



Contaminated Soil & Waste Management Plan

Former Curtain Bros Slipway
Ross Street, South Townsville QLD

Port of Townsville Ltd
April 2024

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2024/1472

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Client No: P0221

Job No: 121817B

Statement of Limitations

This document has been prepared in response to specific instructions from Port of Townsville Ltd to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards, practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by Port of Townsville Ltd and the use of this report by other parties may lead to misinterpretation of the issues contained in this report. To avoid misuse of this report, Prensa advises that the report should only be relied upon by Port of Townsville Ltd and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part and Prensa should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

Prensa is not a professional quantity surveyor (QS) organisation. Any areas, volumes, tonnages or any other quantities noted in this report are indicative estimates only. The services of a professional QS organisation should be engaged if quantities are to be relied upon.

Reliance on Information Provided by Others

Prensa notes that where information has been provided by other parties in order for the works to be undertaken, Prensa cannot guarantee the accuracy or completeness of this information. Port of Townsville Ltd therefore waives any claim against the company and agrees to indemnify Prensa for any loss, claim or liability arising from inaccuracies or omissions in information provided to Prensa by third parties. No indications were found during our investigations that information contained in this report, as provided to Prensa, is false.

Recommendations for Further Study

The industry recognised methods used in undertaking the works may dictate a staged approach to specific investigations. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further investigation or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of Port of Townsville Ltd and Prensa recognises that Port of Townsville Ltd will consider their specific needs and the business risks involved. Prensa does not accept any liability for losses incurred as a result of Port of Townsville Ltd not accepting the recommendations made within this report.

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1 Introduction

Prensa Pty Ltd (Prensa) has developed this Contaminated Soil Waste Management Plan (CSWMP) for implementation by Port of Townsville Ltd (Port) and its subcontractors during the planned construction activities for the HMAS Townsville Project at the former Curtain Bros Slipway (the Site). The Site comprises portions of Lot 1 and Lot 3 on SP126611, situated at Ross St, South Townsville. Investigations have revealed the presence of heavy metals, hydrocarbons, and PAH contamination within these lots above the adopted health and environmental guideline values.

This plan serves as a framework to mitigate the risk of adverse environmental and human health impacts associated with the identified contamination within soils and sediments at the Site during the proposed works.

It should be noted that an **Acid Sulfate Soils Management Plan** has also been prepared to supplement this plan and is presented in **Appendix A**.

2 Objective

The objective of this plan is to ensure that environmental impacts and health risks associated with the contaminated soil at the Site are managed, monitored and reported during the proposed works at the Site.

To complete this objective, the plan aims to:

- Document contaminated soil management requirements for the proposed construction activities on Site; and
- Document workplace health and safety risks and control measures associated with the identified contaminants at the Site.

It should be noted that this CSWMP is related to the works outlined in **Section 5** below only and does not constitute an ongoing management plan for the Site.

3 HMAS Townsville Project Background

HMAS Townsville is one of 15 Fremantle Class Patrol Boats commissioned in 1981 and operated by the Royal Australian Navy until decommissioning in 2005. In 2007 the HMAS Townsville was donated to the Maritime Museum of Townsville as a Museum Ship. In 2015 the not-for-profit company “Townsville Maritime Museum Limited” was established with a board of three directors, two of whom are executives of Port of Townsville.

To prevent any further deterioration of the HMAS Townsville, Prensa understands Port plans to dry dock the vessel at the slipway on the former Curtain Brothers site, located within strategic Port land.

The Site and extent of proposed works (as provided by Port) is shown in **Plate A** below.



Plate A: Site and Extent of Proposed Works

To allow for the vessel to remain dry-docked during cyclone season, it is understood Port are engaging relevant contractors to design and install structural support in the form of a cradle structure, including concrete foundations and cyclone tie-down restraints. An illustration of the proposed structure (as provided by Port) has been provided within **Attachment A** of this plan.

4 Previous Investigations

Previous investigations undertaken by Prensa reported concentrations of heavy metals, hydrocarbons and PAHs in soils at the Site that exceeded the criteria for Public/Open space and Commercial/Industrial land use. Additionally, concentrations of heavy metals and TRH in sediments exceed the ANZECC (2000) ISQG High guideline values. As such, risks to human health and ecological receptors exist.

5 Proposed Works

Based on the information provided, it is understood that the following works will involve the potential disruption of contaminated soil at the Site;

- Clean up and removable of any vegetation, mud, scrap metal items etc. from the Site to allow easy access;
- Removal of damaged rails;
- Installation of new rails;
- Removal of mud and debris along rails;
- Filling, rolling and levelling of the slipway ground/apron;
- Establishment of sumps for runoff and leachate collection; and

- Excavations for cradle footings and retaining wall footings.

Note: this list excludes activities unrelated to soil disturbance as they do not fall under the management requirements for this plan.

6 Surrounding Environment

6.1 Hydrology

6.1.1 Surface Water Receptors

Ross creek is located directly adjacent to the southern and western boundary of the Site. The southern portion of the Site at the Slipway becomes partially inundated by Ross Creek during high tides.

6.1.2 Drainage

Drainage at the Site appears to follow existing topography and is directed downgradient towards the slipway into Ross Creek.

