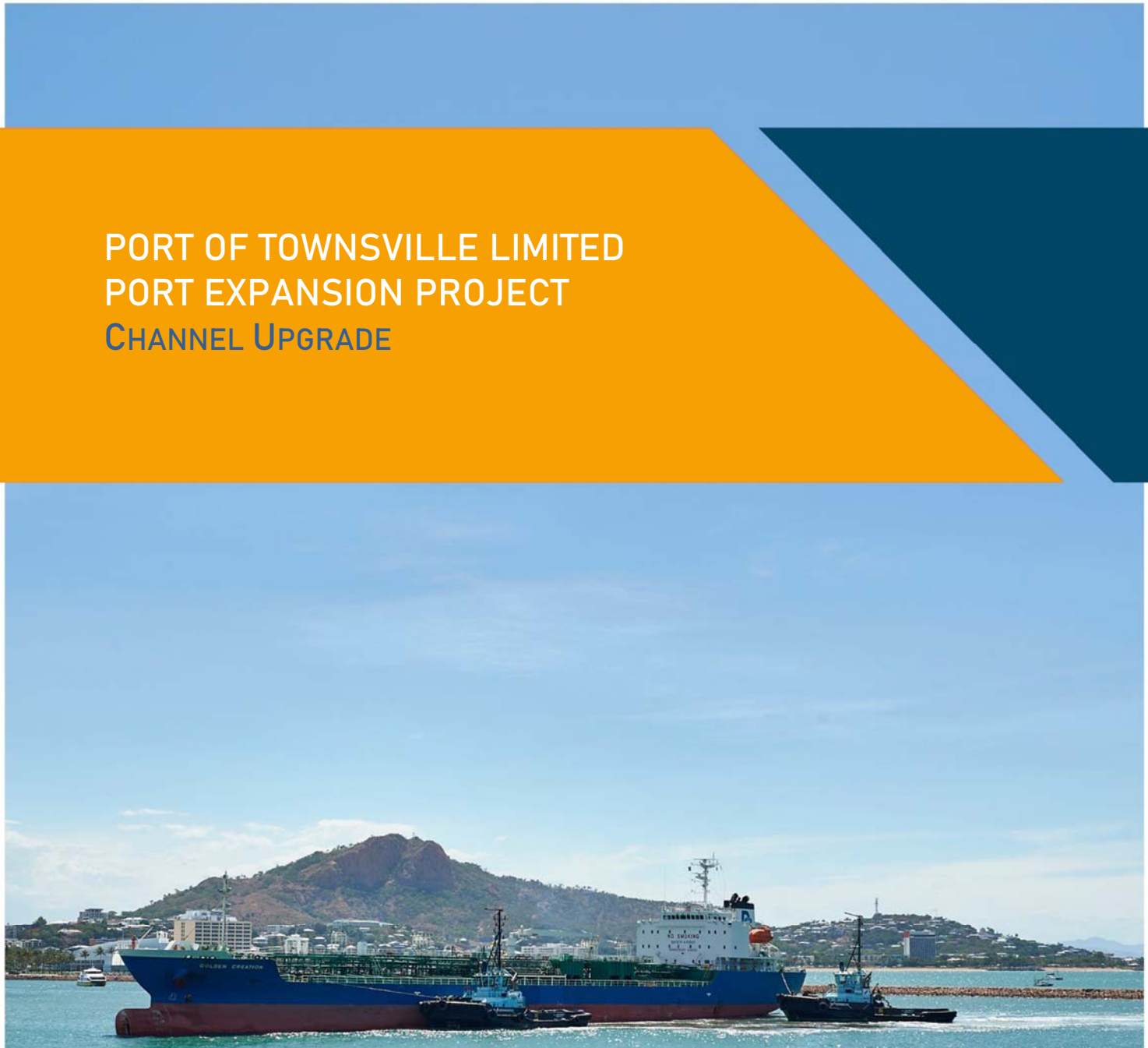
PORT OF TOWNSVILLE LIMITED
PORT EXPANSION PROJECT
CHANNEL UPGRADE



Townsville Port Expansion Channel Upgrade Project

Stormwater, Sediment & Erosion Control Plan

February 2020

Document Control Sheet

Revision History

Revision No.	Date	Changed by	Nature of amendment
0	14/02/2020	T Smith	Submitted version

Review History

Revision No.	Date	Reviewed by
0	14/02/2020	M Louden, M Wise prior to submission

Document approval

Approval of the final Stormwater, Sediment & Erosion Control Plan was issued by DAWE on 26 February 2020.

The Stormwater, Sediment & Erosion Control Plan is published on the CU Project's website on 11 March 2020.

This document has been prepared to meet the Commonwealth Government's EPBC Approval No. 2011/5979 Conditions and the Queensland's Coordinator General's Conditions for the Port of Townsville Limited's Port Expansion Project.

DECLARATION OF ACCURACY

EPBC Number	2011/5979
Project Name	Port of Townsville Port Expansion Project
Approval Holder	Port of Townsville Limited
ACN / ABN	130 077 673 / 44 411 774 236
Approved Action	To expand the Port of Townsville, in Townsville Queensland. The action is for dredging, land reclamation and construction of infrastructure.
Location of the Action	Townsville, Queensland

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name (please print)

Marissa Wise

Organisation (please print)

Port of Townsville Limited

Date: 14 / 02 / 2020

GLOSSARY

AEIS	Townsville Port Expansion Project: Additional Information to the Environmental Impact Statement - Final (June 2017).
ANZECC	Australian and New Zealand Environment Conservation Council
ARQ	*Australian Runoff Quality: Guide to Water Sensitive Urban Design*
CU Project	Townsville Port Expansion Channel Upgrade Project
CEMP	Construction Environmental Management Plan
EA	Environmental Authority
EIS	PEP Environmental Impact Statement
EPP (Water)	*Environmental Protection (Water) Policy 2009*
IECA 2008	*Best Practice Erosion and Sediment Control (International Erosion control Association, 2008)*
PASS	Potential Acid Sulfate Soils
PEP	Port Expansion Project
Port	The Port of Townsville
POTL	Port of Townsville Limited
QWQG	*Queensland Water Quality Guidelines*
RHM	Regional Harbour Master
Significant rain event	Is a rain event that produces stormwater runoff to level that discharge to the marine environment is expected.
Site	The new reclamation area (Lot 794 on SP308904) and the northern extent of the East Port Area at the Port of Townsville (Lot 791 on EP2348)
SSECP	Stormwater, Sediment & Erosion Control Plan
TSHD	Trailer Suction Hopper Dredge – a self-propelled ship with a hold (hopper), and a dredging mechanism comprised of suction pipes connected to draghead(s), by which it can fill the hopper with dredge material

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1 INTRODUCTION

Port of Townsville Limited (**POTL**) is a Government Owned Corporation established under the *Government Owned Corporations Act 1993*, which manages the Port of Townsville (**the Port**). The Port is located on Cleveland Bay, approximately three kilometres east of the Townsville city centre in North Queensland (**Figure 1**). The Port is multi-purpose and handles predominantly bulk and general cargo with a land and sea jurisdiction in excess of 450 Km^2. The Port is situated in the Great Barrier Reef World Heritage Area and is outside of the Great Barrier Reef Marine Park. Townsville is a long-established township with a history of urbanisation and industrial activities in the Ross River and Ross Creek drainage system.

The Townsville Port Expansion Channel Upgrade Project (**CU Project**) is Stage 1 of POTL's long-term Port Expansion Project (**PEP**). The PEP aims to create a series of strategic assets that will address current capacity constraints and accommodate future growth in trade over a planning horizon to 2040. It includes development of port infrastructure, namely work to "top of wharf" facilities, capital dredging; reclamation; breakwaters and revetments; berths; access roads; rail loop; and trunk services and utilities. It does not include the development of "above wharf" infrastructure such as terminal pavements; ship-loaders and unloaders; product conveyors; storage buildings for products; rail loaders and unloaders; stacking and reclaiming equipment; storage tanks; and pipelines, which will be subject to separate statutory assessment and approval requirements prior to the start of their operations.

1.1 Project Scope

The CU Project involves the supply and haulage of marine-grade armour rock; the construction of a reclamation area; and capital dredging and placement of capital dredge material at the Port. The capital dredging, construction activities and infrastructure development for the CU Project will occur inside the existing port limits, the designated water areas in which navigation falls under the control of the Regional Harbour Master (**RHM**). The land-based construction activities will occur on the new reclamation area, namely Lot 794 on SP308904, and the northern extent of the East Port area, namely Lot 791 on EP2348 (**the site**), which is Strategic Port Land (Figure 2).

The capital dredge campaign will last approximately 2 to 3 years and dredge approximately 3.9 million cubic metres of soil from the channels, predominantly using a mechanical dredge with support from a trailer suction hopper dredge (**TSHD**). All the capital dredge material will be placed within the new reclamation area as part of land reclamation activities. Dewatering and ground improvement of emplaced sediments within this area will be undertaken.

A Construction Environmental Management Plan (**CEMP**) will be implemented to manage risk and detail appropriate environmental management controls to reduce the potential for negative impacts on the environment associated with the CU Project 's construction activities. This Stormwater, Sediment & Erosion Control Plan (**SSECP**) forms part of the CEMP and outlines stormwater, sediment and erosion management controls to be implemented during the CU Project, with a separate Site Monitoring Plan detailing the environmental monitoring requirements. It applies only to the surface water flow on the CU Project site at the northern extent of the East Port area. A separate Tailwater Management Plan outlines the environmental monitoring and management controls for the tailwater in the new reclamation area from the capital dredge campaign.

