (Y/N)	Comments/Action Undertaken
Inflow channel	Channel/pipe overtopped		
	Scour in channel		
	Chemical not mixing with inflow runoff		
	Catchment bypassing channel		
	Lateral inflow to main basin cell		
	Other		
Chemical & dosing	Chemical not working		
	No dosing		
	Incorrect dose rate		
	Other		
Fore bay	Sediment re-suspension		
	Other		
Level spreader	Concentrated flow over level spreader		
	Scour on backside of level spreader		
	Other		