6.1.3 Flood Mapping

A review of the City of Townsville Flood Mapping Service (accessed on the 26st of March 2024) indicated the area surrounding the slipway is affected by the flood overlay and has a low likelihood to be impacted by flooding. The review indicated the remainder of the Site has a very low likelihood to be affected by flooding.

6.2 Receiving and Local Environmentally Sensitive Areas

Review of the DESI Environmentally Sensitive Areas mapping indicated the Site is not within an Environmentally Sensitive Area. It is noted that the Site is directly adjacent to Ross Creek which comprises two Category B Environmentally Sensitive Areas (Marine Plants and the Seaward Side of Highest Astronomical Tide).

Under the Queensland Environmental Protection (Water) Policy (QLD EPP) (2009), Ross Creek has been defined as a moderately disturbed middle estuarine waterway with the following environmental values:

- Aquatic ecosystems;
- Human Consumer;
- Secondary Recreation;
- Visual Recreation;
- Industrial Use; and
- Cultural and Spiritual Values.

Additionally, Ross Creek is noted to be within a Category R (GBR Riverine) Matters of State Environmental Significance (MSES) regulated vegetation management area.

A copy of the Environmentally Sensitive Areas Map is presented in **Appendix B**.

7 Potential Source, Pathway and Receptor Linkages

Based on previous investigations at the Site (ref: 121817B *Further Contamination Investigations & 109589B Port of Townsville Curtain Bros Slipway DSI*), key contaminants at the Site include:

- Heavy metals (arsenic, mercury, nickel, lead, copper and zinc); and
- Hydrocarbons (PAHs and TRHs).

A brief outline of the potential exposure pathways to the contamination identified at the Site is provided in **Table 1**. The control measures to manage the potential risks associated with the soil to workers or users of the Site have been detailed in **Section 8** of this CSWMP.

The management controls are intended to reduce the risk of contaminant exposure to sensitive receptors during construction works at the Site.

Table 1: Potential for Exposure	
Identified Contamination	The contamination-impacted media at the Site includes soil, sediment and water.
Potential sensitive receptors	The following may be affected by the identified contamination: - Human receptors, including contractors and sub-contractors onsite during construction works; and - Environmental receptors, including nearby waterways (Ross Creek).
Potential human exposure pathways	Exposure to potential contaminants from soil may occur through: - Dermal (i.e. skin) contact with contaminated soil - Inhalation of contaminated dust (i.e. breathing); and - Ingestion (i.e. eating) of contamination soil.
Potential ecosystem exposure pathways	- Disturbance and liberation of contaminants within the soil via demolition, earthworks and other associated activities. - Runoff of contaminated soils/sediments to nearby Environmentally Sensitive Areas.
Proposed control measures	Refer to Section 8 .

8 Contaminated Soil and Sediment Management Controls

The tables detailed below address each issue requiring management during the proposed works. Control measures are listed within the tables.

8.1 Human Exposure to Contaminated Soil

Table 2: Human Exposure to Contaminated Soil	
Element	Description
Objective	To manage human health risks associated with disturbing contaminated soils during construction works.
Proposed Activity	- Clean up and removal of any vegetation, mud, scrap metal items etc. from the site to allow easy access; - Removal and reinstatement of damaged rails; - Removal of mud and debris along rails; - Fill, roll and levelling of the slipway ground/apron; and - Excavations for cradle footings and retaining wall footings
Contaminants & Source	- Heavy metals, - Hydrocarbons; and - PAHs

Table 2: Human Exposure to Contaminated Soil

Element	Description
Potential Sensitive Receptor	Contractors and sub-contractors
Potential Exposure Pathways	- Dermal contact; - Inhalation; and - Ingestion.
Controls	General Health, Safety & Environmental Controls: - All personnel undertaking soil related activities shall have an understanding of the contaminants previously identified at the Site. This can be achieved via contamination awareness training prior to commencement of demolition/construction works. - The work area shall be clearly marked and suitable barriers erected to prevent members of the public and unauthorised site users from accessing the work zone. - Manual handling or direct contact with soils shall be avoided as much as practicable. - Site workers shall wear appropriate PPE during all disturbance works (minimum of long sleeves and pants, steel caps, gloves and glasses to avoid dermal contact). - Hands shall be thoroughly washed upon leaving the work area, particular before eating or drinking. - Only eat, drink or smoke in designated areas.

8.2 Waste Management & Stockpiling

Table 3: Waste Management & Stockpiling

Element	Description
Objective	Ensure appropriate waste management during the works to reduce risks associated with working on and around contaminated soils and sediments.
Proposed Activity	Proposed works will involve the following: - Clean up and removable of any vegetation, mud, scrap metal items etc. from the site to allow easy access; - Removal and reinstatement of damaged rails; - Removal of mud and debris along rails; - Fill, roll and levelling of the slipway ground/apron; and - Excavations for cradle footings and retaining wall footings.
Contaminants & Source	- Heavy metals, - Hydrocarbons; and - PAHs
Potential Sensitive Receptor	Ross Creek and surrounding waterways
Potential Exposure Pathways	- Disturbance and liberation of contaminants within the soil via demolition, earthworks and other associated activities. - Runoff of contaminated soils/sediments to nearby Environmentally Sensitive Areas.