Figure 1: Locality Plan of the Port of Townsville & CU Project

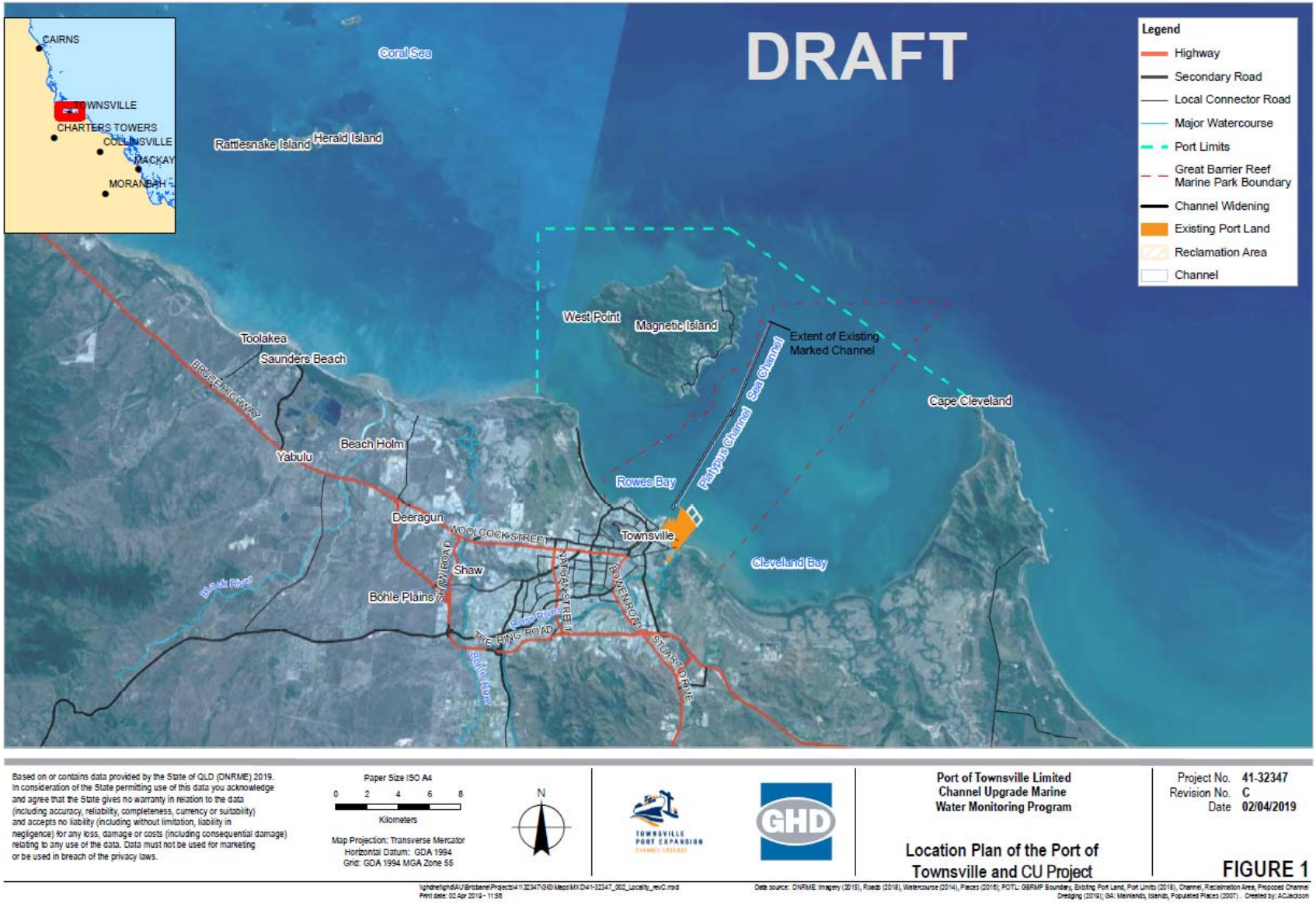
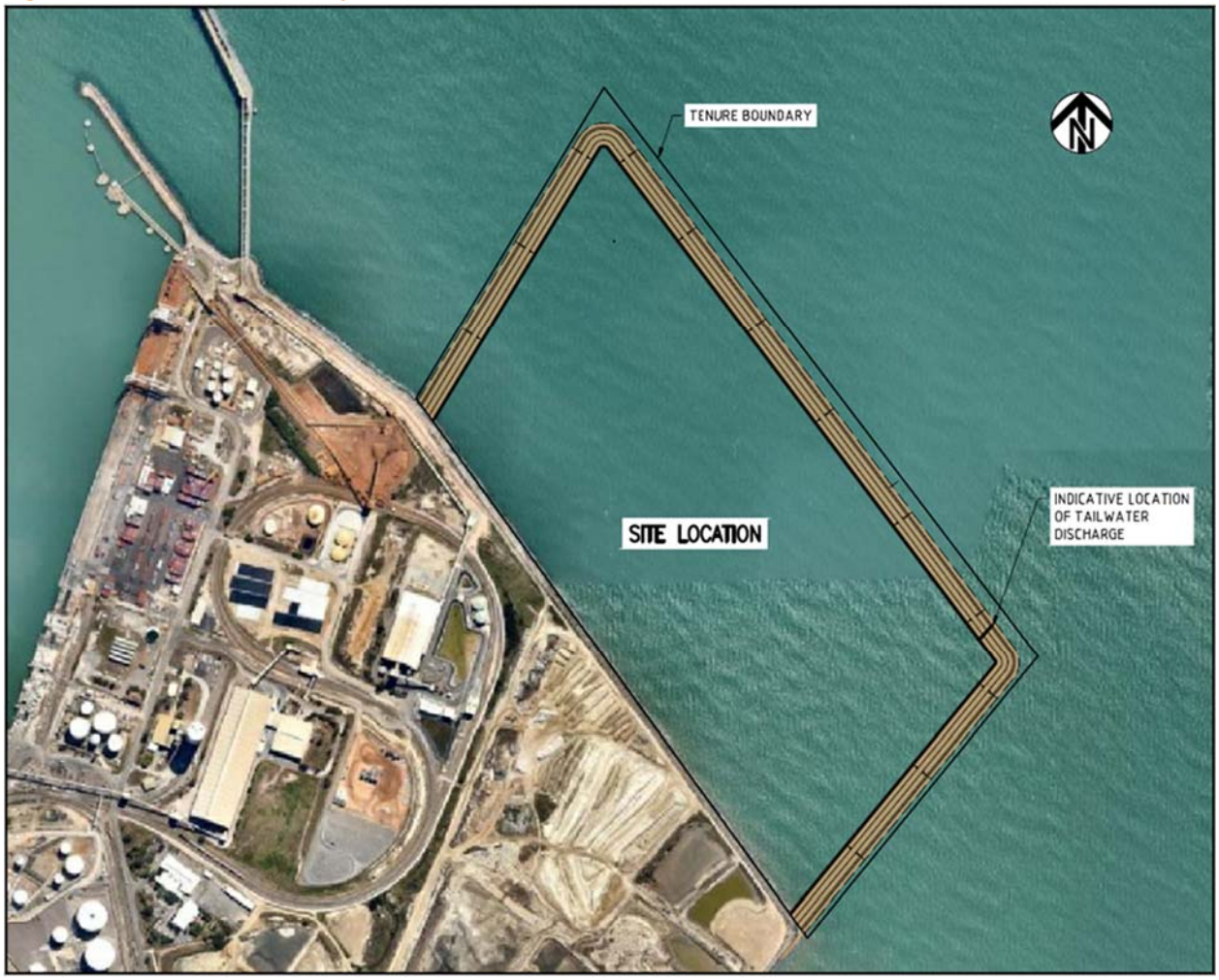


Figure 2: Lot Plan for CU Project Rock Wall Construction & Reclamation Activities



1.2 Legislative overview

The PEP was the subject of an Environmental Impact Statement (**EIS**) and a further Additional Information to the Environmental Impact Statement (**AEIS**), submitted in support of Commonwealth and State project approval applications.

Commonwealth approval (EBPC 2011/5979) under the Environment Protection and Biodiversity Conservation Act 1999 for the PEP was granted on 5 February 2018. The Queensland Coordinator-General issued an evaluation report on the PEP's EIS/AEIS in September 2017. That report contains conditions to be included in the State Development Permits and Environmental Authorities, for the various stages of the PEP, including the CU Project.

Both Commonwealth and State approvals prescribe conditions relevant to the monitoring of and management of stormwater quality and erosion control on site (provided by Appendix A). This document provides the monitoring and management arrangements to address the prescribed conditions and will be used to manage risk to sensitive receptors during construction.

1.3 Purpose & Objectives

The overall objective of this SSECP is to manage risk and reduce the potential for negative impacts on the environment, by identifying and detailing appropriate stormwater, sediment and erosion management controls to assist this task.

This SSECP reflects and/or provides a greater level of detail to mitigation commitments identified in the PEP Environmental Impact Statement (**EIS**) and re-assessed in the PEP Additional Information to the Environmental Impact Statement (**AEIS**). It sets out the framework for management, mitigation and monitoring of relevant impacts affiliated with the CU Project's construction activities. It has been developed to include measures that POTL believes are necessary for protection of sensitive environmental receptors and to incorporate additional actions/controls as required by statutory approvals, permits and licences that relate to the CU Project.

The SSECP is designed to:

- Describe POTL's commitments regarding environmental performance and the reduction of adverse impacts from stormwater and sediment and erosion;
- Provide an action program to enable delivery of the environmental commitments so they are achieved and implemented;
- Establish a temporal and spatial dataset to inform discussions with regulators and provide supporting information for ongoing performance;
- Identify areas of potential concern and detail controls and methodologies that will be adopted to mitigate adverse impacts; and
- Identify corrective actions to rectify any deviation from performance criteria; and
- Establish timely reporting of all EA limit exceedances to regulators.

This Stormwater, Sediment and Erosion Control Plan is Appendix J of the *CU Construction Environmental Management Plan (CEMP POT 2099).* Management actions and controls relevant to mitigating stormwater impacts and sediment and erosion control are also defined in the CEMP. This monitoring plan must be read in conjunction with the CEMP to ensure all management and mitigation measures are captured in undertaking this plan.

2 SITE DESCRIPTION

2.1 Existing Environment

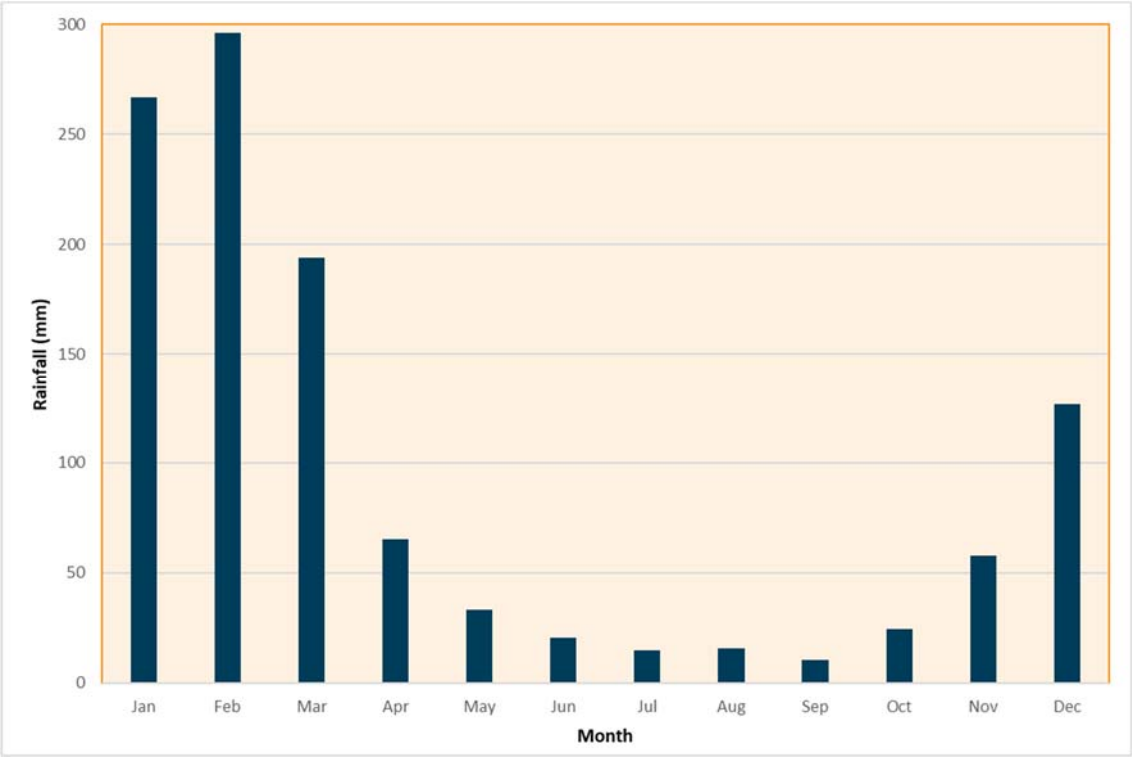
The Port is located on Cleveland Bay, approximately 3 km east of the Townsville city centre in North Queensland (Figure 1). It is a multi-purpose port that handles predominantly bulk and general cargo with a land and sea jurisdiction in excess of 450 km^2. Townsville is a long-established township with a history of urbanisation and industrial activities in the Ross River and Ross Creek drainage system.

Land-based construction activities will occur on the new reclamation area, namely Lot 794 on SP308904 and the northern extent of the East Port area, namely Lot 791 on EP2348 (**the site**), which is Strategic Port Land (Figure 2). The construction site is fenced, and access controlled in accordance with safety legislation for construction sites (including signage and security controls) and POTL port security protocols, i.e. POTL is responsible for port security.

2.2 Rainfall

Townsville is in the dry tropics where there is a clear pattern of the majority of rainfall occurring during the summer months and dry periods in the winter months. Between December and March each year, the region receives approximately 80% of its average annual rainfall (Figure 3). From a seasonal perspective, the wet season represents a more sensitive time of year for receiving waters at the site, due to the increased likelihood of storms and rainfall events transmitting potential contaminants from the upstream sources and port operations out to Cleveland Bay.

Figure 3: Average Monthly Rainfall 1940-2018*



*NOTE: Source: Bureau of Meteorology, 2018.

2.3 Topography and Drainage

The land based construction area is located at the east of the existing port facilities within Cleveland Bay. Existing port facilities are located, on previously reclaimed land, to the west of the site, and the waters of Cleveland Bay to the north, east, and south. The adjoining land is generally flat and drains through internal drainage systems. The construction site area will be linked into the existing drainage systems; as such, no external stormwater catchments are expected to drain onto the CU Project site.

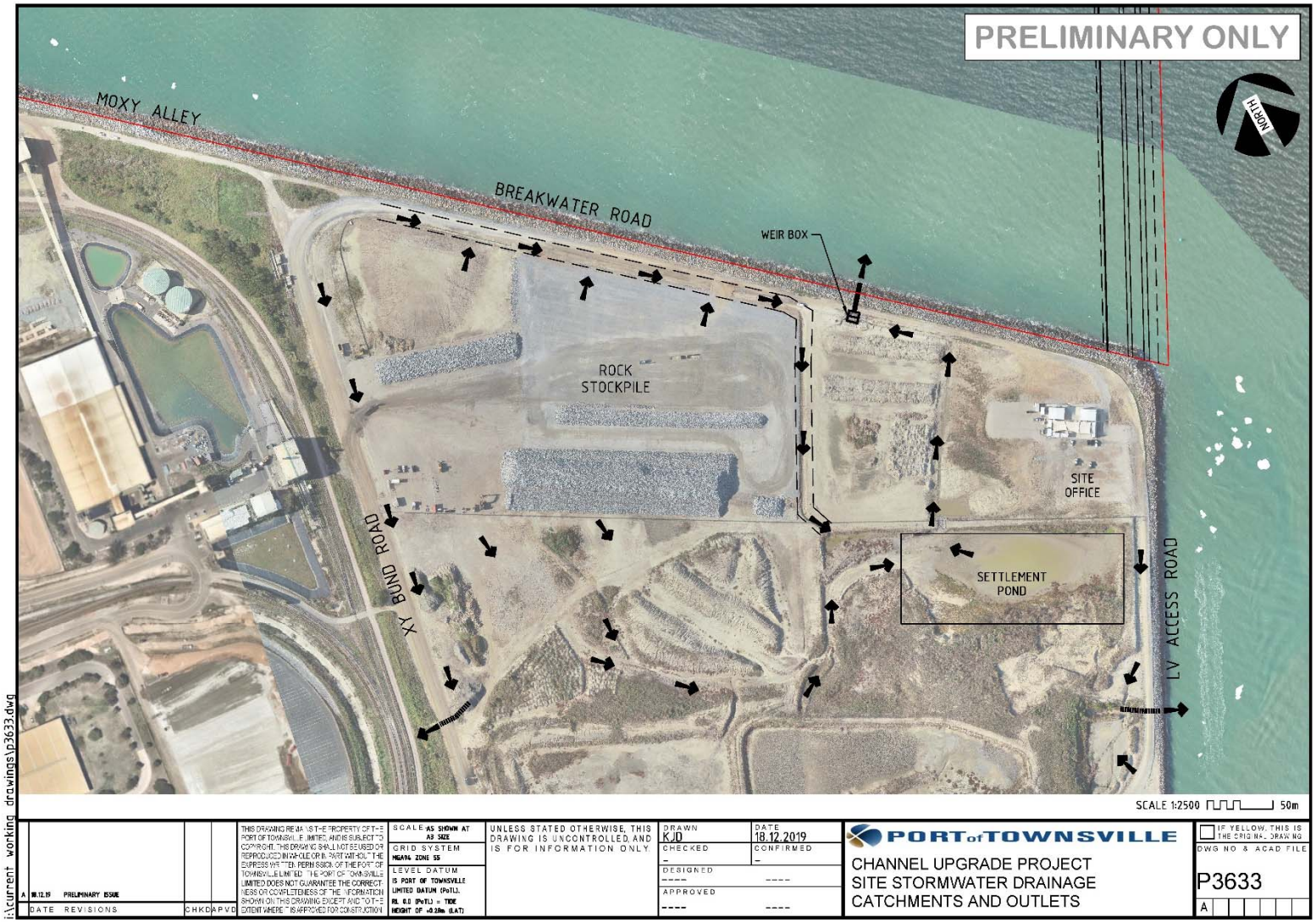
An existing stormwater pond, of around 12,000 m^2 area, and 6.75 Ml capacity, exists on adjoining land immediately to the South of the site. This pond currently functions as a drainage / water quality pond for the surrounding land. An existing weir, and box culvert, discharges water from the pond to Cleveland Bay.

The existing pond, and drainage infrastructure, are available for use during the land based construction activities, with the design, and development of the construction Stormwater, Sediment and Erosion and Control Plan (SSECP) incorporating the existing stormwater infrastructure.

2.4 Receiving Waters & Values

The existing stormwater catchment and the receiving waters adjacent to the site are shown in Figure 4 along with the existing stormwater drainage**.** Due to the topography of the site, these catchments receive limited water from other catchments.

Figure 4: Existing Stormwater Pond and Outlet to Cleveland Bay



The major receiving waterway is Ross River, which flows into Cleveland Bay. Environmental and use values and water quality objectives for the coastal waters of Ross River have been prepared and are scheduled under the *Environmental Protection (Water) Policy 2009* (**EPP (Water)**) as follows:

- Aquatic ecosystems;
- Human consumer;
- Primary recreation;
- Secondary recreation;
- Visual recreation;
- Industrial use; and
- Cultural and spiritual values.

Under the Environmental Protection Water Policy, the majority of Cleveland Bay, including the Port sub-zone, is defined as moderately disturbed waters, therefore discharge of stormwater into these waters are to be considered in light of this status.

The site and the surrounding land are predominately used for port operations with the nearest residential receptors located over 1 km away.

2.5 Soils

The existing land based construction site is a previous reclamation area that has been filled with soil dredged from the port area and shipping channels, as well as excess soil and fill from Ross River dredging and other port developments. The land based construction area soils show materials ranging from silty clay to clayey sands. These soils generally exhibit the following erosion characteristics:

- Medium erodibility potential;
- May create turbid run-off due to release of silt and clay particles.

2.6 Acid Sulfate Soils

The existing site and reclamation area consist of older and new dredge material. As outlined in the CU Project Acid Sulfate Soils and Contamination Plan, the soils at the port of Townsville are either non-PASS; PASS with sufficient acid neutralising capacity to self-buffer; or PASS and requires treatment with relatively low volume of agricultural lime to achieve a sufficient factor of safety against acid generation. PASS soils and site works will be completed in line with the CU Project Acid Sulfate Soils and Contamination Plan. Including training of staff on identification of acid sulfate soils.

2.7 Site Surface Stabilisation

The site is subject to a high erosion hazard due to the nature of seasonal rainfall, the soil type available from previous land development operations, the overall extent of the site works, and the nature of the works.

Best practice erosion control requires appropriate measures to be employed as soon as reasonable and practicable to limit soil erosion and, in particular, to protect all exposed areas of soil from erosion. This principal underlines the SSESCP, with stormwater and erosion control measures to be implemented and maintained during the dry season when rainfall is unlikely. This will ensure that required erosion protection can be implemented prior to wet season rainfall, reducing the risk of significant erosion or stormwater runoff issues.

3 STORMWATER

3.1 Stormwater Quantity

If managed proactively with appropriate controls, the quantity of stormwater runoff from the site is not considered to be a significant concern for this project during construction.