Table 3: Waste Management & Stockpiling

Element	Description
Controls	Excavations - All major excavations (excluding small footings) shall be lined with either geofabric or low density polyethylene (LDPE) black plastic following completion of mechanical excavations. This will provide a physical barrier between workers operating in the vicinity of excavations and the exposed contaminated soils. Sump Dewatering Procedures When dewatering the Site, the following issues/actions require consideration: - The inlet to the pump shall be raised to prevent the sediment on the floor from being collected. - Allow settling time prior to dewatering of excavations, as to minimise transport of sediment laden water (as sediments contain elevated contaminants). - Prior to discharge, water shall meet the relevant criteria outlined within the QLD EPP (2009) for the Ross River Basin and Magnetic Island Environmental Value and Water Quality Objectives (2009) (See Appendix C). Stockpile Management Where excavated soils/sediments are stockpiled, the following control measures shall be implemented: - Maintain designated stockpiling areas. - If stockpiling on the ground surface, a geofabric membrane shall be placed on the surface prior to stockpiling and locate the stockpile outside of surface water flow paths. - Different types of stockpile material shall be separated as much as possible (waste, fill natural material etc.). - Heights of stockpiles shall be limited to a maximum height of two metres. - Stockpiles shall be appropriately bunded (silt fence or similar). - Stockpiles shall be appropriately covered to avoid dust/water infiltration. Regular audits of stockpiling shall be conducted to ensure the following: - Appropriate classification of stockpiles for management and off-site disposal. - Overspill material on haul trucks is removed before leaving excavation or stockpile area. - Dust generation/migration is kept to a minimum. - Conformance with the requirements of the Acid Sulfate Soils Management Plan (Appendix A).

8.3 Imported Fill & Contaminated Soil Disposal

Table 4: Imported Fill & Contaminated Soil Disposal Requirements

Element	Description
Waste Disposal Location	Waste shall be transported for disposal to Stuart Waste Facility at 24 Vantassel Street, Stuart
Disposal Requirements	Disturbed contaminated soils are considered unsuitable for re-use on and offsite. As such, offsite disposal is required for all excavated soils. As the Site is listed on the DESI EMR, offsite disposal of excavated soil will require a soil disposal permit.

Table 4: Imported Fill & Contaminated Soil Disposal Requirements

Element	Description
Imported Fill	Due to the total lead concentrations within soils across the Site, spoil generated may be eligible for a waste levy exception (upon application).
	Prior to acceptance at the Site, documentation certifying that imported soils are free from contamination and suitable for use shall be obtained. Where such documentation cannot be provided, soil sampling must be conducted for by a SQP at a suitable sampling rate.

8.4 Water, Erosion and Sediment Control

Table 5: Surface Water, Erosion & Sediment Control

Element	Description
Objectives	- To minimise erosion risks and prevent transportation of sediment off-site to nearby waterways during construction works. - Compliance with Table 8.2.1 of the <i>Queensland Water Quality Guidelines</i>
Proposed Activity	Bare ground/exposed soil following earthworks.
Potential Impact	- Sediment runoff into surrounding into Ross Creek, resulting in increased suspended solids and contamination within waterway. - Sedimentation of creek bed.
Controls	The following general controls shall be implemented during the works: - Coir logs shall be installed for water/sediment diversions, where appropriate. - Silt fencing shall be installed, where appropriate. - Ensure works shall be conducted in a staged process, where practical, to ensure areas of open excavation are manageable if heavy rain events occur. - Areas of bare ground/open excavations shall be covered, to the extent practicable, at the end of each working day. - Any vehicle wash down shall be conducted in a controlled area to prevent runoff off-site or into stormwater networks. - Earthworks shall not to be undertaken during runoff producing rainfall. - A vibration grid or similar shall be installed at the entry/exit point to the work area. - For stockpiles, appropriate sediment control measures shall be implemented in accordance with Table 3.

8.5 Dust Management

Table 6: Dust Management

Element	Description
Objectives	- Minimisation of the dust generation from construction activities and machinery to prevent erosion and potential exposure to contaminated soils and sediments; and - No visible dust plumes.
Potential Source	Dust generated from areas of exposed ground during dry/windy conditions;

Table 6: Dust Management

Element	Description
	- Dust generated during mechanical excavations of contaminated soil; - Vehicle tracking on dry access routes; and - Dust from uncovered trucks loads.
Potential Impact	- Generation of dust resulting in fugitive emissions and/or offsite deposition; and - Generartion of suspended and deposited particles (dust) during works potentially containing contaminants.
Controls	Dust mitigation controls include the following: - Progressive reinstatement of exposed soil surfaces shall be conducted throughout works. - Machinery shall only track within designated areas. - Works shall be staged appropriately to minimise the length of time areas of bare ground are left exposed. - All stockpiles, earthwork areas and bare ground shall be watered, temporarily sealed, turfed and/or seeded as and when required to reduce the potential for wind erosion. - Water shall be used for dust suppression. - Works shall not be undertaken during excessively windy conditions. - All trucks carrying bulk soil shall be appropriately covered during transport.