The project land based site area covers approximately 13.1ha, primarily for rock stockpiling and site offices. These areas have been designed prior to use, and therefore have been established to ensure all stormwater runoff enters the established stormwater drains. These areas are unsealed, and so some infiltration of rainwater to the soils in this area will occur. The developed site will contribute run-off directly to waters of the bay with no undesirable effect on the hydrology of the receiving waterbody predicted.

Construction drainage infrastructure will be sequenced and established to cater for the stormwater flow at each aspect of the construction site and discharge that water from the site into Cleveland Bay. Appropriate civil design will ensure that site infrastructure is developed appropriately, to capture and convey stormwater from the land based construction site to the bay. IECA 2008 recommends a 10 year Average Recurrence Interval (10% Average Exceedance Probability) design storm event for temporary drainage works where the infrastructure will have a design life of more than 24 months in Queensland (refer to IECA 2008 Table 4.3.1). Temporary construction drainage will consider this recommendation in the capacity, and resistance to erosion, of the structure.

3.2 Stormwater Quality

Given the environmental values existing in areas adjacent to the site, the Australian and New Zealand Environment Conservation Council (**ANZECC**) 2000 guidelines are recommended for water quality assessment.

Sediment is the key stormwater contaminant, likely to be encountered during the CU Project works. Erosion of sediment from the site, and subsequent contamination of stormwater, may lead to increased levels of turbidity and suspended solids in the receiving environment during construction. The International Erosion Control Association, Australasia (IECA), produced 'Best Practice Guidelines for Erosion and Sediment Control' in 2008 (IECA 2008) will be adopted to identify appropriate works for erosion and sediment control during construction activities.

Therefore, this SSECP references the ANZECC 2000 guideline, and adopts IECA 2008 as the 'best practice' guideline for control of eroded sediments.

The risk management approach outlined in the *Australian Runoff Quality: Guide to Water Sensitive Urban Design* (Engineers Australia, 2006) (**ARQ**) also provides methodologies to establish sustainable water quality targets for contaminants and associated mitigation controls. The ARQ approach can be summarised as follows:

- Identify the waterways and their designated environmental and use values, which will potentially be affected by the development;
- Identify the existing major threats to the waterways and the estimation of sustainable catchment levels for key contaminants;
- Describe the key sources and pathways of contaminants and current management;
- Assess the predicted loads of key contaminants from the development relative to sustainable levels;
- Establish water quality targets for contaminants with an acceptable risk based on comparable, "healthy" ecosystems within the same climatic region; and
- Select and design appropriate mitigation measures to limit key contaminant sources and manage pathways to meeting the water quality targets.

3.3 Existing conditions

Background stormwater monitoring commenced prior to the preliminary site setup and construction phases of the CU Project as discussed in the project's Site Monitoring Plan. This has enabled the establishment of reference conditions, the identification of the relevant ecosystem status, the estimation of sustainable annual catchment loads for key contaminants and the development of subsequent mitigation controls. The assessment of projected site conditions is based on "trigger values" which establish the concentration or loads of key performance indicators below which there is a low risk that adverse biological effects will occur. These values are detailed in the Site Monitoring Plan (refer to POT 2103 / CEMP Appendix I).

3.4 Contaminant Sources & Pathways

Table 1 outlines the anticipated sources, and contaminants, of surface runoff from the site. The key contaminant is considered to be sediment, which may lead to increased levels of turbidity and suspended solids in the receiving environment during construction, and particularly in rain events.

Table 1: Existing Contaminants Sources & Contaminants in Surface Runoff

Existing Sources	Existing Contaminants
• Clearing and earthmoving activities (haul road, internal access roads, dredge ponds) • Plant and equipment operations (fuels, oils, hydraulic fluid) • Haulage trucks and vehicle wear • General storage	• Sediment o Suspended solids o Metals • Hydrocarbons • Nutrients • BOD and pathogens • Debris

Contaminant performance objectives associated with stormwater from the CU site are detailed in the Site Monitoring Plan, utilising the objectives set under the relevant Queensland Water Quality Guidelines. Further, the CU Project Tailwater Management Plan also establishes water quality objectives and limits associated with discharges to the marine environment. While specifically established for tailwater discharge from the reclamation area, these discharge limits may also be considered.

3.5 Potential Construction Conditions

The proposed construction activities will change the hydrologic conditions and drainage characteristics of the site. The major contributors to altered conditions are considered to be:

- Changing hydrologic conditions during construction, due to construction of temporary and new infrastructure, with changing levels of stormwater run-off. Construction infrastructure will include internal access roads, infrastructure areas (crib rooms, site offices, and fuel storage), diversion channels and culverts. There will be continuing opportunity for stormwater infiltration into groundwater with large surface areas, roads, and carparks proposed to remain unsealed;
- Potential sediment contamination of stormwater run-off due to flow across unsealed surfaces;
- Potential chemical contamination of surface water due to spills or leakage from plant and equipment and maintenance activities conducted on-site;
- Potential hydrocarbon contamination of surface water due to spills or leakage of any stored fuels, oils and hydraulic oils, which may be stored in significant volumes on-site. All fuel is proposed to be stored in self-bunding double cell fuel storage tanks with emergency valves to limit spills. As detailed in the CEMP, all spills will be managed and cleaned up as soon as practicable, such that material is removed and taken to an approved facility off site. No other hazardous materials are likely to be stored on site.

Table 2 lists the potential sources and contaminants for surface runoff from the site based on the CU Project's proposed construction activities. Sediment is anticipated to be the key contaminant that may increase as a result of the CU Project's construction activities, if not proactively managed.

Table 2: Potential Contaminants and Contaminant Sources in Surface Runoff during Construction Activities

Potential Sources	Potential Contaminants
• Clearing and earthmoving activities (haul road, internal access roads) • Plant and equipment operations and maintenance (fuels, oils, hydraulic fluid) • Fuel storage • Haulage trucks and vehicle wear • Site facilities	• Sediment o Suspended solids o Metals • Hydrocarbons • Nutrients • BOD and pathogens • Debris and gross pollutants (litter)

A number of the land based construction activities have the potential to impact on stormwater quality to varying levels. These activities are detailed in the Construction Environmental Management Plan (CEMP). The CEMP also details the potential influence the project will have on the key environmental parameters and establishes the residual risk level assessed for the likely to impact on these elements. As detailed in the CEMP, stormwater quality residual risk level has been assessed as medium to low.

4 EROSION AND SEDIMENT CONTROL MEASURES

4.1 Erosion Hazard

Erosion Hazard Assessment is a procedure for undertaking a "preliminary" assessment of the environmental hazard associated with the construction of a given land development. The assessment is based on the land development as a whole, and generally does not consider individual drainage catchments within the development.

An Erosion Hazard assessment following the TASK number method noted in IECA 2008 has been undertaken (see details in Appendix B). This method is a modification of the Revised Universal Soil Loss Equation (RUSLE). The TASK number is directly proportional to the estimated soil loss within a particular geographical region (related to a given rainfall erosivity).

Based on a project land based site area of 13.1ha and a land based construction timeframe of 4 years (48 months), the TASK value for the site is 116,202. This equates to a High Erosion Risk Site (values greater than 200). This is considered to be conservative, as it is unlikely the entire area of the existing site will be disturbed at any given time.

As detailed in Appendix B, Low Erosion Hazard may be achieved by limiting erodible surfaces to a duration of 1 month or less, work with gentle slopes across the site, and limit the size of the soil disturbance area at one given time. As shown, while site treatment works to reduce erosivity will occur, it is unlikely that sufficient area will be subject to erosion control to reduce the Hazard to this classification.

It is noted that the new reclamation area filling by dredge material, is linked to the tailwater and site monitoring plans as controls on discharge.

4.2 Erosion Risk

Best practice erosion control requires appropriate measures to be employed as soon as reasonable and practicable to limit soil erosion and, in particular, to protect any, and all, exposed areas of soil from raindrop impact erosion.

Table 3 (from IECA 2008, Table 4.4.4) allows an assessment of Erosion Risk based upon monthly rainfall erosivity, in Townsville.

Table 3: Erosion Risk Ratings Based on Monthly Rainfall Erosivity (IECA 2008)

Month	Jan	Feb	March	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Risk	**E**	**E**	**E**	**H**	**M**	**L**	**VL**	**L**	**VL**	**M**	**H**	**H**

Where:

- E = Extreme (erosivity >1500)
- H = High (erosivity 285 to 1500)
- M = Moderate (erosivity 100 to 285)
- L = Low (erosivity 60 to 100)
- VL = Very Low (erosivity 0 to 60)

This indicates that the Erosion Risk is more considerable during the summer months (November to April) than the winter months.

4.3 Erosion Control

Best practice erosion control and site rehabilitation depends on the Erosion Risk Rating noted in Table 3. General recommendations for land clearing (leaving areas of exposed soil) and rehabilitation (or temporary stabilisation) of those areas, are made for each period of particular erosion risk ratings, listed in Table 4.

Table 4: Best Practice Land Clearing and Rehabilitation Requirements (from IECA 2008, Table 4.4.7)

Risk	Best practice requirements
All cases	All reasonable and practicable steps taken to apply best practice erosion control measures to completed earth works, or otherwise stabilise such works, prior to anticipated rainfall-including existing unstable, undisturbed, soil surfaces under the management or control of the building/construction works.
Very low	Land clearing limited to 8 weeks of work if rainfall is reasonably possible. Disturbed soil surfaces stabilised with minimum 60% cover within 30 days of completion of works if rainfall is reasonably possible. Unfinished earthworks are suitably stabilised if rainfall is reasonably possible, and disturbance is expected to be suspended for a period exceeding 30 days.
Low	Land clearing limited to maximum 8 weeks of work. Unfinished earthworks are suitably stabilised if rainfall is reasonably possible, and disturbance is expected to be suspended for a period exceeding 30 days. Appropriate protection of all planned garden beds is strongly recommended.
Medium	Land clearing limited to maximum 6 weeks of work. Staged construction and stabilisation of earth batters (steeper than 6H:1V) in maximum 3 m vertical increments wherever reasonable and practicable. Unfinished earthworks are suitably stabilised if rainfall is reasonably possible, and disturbance is expected to be suspended for a period exceeding 20 days.
High	Land clearing limited to maximum 4 weeks of work. Staged construction and stabilisation of earth (soil) batters (steeper than 6H:1V) in maximum 3 m vertical increments wherever reasonable and practicable. The use of turf to form grassed surfaces given appropriate consideration. Soil stockpiles and unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 10 days.
Extreme	Land clearing limited to maximum 2 weeks of work. Staged construction and stabilisation of earth batters (steeper than 6H:1V) in maximum 2 m vertical increments wherever reasonable and practicable. High priority given to the use of turf to form grassed surfaces. Soil stockpiles and unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 5 days.

The CU Project will adopt relevant controls from these recommendations, where practical, during the proposed construction activities, noting that some of these will not applicable given the land use activities (i.e. active rock stockpiling). While saying this, the rock stockpile and traffic areas (~50-65% of the existing site) have been treated with quarry product (includes limestone) with <15% fines. This limits the amount of fines available for erosion in the new surface profile, and the lime stone acts as a natural stabilising bonding material into the profile.

4.4 Sediment Control

IECA 2008 (Table 4.5.1) allows nomination of a sediment control standard based upon monthly rainfall erosivity (between 57.4 in July, and 5186 in February, for Townsville).

Table 3 notes the monthly rainfall erosivity for Townsville ranging from Very Low to Extreme, with eight months subject to at least a moderate period of rainfall erosivity. Based on this, a Type 1 Sediment Control Standard is adopted for the site during the Construction phase.

While taking this approach, it is noted that it is highly unlikely that the entire site (13.1ha) will be in a disturbed condition during the construction period. For example, the rock stockpiling area has been constructed with a limestone bridge layer (<15% fines) which is a site improvement that will reduce sediment and erosion potential.

Table 5 notes sediment controls that are applicable to the Type 1 Sediment Control Standard. These devices form the basis of sediment control methodology for the site construction under the conditions noted previously. Specific details of the adopted controls are listed in Section 4.

Table 5: Default sediment control techniques for type 1 classification (from IECA 2008 Table 4.5.3)

Sediment control pathway	*Default Sediment Control Techniques – Type 1*
Sheet flow treatment techniques	Buffer Zone capable of infiltrating 100% of stormwater runoff or process water Infiltration basin or sand filter bed capable of infiltrating 100% of flow
Concentrated flow treatment techniques	Sediment Basin (sized in accordance with design standard)
De-watering sediment control techniques (selection not based on soil loss rate)	Type F/D Sediment Basin Stilling Pond
Instream sediment control techniques (selection not based on soil loss rate)	Pump sediment-laden water to an off-stream Type F or Type D Sediment Basin or high filtration system

4.4.1 Proposed stormwater pond/sediment retention basin

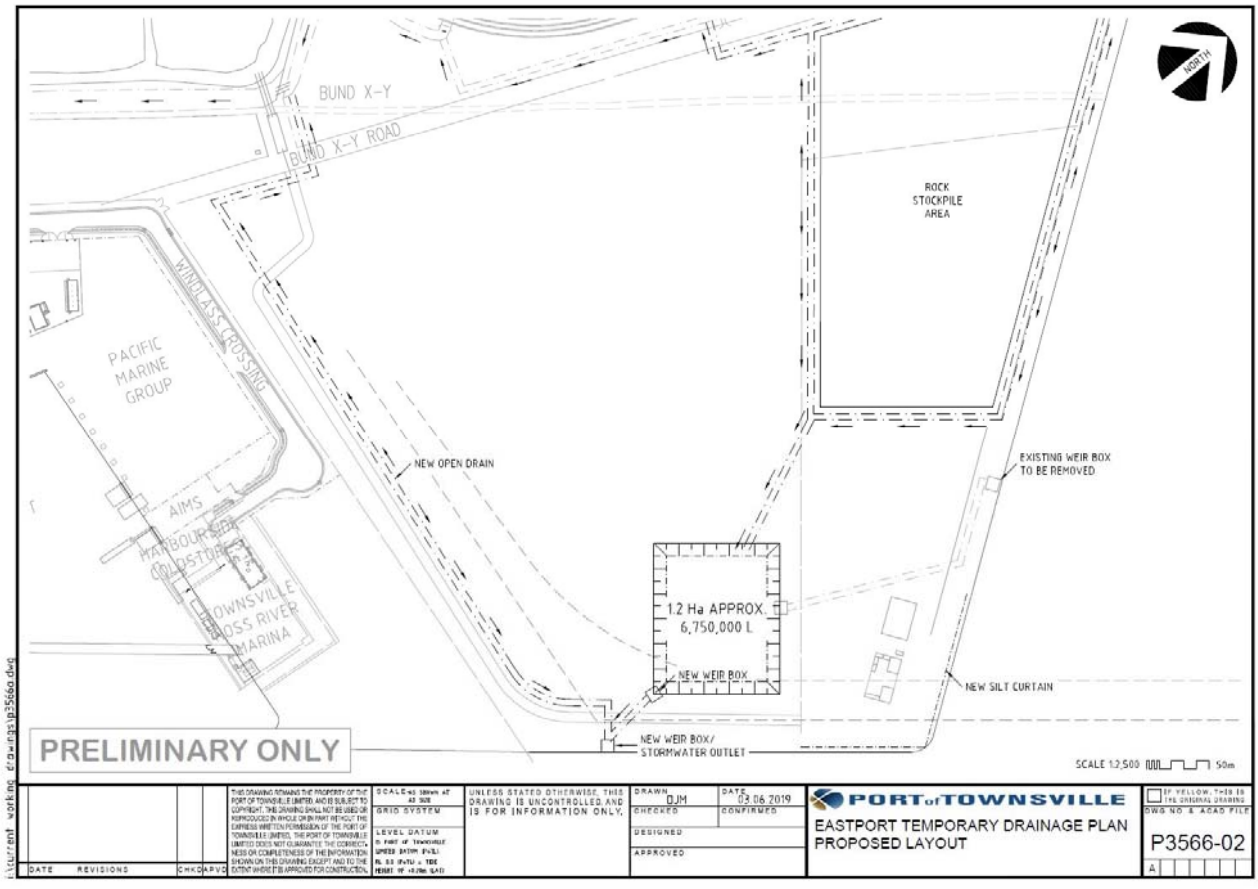
Following the standards listed above, an appropriately designed sediment basin, or multiple basins/ponds, is proposed to be the most appropriate construction phase sediment control for this site.

A stormwater pond, of around 12,000 m^2 area, and 6.75 Ml capacity, and associated drainage system (Figure 5) has been designed with capacity to suit local climatic conditions. Initially all stormwater will exit the site via the existing weir box outlet.

A new stormwater outlet and associated drains will be constructed during the first 12 months of construction and once this is completed, all stormwater will be discharged from this outlet. Regular inspections of this stormwater pond and drainage system and subsequent repairs, as required, will ensure it is operating close to design capacity. Management of stormwater discharge during storm events will be achieved through a combination of time management and engineering controls. Uncontrolled discharges, during storm events, will be minimised given the environmental value of the downstream receiving waters.

The stormwater pond, and associated drainage system, will be designed to function as a sediment basin, to collect sediment particles of size appropriate to the site fill material, with capacity to suit local climatic conditions and in accordance with the recommendations made in IECA 2008.

Figure 5: Proposed Initial Stormwater Pond Arrangement



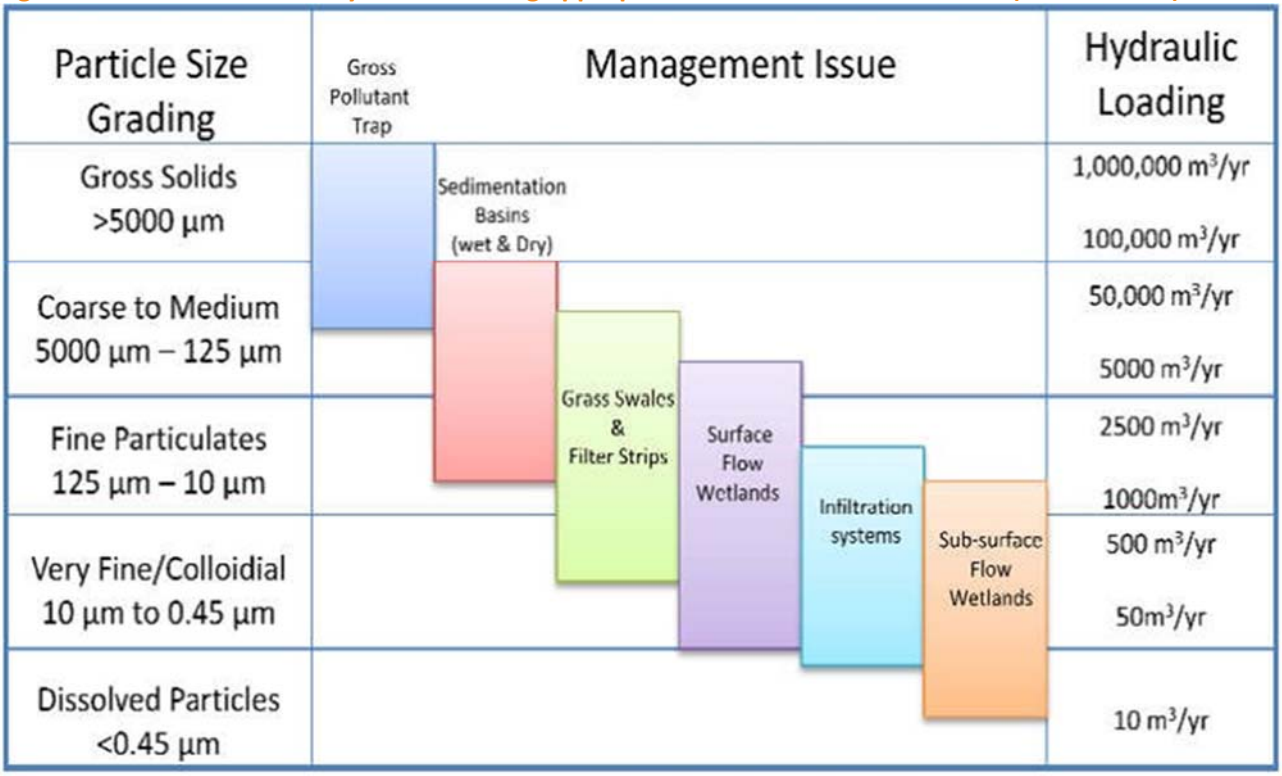
5 EROSION AND SEDIMENT CONTROL PLAN

This SSECP contains the stormwater, sediment and erosion controls which have been selected and designed:

- to mitigate impacts from the types of contaminants identified in **Table 2**;
- to minimise the potential contaminant sources; and
- to meet the performance objectives.