8.6 Machinery Decontamination Procedures

Table 7: Machinery Decontamination

Element	Description
Objective	Minimisation of the spread of contaminated soil and sediment offsite.
Proposed Activity	Vehicle tracking around Site.
Potential Impact	Spread of contaminated soil and sediments to public areas.
Controls	Decontamination of vehicles that traverse the contamination-impacted area via: - Wheel washing prior to travelling on public roads. - During/after decontamination, ensure management of contaminated wash waters to prevent migration of contamination from the Site.

9 Unexpected Finds Protocol

If unexpected gross contamination is identified, the party conducting the works should notify Port immediately in accordance with an Unexpected Finds Protocol provided in **Appendix D** of this document. Due to the heterogeneous nature of the site, there is potential to encounter unidentified contamination. Potential unidentified contamination may be include:

- Discoloured/odorous soils;
- The presence of foreign materials, such as putrescible or toxic substances;
- The presence of significant quantities of bonded or friable asbestos; or
- Voids, significant bridged waste or substantially sized inert waste.

If previously unidentified contamination is encountered during works, works must cease and the Project Manager immediately notified.

If it is considered safe, potential unidentified finds should be separated and stockpiled pending assessment by a Suitably Qualified Person. Stockpiles should be managed in accordance with **Section 8.2**.

10 Training and Awareness

All employees will receive suitable environmental training under this CSWMP to ensure that they are aware of their health and environmental responsibilities and are competent to carry out the work.

Environmental requirements will be explained to employees during site induction and on-going training via tool box meetings, briefings, notifications and the like.

All employees (including subcontractors) will receive induction and training in the following:

- Contaminate land risks associated with the project;
- Environmental legislation;
- site environmental objectives and targets;
- Potential consequences of departure from rules;
- Emergency procedure and response (eg. Spill clean-up); and
- Basic understanding of their legal obligations.

Personnel performing tasks which can cause significant environmental impacts will be competent on the basis of appropriate education, training and / or experience.

All training and tool box meetings will be recorded and held on site.

11 Relevant Legislations and Guidelines

This CSWMP has been drafted in accordance with the following documents where relevant:

- Australian Standard AS 1470-1986 Health and Safety at Work- Principles and Practices;
- Australian Standard AS 2865-2009 Safe Working in a Confined Space;
- Australian Standard 4482.1, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-volatile and semi-volatile compounds, 2005;
- Australian Standard 4482.2, Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 2: Volatile Substances, 1999¹;
- DES, Guideline: Assessing a Suitably Qualified Person, 2013;
- Environmental Protection Agency (EPA) Victoria (Siting, Design, Operation and Rehabilitation of Landfills, Publication 788.3), 2015;
- National Exposure Standards for Atmospheric Contaminants in the Occupational Environment (NOHSC:1003 (1995));
- NSW EPA Environmental Guidelines Solid Waste Landfills, 2016;
- NSW EPA Assessment and Management of Hazardous Ground Gases, December 2019 (revised May 2020);

¹ It is noted that AS 4482.1 and AS 4482.2 have been withdrawn. The withdrawn standards have been considered in this document as they add to the 'state of knowledge' without a replacement available. These documents are also referenced in relevant guidelines such as the NEPM 1999, as amended 2013 and IWRG702.

- PFAS National Environmental Management Plan Version 2.0', Heads of EPA Australia and New Zealand 2020;
- Environmental Protection (Air) Policy 2019;
- Environmental Protection (Water and Wetland Biodiversity) Policy 2019;
- *Environmental Protection Act 1994*;
- *Environmental Protection Regulation 2019*
- Guidelines for the Assessment and Management of Asbestos-Contaminated sites in Western Australia, May 2009 (updated 2021);

Attachment A

Appendix A: Acid Sulfate Soils Management Plan



**Acid Sulfate Soil
Management Plan**
Former Curtain Bros Slipway
South Townsville, QLD

Port of Townsville Ltd
March 2024

Client No: P0221
Job No: 121817B

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Sampling Risks

Prensa acknowledges that any scientifically designed sampling program cannot guarantee all sub-surface contamination will be detected. Sampling programs are designed based on known or suspected site conditions and the extent and nature of the sampling and analytical programs will be designed to achieve a level of confidence in the detection of known or suspected subsurface contamination. The sampling and analytical programs adopted will be those that maximises the probability of identifying contaminants. Port of Townsville Ltd must therefore accept a level of risk associated with the possible failure to detect certain sub-surface contamination where the sampling and analytical program misses such contamination. Prensa will detail the nature and extent of the sampling and analytical program used in the investigation in the investigation report provided.

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Soil contamination can be expected to be non-homogeneous across the stratified soils where present on site, and the concentrations of contaminants may vary significantly within areas where contamination has occurred. In addition, the migration of contaminants through groundwater and soils may follow preferential pathways, such as areas of higher permeability, which may not be intersected by sampling events. Subsurface conditions including contaminant concentrations can also change over time. For this reason, the results should be regarded as representative only.

Port of Townsville Ltd recognises that sampling of subsurface conditions may result in some cross contamination. All care will be taken and the industry standards used to minimise the risk of such cross contamination occurring, however, Port of Townsville Ltd recognises this risk and waives any claims against Prensa and agrees to defend, indemnify and hold Prensa harmless from any claims or liability for injury or loss which may arise as a result of alleged cross contamination caused by sampling.