The management and mitigation measures have been selected taking into account the typical treatment processes suitable for particles sizes and hydraulic loading (Error! Reference source not found.). In line with ARQ best management practices, construction activities that disturb significant areas of exposed soil will be timed for the dry season, thereby minimising exposure to wet weather and reducing net sediment loss.

Figure 6: Particle sizes and hydraulic loading appropriate for treatment measures* (Source: ARQ)



*NOTE: Source: ARQ.

Stormwater control objectives, and proposed measures to achieve them, are summarised in the tables within the following sections. These provide a basis for erosion and sediment control during CU Project construction land based activities.

5.1 Stormwater Management

Element	Stormwater Quality
Residual Risk Level	**Objectives**
LOW	Minimise Impacts to Stormwater Quality - To prevent sediments and other materials generated by construction activities from causing a hazard or nuisance.

Activities

- Earthworks activities, rock stockpiling activities and truck haulage may increase the suspended sediment concentration in stormwater.
- Chemical and oil/fuel, hazardous materials and dangerous goods storage and potential spills (i.e. machinery / storage leaks) may contaminate stormwater.
- Heavy machinery operation and use, (leaks, spills or incident)
- Rain events / wet season can lead to contaminated stormwater entering the marine environment, reducing water quality and negatively impacting on the natural environment.

Performance Indicators/Criteria

- All works are managed in accordance with the relevant management plans (CEMP), the *Environmental Protection (Water) Policy 2009* and any other relevant approvals, standards, statutory requirements, and guidelines (such as IECA 2008).
- No exceedance of limits set in the Site Monitoring Plan for suspended sediment concentrations.
- No impact to water quality in the receiving environment as a result of contaminated stormwater.
- No complaints are received from regulators or the community in relation to stormwater management.

Mitigation	Responsibility
- Provide and maintain suitable site access roads for heavy vehicles. Minimise site entry/egress points.	Project Engineer
- Minimise to the extent practicable contamination of surfaces exposed to runoff generation through source controls.	Contractor
- Implement necessary changes to ensure that stormwater from the stockpile area is effectively contained by the stormwater control structures/drains as the size of the stockpile changes and that stormwater is still captured within the stormwater pond.	Project Engineer
- Ensure spoon drains are constructed to suit the drainage requirements, and soil characteristics, of the site.	Project Engineer
- Stage the design, and location, of the stormwater pond / sediment basin according to construction schedules (such as prior to the commencement of any works that may have the potential to generate sediment or soil erosion) and of an appropriate size for the contributing catchment during that stage.	Project Engineer/ Contractor
- Where possible, drain / decant stormwater pond at a rate slow enough to allow natural attenuation processes, including the dropout of suspended solids and the increase in dissolved oxygen content.	Project Engineer
- Maintain suitable access to the stormwater pond for maintenance and de-silting.	Project Engineer
- Direct stormwater to the stormwater pond/sediment basin to eliminate/reduce off-site migration of sediment.	Project Engineer
- Install sediment control structures at regular intervals to retain any eroded sediments.	Project Engineer

Element	Stormwater Quality	
	- Compact suitably, scour protect and install appropriate drainage when maintaining site access roads for heavy vehicles.	Project Engineer
	- Conduct stockpiling activities in a manner that does not adversely affect surface drainage or water flows (i.e. design suitable drainage structures) so that they have the least potential to result in sedimentation of land or surface water.	Contractor
	- Manage hazardous products appropriately (e.g. bunded areas) and dispose in accordance with Safety Data Sheets and legislative requirements.	Contractor
	- Cease operation of all operational activities and move equipment to a safe location in the event of extreme weather conditions (e.g. storm).	Contractor
	- Inspect and maintain all previously installed stormwater control structures/drains and the stormwater pond (including de-silting) so they operate effectively.	Environmental Advisor/ Project Engineer
	- Make available sufficient materials to construct and to maintain necessary repairs/changes to stormwater controls and to implement incident responses.	Project Director
	- Conduct maintenance works in the stormwater pond to coincide with periods of low predicted rainfall and low water volume in the stormwater pond.	Project Engineer
	- Conduct monitoring of stormwater in accordance with CU Site Monitoring Plan.	Environmental Advisor
	- Include appropriate trigger levels and protocols e.g. monitor water quality of standing water within the stormwater pond to confirm that contaminant levels meet release limits prior to controlled discharge.	Environmental Advisor
	Training	
	- Ensure that the appropriate CU Project personnel undertake environmental awareness and training covering the requirements of this SSECP.	Manager Environment CU
	Monitoring and Auditing	**Responsibility**
	- Conduct ongoing monitoring of weather conditions (including extreme weather) and alerts relevant to the site.	Project Engineer CU
	- Conduct monitoring in accordance with the Site Monitoring Plan.	Environmental Advisor
	- Undertake regular inspections of the stormwater system during the dry system to ensure system is weed-free and controls are in place.	Environmental Advisor
	- Undertake inspection of the stormwater system prior to the commencement of the wet season to ensure any necessary maintenance can be conducted prior to major rainfall.	Environmental Advisor/ Project Engineer CU
	- Undertake regular inspections of stormwater run-off areas to check for cleanliness and potential for contaminants to impact on water quality and the effectiveness of the implemented stormwater control measures.	Environmental Advisor
	- Undertake regular inspections to identify the depth of sediment accumulation, scouring and debris build-up.	Environmental Advisor CU
	- Undertake regular site inspections to check for leaks, spillage and damage to bunded storage areas.	Environmental Advisor CU
	- Undertake inspections of the effectiveness of stormwater control measures after significant rainfall events.	Environmental Advisor CU

Element	Stormwater Quality

Corrective actions

- Implement appropriate control measures in a timely manner where stormwater control issues are identified or have the potential to occur in the future.
- Investigate all incidents in relation to stormwater control promptly and undertaken appropriate actions, as required.
- Investigate all complaints in relation to stormwater control promptly and rectify legitimate problems, as required.
- Consider chemical dosing of sediment polluted water where required to enhance basin performance if discharge of sediment laden water is likely to occur.
- Revise SSECP/CEMP and implement further controls where investigations show unacceptable impacts to stormwater quality, as necessary.
- Implement corrective actions to meet required outcomes of regulators.

Reporting

- The Contractor/s will maintain a site activity log, recording the type of activities occurring during various times of the day to assist with the retrospective investigation of any incidents / complaints.
- All CU Project personnel will inform the Manager Environment CU and Project Director as soon as possible in the event of a stormwater issue. The Manager Environment CU will report to the General Manager Infrastructure and Environment with any additional investigation(s) undertaken as required.
- The Manager Environment CU will inform the Regulators in a timely manner in the event of a significant stormwater incident.

Adaptive management program

- The Manager Environment CU will ensure new data/information is collected and incorporated into this plan/CEMP, as a result of implementing this plan and new information from external sources (e.g. academic literature, EPBC policy statements);
- The Environmental Advisor will effectively coordinate, schedule and/or trigger monitoring, risk management, auditing and reporting activities;
- The Manager Environment CU will periodically (min 6 monthly) review risks associated with stormwater contamination and sediment and erosion control, including in response to the risk level, changing circumstances or the results from implementing contingency response/corrective actions;
- The Manager Environment CU will periodically (min 6 monthly) review the effectiveness of management measures with relatively long implementation timeframes, significant levels of uncertainty and upon which the plan is highly dependent;
- The Manager Environment CU will address the consequences of significant environmental incidents (planned and unanticipated); and
- The Manager Environment CU will review the plan under the following circumstances:
  - performance reports indicate performance targets/indicators may not be achieved;
  - according to approved timeframes; or the impacts of significant environmental incidents.

5.2 Sediment & Erosion Control Management

Element	Sediment & Erosion Control	
Residual Risk Level LOW	**Objectives** **Minimise Impacts from Soil Loss and Erosion** - To implement effective sediment and erosion control measures, which prevent sediments generated by construction activities from causing a hazard or nuisance.	
Activities - Earthworks activities will expose soil and may increase erosion leading to increased suspended sediment concentration in stormwater. - Rock stockpiling activities and truck haulage may increase the suspended sediment concentration in stormwater. - Rain events / wet season can lead to sediment-laden stormwater may then enter the marine environment, reducing water quality and negatively affecting the natural environment.		
Performance Indicators/Criteria - All works managed in accordance with relevant management plans (CEMP), the *Environmental Protection (Water) Policy 2009, Queensland Water Quality Guidelines,* and any other relevant approvals, standards, statutory requirements, and guidelines (such as IECA 2008). - No failure of sediment and erosion controls (i.e. controls are maintained and fit for purpose). - No exceedance of limits set in the Site Monitoring Plan for suspended sediment concentrations. - No impact to water quality in the receiving environment as a result of site eroded sediments. - No complaints received from regulators or the community in relation to sediment and erosion control issues		
Mitigation		**Responsibility**
- Maintain soil and surface stability within the construction area at all times.		Project Engineer
- Install sediment control structures to retain any eroded sediments.		Project Engineer
- Control surface drainage from the construction site through appropriate site management (i.e. drainage flows to the stormwater pond.		Contractor
- Contour large surfaces to have minimum gradient in order to slow water velocity on surfaces and decrease erosion potential.		Project Engineer/ Contractor
- Stockpile graded soil according to codes and best practice, in a location where it has the least potential to result in sedimentation of land or surface water.		Project Engineer
- Stabilise temporary soil stockpiles immediately.		Contractor
- Batter stockpiles of soils (including sands, clays and silts) no steeper than 1V:2H, with the sides track rolled. Create a diversion bund around the upslope side, and sediment control (such as non-woven silt fence) around the downslope side of the stockpile.		Project Engineer
- Construct spoon drains to suit the drainage requirements, and soil characteristics, of the current site with sediment control structures at regular intervals to retain any eroded sediments.		Project Engineer
- Install temporary control measures prior to the commencement of any works to reduce erosion and contain sediment within the site.		Project Engineer
- Repair areas of erosion or erosion control measures immediately.		Project Engineer