Reliance on Information Provided by Others

Prensa notes that where information has been provided by other parties in order for the works to be undertaken, Prensa cannot guarantee the accuracy or completeness of this information. Port of Townsville Ltd therefore waives any claim against the company and agrees to indemnify Prensa for any loss, claim or liability arising from inaccuracies or omissions in information provided to Prensa by third parties. No indications were found during our investigations that information contained in this report, as provided to Prensa, is false.

Recommendations for Further Study

The industry recognised methods used in undertaking the works may dictate a staged approach to specific investigations. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further investigation or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of Port of Townsville Ltd and Prensa recognises that Port of Townsville Ltd will consider their specific needs and the business risks involved. Prensa does not accept any liability for losses incurred as a result of Port of Townsville Ltd not accepting the recommendations made within this report.

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1 Introduction

This Acid Sulfate Soil Management Plan (ASSMP) has been prepared by Prensa Pty Ltd (Prensa) for Port of Townsville (Port). The ASSMP outlines the management requirements for Acid Sulfate Soils (ASS) disturbance during excavation and constructions works associated with the HMAS Townsville Project.

This ASSMP is to be adhered to until the proposed development works have been completed at the Site. Upon completion of works, the author of this ASSMP (or a suitably qualified person) must verify in writing that all directions and conditions contained within the ASS have been satisfied.

1.1 Background

Projects involving the disturbance of ASS materials must assess the hazards associated with disturbance and consider potential impacts. As such, an ASS Investigation was carried out in March 2024 to inform the management recommendations within this ASSMP.

This ASSMP shall be adopted during all construction activities during the HMAS Townsville Project and aims to minimise and manage the disturbance of ASS in order to mitigate environmental impacts associated with acid production through the disturbance of ASS. Mitigation of potential environmental impacts will typically be achieved through:

- Neutralisation of any disturbed ASS material via a staged approach to minimise impacts to surface waters and active control of stormwater drainage/site runoff throughout site development.
- Containment, testing and treatment (where necessary) of any water collected during the excavation and/or during the treatment process; and
- Limitation of any alteration to the existing surface water conditions and appropriate treatment of any collected surface water before re-use, offsite discharge or disposal.

The appropriate application of these strategies will ensure that generation or release of acid and heavy metal contaminants, resulting from disturbance of ASS, will not adversely affect the natural and built environments or human health.

This ASSMP does not include general construction health and safety procedures which should be addressed within subcontractor procedures and safe work method statements (SWMS). Furthermore, this ASSMP does not represent an Environmental Management Plan for ongoing management of land contamination or ASS at the Site into the future. Rather, the ASSMP is limited to the management of ASS during the construction phase of the proposed works.

1.2 Acid Sulfate Soils

ASS are described in detail within the Department of Agriculture and Water Resources' *National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual*, 2018.

ASS materials are distinguished from other soil or sediment materials (referred to as 'soil materials' throughout this guideline) by having properties and behaviour that have either:

1. Been affected considerably by the oxidation of Reduced Inorganic Sulfur (RIS); or
2. The capacity to be affected considerably by the oxidation of their RIS constituents.

The factor common to all ASS materials is that RIS components have either had, or may have, a major influence on the properties or behaviour of these soil materials.

These soils are typically found in low-lying coastal areas and saline inland areas, however, they have been identified in a wide range of environmental settings.

In a waterlogged anoxic state (that is depleted of dissolved oxygen), these materials remain benign and do not pose a significant hazard to human health or the environment. However, ASS disturbance, and exposure to oxygen, may result in a wide range of environmental hazards, including:

- Severe acidification of soil and drainage waters (below pH 4 and often pH less than 3);
- Mobilisation of metals (for example iron, aluminium, copper, cobalt, zinc), metalloids (for example arsenic), nutrients (for example phosphate) and rare earth elements;
- Deoxygenation of water bodies;
- Production of noxious gases (for example hydrogen sulfide);
- Production of greenhouse gases; and
- Scalding (that is de-vegetation) of landscapes.

These hazards have the potential to cause a number of significant environmental and economic impacts such as fish kills, loss of biodiversity in wetlands and waterways, contamination of groundwater resources, loss of agricultural productivity, and corrosion of concrete and steel infrastructure.

2 Objectives

The objectives of this ASSMP is to:

- Outline appropriate control measures to manage Potential Acid Sulfate Soils (PASS) that is to be disturbed during the proposed works at the Site and control any acid leachate; and
- Minimise the potential ecological risks associated with ASS disturbance at the Site.

3 Technical Framework

This ASSMP was prepared in accordance with reference to the following technical framework.

- Dear SE, Williams KM, McElnea AE, Ahern CR, Dobos SK, Moore NG, and O'Brien LE, 2023, *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines*, Version 5, Department of Resources and Department of Environment and Science, Queensland;
- Queensland Department of Resources and the Department of Environment and Science, *Queensland Acid Sulfate Soil Technical Manual – Soil management guidelines version 5*, 2023;
- Queensland Government, *Planning Act 2016*;
- Queensland Government, *Environment Protection Act 1994*;
- Queensland Government, *Environment Protection Regulation 2019*;
- Queensland Government, *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*;
- Queensland Government Department of Infrastructure, *State Planning Policy 2017*;
- Queensland Government Department of Infrastructure, *State Planning Policy – State Interest Guideline Water Quality (Policy 9)*, April 2016;
- Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification and Laboratory Methods Manual*, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0.;
- The ANZG 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018';
- *Work Health and Safety Act*, 2011; and
- *Work Health and Safety Regulation*, 2011.

4 Site Description

The Site is located at the Former Curtain Bros Slipway located at Lot 1 and Lot 3 on SP126611 on Ross St, South Townsville (the Site) with a combined area of 1,921 m². The Site is roughly rectangular in shape, bound by Ross Creek to the south, Ross St to the east, a former laydown area to the west and general commercial/industrial activities to the north.

The Site extent, as illustrated in the proposed development documents attached as **Appendix A** outlines the proposed disturbance footprint associated with the HMAS Townsville Project. Disturbance works associated with the HMAS Townsville Project are outlined within **Section 5** below.

4.1 Receiving Environment

The Site is located along the Ross Creek, a shallow estuarine area that drains into the ocean at the Port of Townsville (approximately 2.0 km to the north east). It is located at the base of the slipway which is regularly inundated by natural tidal fluctuations. Under the Queensland Environmental Protection (Water) Policy (QLD EPP) (2009), Ross Creek has been defined as a moderately disturbed middle estuarine waterway with the following environmental values:

- Aquatic ecosystems;
- Human Consumer;
- Secondary Recreation;
- Visual Recreation;
- Industrial Use; and
- Cultural and Spiritual Values.

Ross Creek is noted to be within a Category R (GBR Riverine) Matters of State Environmental Significance (MSES) regulated vegetation management area.

There are also two Category B Environmentally Sensitive Areas (Marine Plants and the Seaward Side of Highest Astronomical Tide) which apply to Ross Creek (at the Site).

A copy of the Environmentally Sensitive Areas and MSES mapping is presented in **Appendix A**.

5 Proposed Development

Port provided a copy of the proposed development plans for the Site for review. Based on information provided, it is understood the proposed works include:

- Design of structural support;
- General clean-up of slipway;
- Servicing and repair of the rails;
- Prepare, fill, roll and level slipway ground / apron (possibly using coarse gravel mix) where vessel will be finally located to allow placement of jacking points to lift the two cradles; and
- Placement of two pre-cast in-ground concrete footings to a maximum depth of 1.0 m below ground level (bgl) at neap tide and provision of cyclone tie-down restraints.

It is estimated approximately **180 m³** of soil will be disturbed during the slipway clean-up, excavation and placement of the concrete footings.

Proposed development plans have been attached in **Appendix B**.

Proposed development plans have noted the provision of a temporary bund, silt curtain and two sumps to be utilised throughout the duration of the project (where required).

6 ASS Site Assessment

As part of the ASS Investigation undertaken by Prensa (March 2024), two boreholes were progressed until water ingress prevented further sampling (BH04 to 0.5 m bgl, and BH05 to 1.5 m bgl). In selecting these boreholes, Prensa selected two locations that represented the proposed locations of footings to be established for the HMAS Townsville project as outlined within the proposed development plans provided within **Appendix B**.

Samples were screened for pH 'field' screening ($\text{pH}_{(\text{F})}$ and $\text{pH}_{(\text{FOX})}$), and the results of the field screening were used to select samples for quantification of sulfur acidity via chromium suite analysis. Field screening was undertaken on all eight samples collected from BH04 and BH05. Where screening indicated the potential of PASS, samples were further analysed to quantify potential and/or actual sulfur acidity within the site soils.

6.1 Stratigraphy

Different subsurface lithology was observed between the two ASS investigation boreholes. The brown gravelly sands and clays observed within BH04 were consistent with soils noted across the Site during previous investigations. However, the soil profile observed within BH05 was characteristic of marine sediments, with minor yellow mottling, potentially indicative of Jarosite, observed from 0.0 to 0.7 m bgl. A generalised subsurface profile of each borehole has been summarised in **Table 1** below.

Table 1: Generalised Subsurface Profile		
Approximate Depth (m BGL)	Domain	Soil Description
BH04		
0.0 – 0.5	Fill	Brown gravelly sands and clays.
BH05		
0.0 – 0.7	Natural	Sandy clay, high plasticity, black/green with yellow mottling.
0.7 – 1.5	Natural	Clayey Sand, medium to coarse particles, dark grey/ yellow / green.

Ground disturbance associated with site development is anticipated to occur within the first 1.0 m bgl.

6.2 Actual and Potential ASS Hazard

On the basis of the qualitative field pH screening results, the presence of *Actual Acid Sulfate Soils* (AASS) was unlikely (due to the high pH_{F} results in all samples analysed); however, the presence of *Potential Acid Sulfate Soils* (PASS) was considered to be likely at both sample locations due to the significant pH drop following oxidation at samples collected BH04 at 0.25 m bgl and BH05 at 0.5 m bgl. Both total actual acidity and potential acidity were analysed as part of the chromium suite analysis. The net acidity was determined such that a liming rate could be calculated. Samples analysed were from BH04 at 0.25 m bgl and BH05 at 0.5 m bgl.