Element	Sediment & Erosion Control	
	- Inspect and maintain all previously installed sediment and erosion control structures so that they operate effectively.	Project Engineer CU/ Environmental Advisor CU
	- Clean out sediment control structures when capacity is reduced.	Project Engineer
	- Make available sufficient materials to enable required sediment and erosion controls to be implemented, before commencing earthworks on any part of the site and to maintain necessary repairs to sediment and erosion controls and to implement incident responses.	Project Director
	- Cease operation of all operational activities and move equipment to a safe location in the event of extreme weather conditions (e.g. storm).	Contractor
Training		
	- Ensure that the appropriate CU Project personnel undertake environmental awareness and training covering the requirements of this SSECP.	Manager Environment CU
Monitoring and Auditing		**Responsibility**
	- Conduct ongoing monitoring of weather conditions (including extreme weather) and alerts relevant to the site.	Project Engineer CU
	- Conduct monitoring in accordance with the Site Monitoring Plan.	Environmental Advisor CU
	- Undertake regular site inspections to check for damage to sediment and erosion controls and the effectiveness of sediment and erosion control measures.	Environmental Advisor CU
	- Undertake inspection of the stormwater system prior to the commencement of the wet season to ensure any necessary maintenance can be conducted prior to major rainfall.	Environmental Advisor CU
	- Undertake inspections of the effectiveness of sediment and erosion control measures after significant rainfall events.	Environmental Advisor
Corrective actions		
	- Implement appropriate control measures in a timely manner where sedimentation or erosion issues are identified, or have the potential to occur in the future.	
	- Investigate all incidents in relation to sediment and erosion control promptly and undertaken appropriate actions, as required.	
	- Investigate all complaints in relation to sediment and erosion control promptly and rectify legitimate problems, as required.	
	- Revise SSECP/ CEMP and implement further controls where investigations show unacceptable impacts, as necessary.	
	- Implement corrective actions to meet required outcomes of regulators.	

Reporting

- The Contractor/s will maintain a site activity log, recording the type of activities occurring during various times of the day to assist with the retrospective investigation of any incidents / complaints.
- All CU Project personnel will inform the Manager Environment CU and Project Director CU as soon as possible in the event of a sediment and erosion control issue. The Manager Environment CU will report to the General Manager Infrastructure and Environment, with any additional investigation(s) undertaken as required.
- The Manager Environment CU will inform the regulators in a timely manner in the event of a significant sediment and erosion control incident.

Element	Sediment & Erosion Control

Adaptive management program

- The Manager Environment CU will ensure new data/information is collected and incorporated into this plan/CEMP, as a result of implementing this plan and new information from external sources (e.g. academic literature, EPBC policy statements);
- The Environmental Advisor will effectively coordinate, schedule and/or trigger monitoring, risk management, auditing and reporting activities;
- The Manager Environment CU will periodically (min 6 monthly) review risks associated with stormwater contamination and sediment and erosion control, including in response to the risk level, changing circumstances or the results from implementing contingency response/corrective actions;
- The Manager Environment CU will periodically (min 6 monthly) review the effectiveness of management measures with relatively long implementation timeframes, significant levels of uncertainty and upon which the plan is highly dependent;
- The Manager Environment CU will address the consequences of significant environmental incidents (planned and unanticipated); and
- The Manager Environment CU will review the plan under the following circumstances:
  - performance reports indicate performance targets/indicators may not be achieved;
  - according to approved timeframes; or the impacts of significant environmental incidents.

6 PERFORMANCE OBJECTIVES

This plan will address the performance objectives prescribed for stormwater, sediment and erosion control by the CEMP.

Stormwater will be monitored in accordance with the requirements of the Site Monitoring Plan (POT 2103 / CEMP Appendix I). Local Ross River Basins water quality objectives are scheduled under the EPP (Water). These form sub-region guidelines for Townsville. Regional values have been developed for all Queensland regions and are contained in the *Queensland Water Quality Guidelines 2009*. The Townsville Ross River basin falls within the Central Queensland Coast region. As described in the Site Monitoring Plan, stormwater monitoring results will be assessed against the parameters and performance criteria outlined in Table 6. It is important to note that the waters of the majority of Cleveland Bay, as listed under the EPP, are defined as moderately disturbed.

Whilst a comparison to the objectives is undertaken to provide an overall trend for stormwater quality and to help identify any emerging issues, it should be noted that the monitoring locations are at the point of discharge and not at the edge of the mixing zone and the receiving environment. Monitoring results outside the performance objectives will trigger additional investigations and possible mitigation actions.

Table 6: Stormwater Monitoring Performance Objectives

Parameter	Performance Objective	Source
pH	6.5 – 8.5	EA Limit
Total Suspended Solids	270 mg/L (road)	QWQG 2009
Cadmium	0.03 mg/L	QWQG 2009
Copper	0.095 mg/L	QWQG 2009
Lead	0.12 mg/L	QWQG 2009
Zinc	0.4 mg/L	QWQG 2009
Persistent sheens	not be visible on the water surface	n/a
Odours/Colouration	no unusual odour or colouration	n/a

Severe Weather Unpredictability:

A key risk to the success of implementing this plan will be the unpredictability of severe or extreme weather events. The unpredictability of such events occurs in both forecasting such an event as well as in predicting the scale of the event. One such an event occurred in January 2019 with the Townsville wide flooding event that resulted in a ~1 in 500 year ARI flood.

In situations such as these, the ability to meet the performance objectives listed above will be managed by way of pre-wet season preparation measures, such as:

- Stormwater control devices will be fully reviewed and reinstated prior the commencement of the wet season during construction activities;
- A terms of engagement is established with an on site contractor for maintenance and remediation of stormwater and erosion controls throughout the wet season, especially after a weather event;
- Selection of highly experienced contractors for the stockpile management activities with experience across North Queensland and the climatic conditions likely to be encountered; and

- Well established cyclone and severe weather event emergency management procedures that involve the management of key stormwater risks as part of the whole of port response to a forecast weather event.

7 REPORTING AND RESPONSIBILITY

POTL will take responsibility for coordinating the implementation of this plan, with the assistance of suitably qualified contractors/consultants, where required.

POTL will produce an annual summary of the monitoring results generated from the Site Monitoring Plan, including the stormwater results. Copies of all finalised reports will be kept on-site and will be available for regulatory inspection. If requested by the regulators, all survey data and information related to this SSECP will be submitted within 30 business days of the request, or within a timeframe agreed in writing between POTL and the relevant regulator.

In the event of an exceedance of an EA limit or monitoring results significantly above a guideline value, relevant regulators will be notified as per condition timeframes. This notification will include the monitoring result and control measures being implemented to address the incident.

Where management controls are to be amended during the CU Project in response to recommendations, the CEMP will be updated to incorporate updated management arrangements into the on ground practices. The updating of the plans will occur immediately, or as part of the regular review of the plan depending on the significance of the management action modification. A record of changes made will be kept.

In the event that the monitoring plan needs to be revised during implementation, POTL will consult with the regulators on the need for amendments and submit a revised plan for approval. Changes of a minor administrative nature will not require approval, in accordance with the Department's policy on management plans.

8 CONTINUOUS IMPROVEMENT

The SSECP will be subject to regular review.

This plan is a "living document" which will undergo formal review annually during the construction phase. During delivery, review and amendment will also occur as necessary via adaptive management actions to ensure it remains fit for purpose and achieves the required program objectives inclusive of identification and implementation of any new or changing environmental risks and mitigation actions. Recommendations on improvements or amendments are to be reported as part of the annual reporting process. This will align with the regular review of the performance of the CEMP as required under the approval conditions.

Feedback systems will be in place for the duration of the CU Project to enable this SSECP to be updated and responsive to learning from any incidents, complaints and ongoing monitoring results and to reflect knowledge gained. Other triggers for SSECP review may include:

- Changes in project operations or management;
- Changes in environmental legislation and/or policies; and
- New technologies / innovation relevant to applied monitoring methods and mitigation actions that provide innovative means of executing activities in order to meet performance objectives.

Changes to the SSECP may be developed and implemented in consultation with relevant regulators and other stakeholders over time. All changes are to maintain the approval conditions and be approved by the CU Project Management, before implementation. Information from this SSECP will be used to assist with improving the control measures in the CEMP.

Information from this Plan will be used to assist with improving control measures in the CEMP.

As noted in section 7, an annual report on the site monitoring including stormwater quality will be produced that will identify the results found and an interpretation of the results in relation to the CU construction activities. This information will be reviewed and considered by POTL to identify any recommendations on likely causes of exceedances or raised levels and necessary management actions to be implemented as a result of the monitoring outcomes.

As noted, where the monitoring identifies the need for revised management actions, the CEMP will be revised to incorporate the adaptive management arrangements. This will include the assessment of any monitoring program modifications and all required changes reflected within this plan.

As per Condition 38 of the EPBC Act Approval (EPBC 2011/5979), any changes to this Management Plan, or any of the Management Plans as a result of the outcomes of the site monitoring will be notified to the Department.

Continuous improvement will also be achieved via the *Construction Environmental Management Plan*, to which this monitoring plan is a part of (Appendix J of CEMP). Consideration and review of improvements to the CEMP will be reflected within this Monitoring Plan.

9 REFERENCES

ANZECC 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000.

BOM 2018. Monthly rainfall – Townsville Aero. http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=032040.

DNRME 2013. *Queensland Urban Drainage Manual*. Department of Natural Resources, Mines and Energy, 2013.

Engineers Australia 2006. *Australian Runoff Quality: Guide to Water Sensitive Urban Design.* Engineers Australia, 2006.

EPP (Water) 2009. *Environmental Protection (Water) Policy 2009: Ross River Basin and Magnetic Island Environmental Values and Water Quality Objectives Basin No. 118 including all waters of the Ross River Basin, and adjacent coastal waters (including Magnetic Island)*. Department of Environment and Heritage Protection, Brisbane, 2016.

IECA 2008. *Best Practice Erosion and Sediment Control*. International Erosion Control Association Australasian Chapter, Picton, 2008.

IECA 2016. *Appendix B Sediment Basin Design and Operation, Revision of Appendix B from IECA* (DRAFT). International Erosion Control Association Australasian Chapter, Picton, 2008.

QWQG 2009. *Queensland Water Quality Guidelines*. Department of Environment and Heritage Protection, Brisbane, 2013.

APPENDIX A

Commonwealth (EPBC Approval) and State (EA) Conditions relevant to Site Monitoring requirements

DA190 / SARA 1905-11091 SRA Development Permit Conditions relevant to Stormwater and Sediment and Erosion Control

Ref	Cond. No.	Condition Requirement	Plan Reference	Demonstration of how the plan addresses the condition requirement
1.	2	The development must be carried out generally in accordance with the *Townsville Port Expansion Project Additional Information to the Environmental Impact Statement* prepared by AECOM and BMT WBM dated October 2016, in particular: a) Section 2 Project Description b) Appendix B2 Construction Environmental Monitoring Plan	5	Section 5 provides the Erosion and Sediment Control Plan that details clearly defined management controls, performance indicators, trigger levels, reporting and corrective and adaptive management strategies. The plan also links directly to the CEMP and its implementation.
2	4	An erosion and sediment control plan must be prepared by an appropriately qualified person/s, in accordance with the *Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association).* Provide the erosion and sediment control plan to the palm@des.qld.gov.au Undertake development generally in accordance with the erosion and sediment control plan Provide written evidence from an appropriately qualified person that all elements of this condition have been complied with.	5	Section 5 provides the Erosion and Sediment Control Plan that details clearly defined management controls, performance indicators, trigger levels, reporting and corrective and adaptive management strategies, To be completed once drafted. Section 5 and 6 detail the actions and reporting to be undertaken in completing the development. To be completed once drafted

Coordinator General's Stated Conditions (EA) relevant to Stormwater and Sediment and Erosion Control

Ref	Cond. No.	Condition Requirement	Plan Reference	Demonstration of how the plan addresses the condition requirement
1.	G3	Any breach of a condition of this environmental authority must be reported to the administering authority as soon as practicable within 24 hours of you becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.	6	Section 6 details the reporting and responsibility aspects associated with stormwater, sediment and erosion control, including the reporting of breaches to the administering authority.
2	G4	Other than as permitted by this Environmental Authority, the release of a contaminant into the environment must not occur.	5	Section 5 provides the Erosion and Sediment Control Plan that details clearly defined management controls, performance indicators, trigger levels, reporting and corrective and adaptive management strategies,

Definitions:
Administering authority means the Department of Environment and Heritage Protection or its successor or predecessors.

Release of a contaminant into the environment means to:

a) Deposit, discharge, emit or disturb the contaminant;
b) Cause or allow the contaminant to be deposited, discharged, emitted or disturbed;
c) Fail to prevent the contaminant from being deposited, discharged, emitted or disturbed;
d) Allow the contaminant to escape;
e) Fail to prevent the contaminant from escaping.

EPBC Approval conditions relevant to this SSECP

Ref	Cond. No.	Condition Requirement	Plan Reference	Demonstration of how the plan addresses the condition requirement
1	10	**Construction and management of the reclamation area** The person taking the action must submit a Construction Environmental Management Plan (CEMP) for the Minister's approval, which includes measures to mitigate impacts to MNES from the construction of the reclamation area before the commencement of the action. The person taking the action must not commence the action unless the Minister has approved the CEMP. The CEMP must be prepared in accordance with the Department's Environmental Management Plan Guidelines and include at least the following: a) clearly defined objectives and performance criteria to mitigate impacts to MNES from the construction of the reclamation area and the placement of dredged material in the reclamation area;	1.1 5	Section 1.1 provides clearly defined objectives of the plan. Section 5 provides the Erosion and Sediment Control Plan that details clearly defined objectives, performance criteria, management measures, reporting and corrective actions to minimise the impact of stormwater contamination and sediment and erosion on the marine environment and MNES.
2	10	**Construction and management of the reclamation area** The person taking the action must submit a Construction Environmental Management Plan (CEMP) for the Minister's approval, which includes measures to mitigate impacts to MNES from the construction of the reclamation area before the commencement of the action. The person taking the action must not commence the action unless the Minister has approved the CEMP. The CEMP must be prepared in accordance with the Department's Environmental Management Plan Guidelines and include at least the following: c) specific and auditable mitigation and management measures to avoid and minimise impacts to MNES, including: controls, performance indicators, early warning trigger levels, risk management, adaptive management strategies,	**5**	Section 5 provides the Erosion and Sediment Control Plan that details clearly defined management controls, performance indicators, trigger levels, reporting and corrective and adaptive management strategies,

Definitions:

Minister The Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and includes a delegate of the Minister

MNES Matters of National Environmental Significance: In the context of this approval: Great Barrier Reef World Heritage Area, Great Barrier Reef National Heritage Place, Listed turtle species, listed dolphin species, and all other Cetaceans, Dugong (*Dugong dugon*), Commonwealth marine area and the Great Barrier Reef Marine Park.

Commencement Any works that are required to be undertaken for construction (includes works associated with the construction of the reclamation area, pile driving activities, dredging activities, and any infrastructure associated with the action). Excludes preliminary works.

Stage As identified at Section 2.4.1 of the *Townsville Port Expansion Project – Additional Information to the Environmental Impact Statement (October 2016).*

APPENDIX B

Erosion and sediment control assessment calculation (using TASK number method)

Erosion Hazard Assessment

For the purpose of this assessment, the total site area of 13.1 Ha has been considered, along with an anticipated construction period of up 4 years (48 months).

H = T*A*S*K where:

H = Numerical value of the TASK number
T = duration of the soil Disturbance (months)
A = Total area of soil disturbance (m^2)
S = Slope factor
K = Soil erosivity factor for site soils (RUSLE K-factor)

For this site:

T = 48 month (assumed duration of erodible surface during land based construction stage – rockwall construction and majority of reclamation timeframe)
A = 131,000 m^2 (13.1 Ha, total site area)
S = 0.42 (assume no more than 10% of the work site is steeper than 2.5% gradient)
K = 0.044 (nominally, based on clayey sand soil)

Refer to IECA 2008, Appendix F.

For this total site:

H = 116,202 = High Erosion Risk Site (greater than 200)

Erosion hazard within separated stages (considering area and duration of exposed soil) of a development are generally assessed using soil loss prediction tools such as the Revised Universal Soil Loss Equation (RUSLE). However, the following adopts the TASK method to give an approximate guide to general stages of development should a Low Erosion Risk site be desired in the interests of increased environmental control.

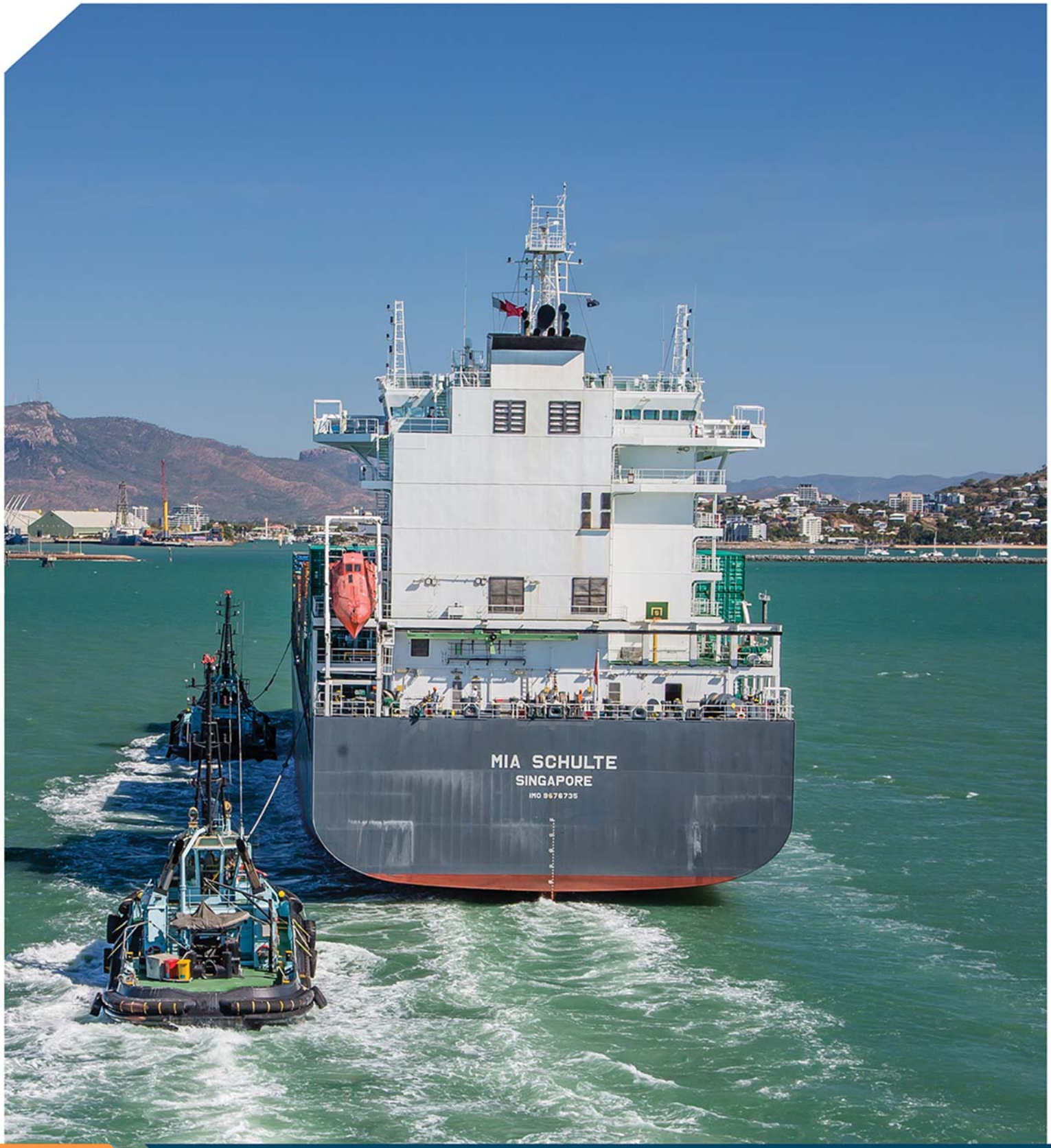
For a Low Erosion Risk site:

T = 1 month (assumed duration of erodible surface during any construction stage)
A = 10,000 m^2 (1 Ha, assumed maximum ground surface area open to erosion at any single time)
S = 0.42 (assume no more than 10% of the work site is steeper than 2.5% gradient)
K = 0.044 (nominally, based on clayey sand soil)

H = 1*10,000*0.42*0.044
H = 185 = Low Risk Site (less than 200)

Adoption of the TASK method indicates that a Low Erosion Hazard may be achieved, based upon the assumed site factors noted above (1 month duration and 1 Ha site area).

However, should the area or duration of disturbance increase, or the slope of earthworks and/or soil type vary, then the site Erosion Hazard may increase to high with a greater focus on erosion prevention required.



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