While **actual acidity** was noted to be below the action criteria within both samples, the chromium reducible sulfur analysis identified **potential acidity** above the criteria in both samples. The **net acidity** in both BH04 at 0.25 m bgl (23 mol H^+ /tonne / 0.04 %S) and BH05 at 0.5 m bgl (45 mol H^+ /tonne / 0.07 %S) exceed the applicable action criteria. The corresponding liming rates (calculated from the net acidity) were 1.7 kg CaCO_3 /tonne in the sample collected from BH04 and 3.4 kg CaCO_3 /tonne in the

sample collected from BH05. **Plate 1** below illustrates the generalised soil profile encountered during previous investigations, together with indicative lime treatment rates.

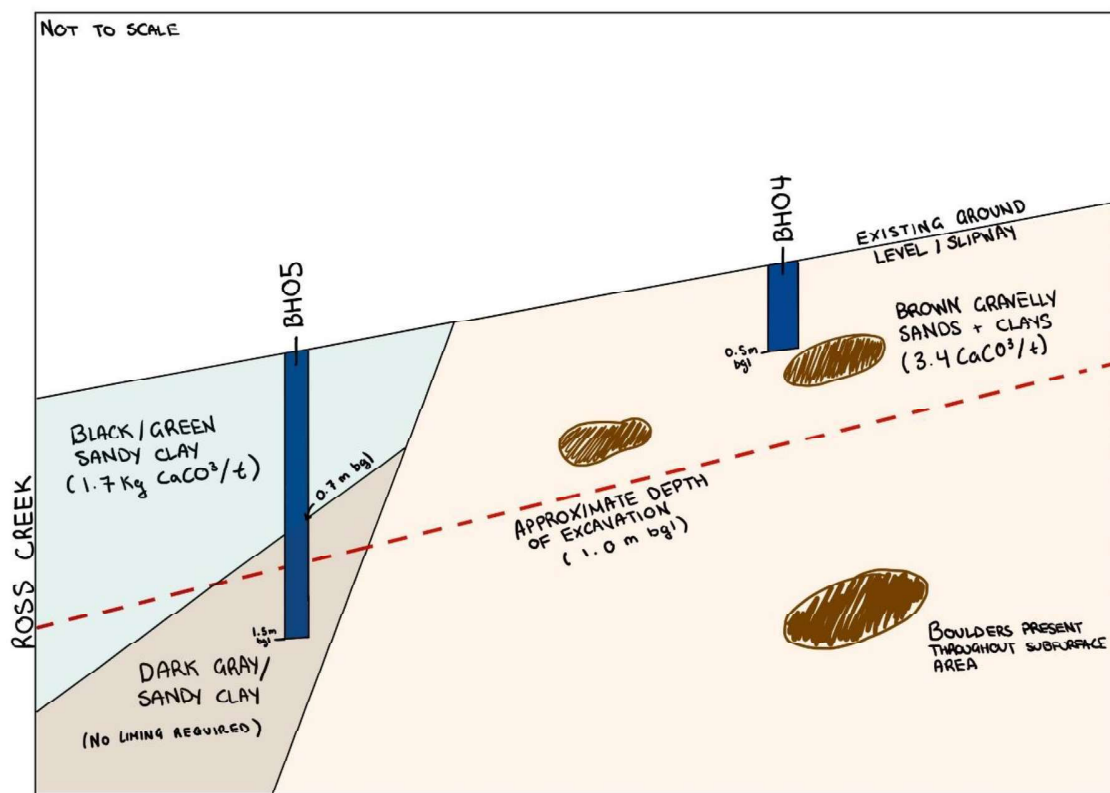


Plate 1 - Expected subsurface conditions (including liming rates)

6.3 ASS Treatment Category

Based on the proposed excavation volume of 180 m³ and the highest liming rate of 3.4 kg CaCO₃/tonne, the material has been classified as **Category-M – Medium level of treatment** as per the Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines V5, 2023.

Management of Category-M ASS require the following:

- Soils are treated with an amount of neutralising agent that will counter Net Acidity (up to the equivalent of 1 t of fine CaCO₃)
- The neutralising agent is thoroughly mixed with the soil, but **verification testing is not required**;
- Site run-on, run-off and infiltration of water and leachate that is percolating through the soil is managed (any bunding must be made from non-ASS material); and
- Documentation and records of the ASS management strategies that were implemented on site. These may need to be provided to the regulatory decision maker upon request.

7 Acid Sulfate Soil Management

Management strategies outlined within this ASSMP are to be implemented to minimise the risk of *Environmental Harm*¹ to the receiving environment (including any acidic leachate generated), and limit any *Environmental Nuisance*² that may result from:

- Disturbance of ASS during excavation and filling construction works;
- Treatment, handling and temporary placement of spoil ASS on-site;
- Resulting impacts on surface waters in Ross Creek either directly, or via off-site migration of impacted surface water;
- In-situ treatment of water contained within excavations prior to connection with existing water courses; and
- Off-site disposal of any soil or surface or drainage water from the Site.

As no groundwater was encountered during initial investigative works, this ASSMP does not outline groundwater or associated dewatering management procedures. If any subsurface water is encountered upon excavation, revision and further guidance on management will be required.

7.1 Training and Orientation

Appropriate training should be provided to all contractors' staff involved in earthworks on the Site, to be delivered as part of Site induction / toolbox talks. Sessions should be conducted prior to the commencement of earthworks and at other such intervals as required to ensure staff are fully aware of the requirement for field management of ASS and associated waters, the management strategies to be implemented, and their roles and responsibilities in achieving the desired management outcomes.

This ASSMP should be included in the site induction, with details of all persons completing the induction being recorded using an induction register.

7.2 Roles and Responsibilities

The key stakeholders responsible for the implementation of the control measures outlined within the ASSMP are presented in **Table 2**.

¹ EP Act 1994: ***Environmental Harm*** "Any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance.

² EP Act 1994: ***Environmental Nuisance*** "Is unreasonable interference or likely interference with an environmental value caused by:

- A) Aerosols, fumes, light, noise, dust, litter etc.;
- B) An unhealthy, offensive or unsightly condition because of contamination; or
- C) Another way prescribed by regulation.

Table 2: Summary of Responsibilities

Role	Company and Representative	Responsibilities
Site Owner	Port of Townsville Ltd	• Appointment of site management personnel / construction contractor for administration of requirements stipulated in the ASSMP; and • Provision of ASSMP to guide site management / construction contractor.
Site Management / Manager/Construction Contractor	To be appointed at the discretion of Port of Townsville Ltd	• Ensure appropriate implementation and management of the ASSMP during the construction phase of development; • Ensure compliance with ASSMP during the construction phase of development; • Ensure construction workers performing works in contact with ASS soil and potentially groundwater at the Site are inducted into the ASSMP; • Ensure all parties involved in the construction phase are aware of roles and responsibilities associated with the implementation and maintenance of this ASSMP; • Notify Environmental Consultant in the event that suspect materials are encountered on the Site during construction works; • Review and seek revision to ASSMP (as and if required) to meet current/relevant Site conditions; and • It should be noted that Department of Environment, Science and Innovation (DESI) must be notified within 24 hours of an incident which has the potential to cause environmental harm.
Site Contractors	To be appointed at the discretion of Port of Townsville Ltd	• Site contractors must operate under the direction of site management; • Site contractors are responsible for obtaining any relevant permits (i.e. tidal works permits, vegetation disturbance permits, excavation and trenching works etc); and • Once inducted, site contractors engaged in works on-site are responsible for compliance with the requirement of the ASSMP.
Environmental Consultant	To be appointed at the discretion of Port of Townsville Ltd	• Provide guidance to Site Management/Manager (if required) in regard to the ASSMP; • Attend Site (as, and if required) to inspect suspect materials and conduct sampling (where appropriate) and/or other environmental works (as required); and • Revise the ASSMP (as and if required) to meet current/relevant Site conditions.

8 Implementation of Management Strategies

8.1 Site preparation

Prior to the commencement of any excavation works at the Site, the area where treatment is expected to be undertaken should be adequately prepared to ensure runoff control is implemented such as (but not limited to):

- Sediment bund using non ASS material;
- Silt curtain; and
- Sumps/water pumps and treatment area.

8.2 Soil Disturbance Staged Works

It is not possible that disturbance of ASS can be avoided. As such, a staged approach is recommended for any soil disturbance. A staged approach will:

- Limit the potential effects on any area disturbed at any one time and help manage any acid generating conditions;
- Minimise the amount of time that ASS are exposed to the atmosphere (i.e. minimise the time that excavations are left open); and
- Allow for the rapid neutralisation of ASS materials in accordance with the liming and capping procedures outlined below.

It is envisaged that a stage of works would comprise:

1. The excavation of any pits/batters within the construction zone **during low-tide**;
2. Loading of excavated soil into the designated treatment area for liming as per **Section 8.3**;
3. Liming of excavated area within the same low tide period as excavation has occurred; and
4. Installation of pre-cast concrete footings as soon as practicably possible.

8.3 Treatment of Excavated Soils - Neutralisation

Material excavated or otherwise disturbed during construction shall be treated to neutralise the potential and/or actual acidity present. Neutralisation of disturbed soils shall be undertaken in specially prepared treatment areas. These areas must be adequately prepared to ensure potential runoff or leachate from the area is contained and controlled.

8.3.1 Designated Treatment Area

A dedicated treatment pad shall be constructed for the treatment of ASS. Soil stockpiles should be separated as outlined within Table 3 of the *Contaminated Soil and Waste Management Plan (CSWMP)* (Prensa, 2024).

The following items shall apply to the construction and maintenance of the treatment pad throughout the duration of the HMAS Townsville project:

The treatment pad shall consist of a 300 mm thick basal layer, consisting of fine-textured, non-sodic natural soils (fine texture required to minimise hydraulic conductivity);

- This basal layer shall be covered by a guard layer, consisting of 5 kg/m² of agricultural lime. The guard layer must include 5 kg/m² of agricultural lime to support neutralisation of any leachate resulting from the soils placed into the treatment pad.
- The treatment pad shall be surrounded by bunds, which are to be at least 800 mm in height and lined with agricultural lime at the same 5 kg/m² rate used for the guard layer;

- Stockpiled ASS should **NOT** be located in overland flow areas or within 50 m of a water body (where possible);
- The containment pad needs to be large enough to accommodate the soil, and is to be divided into at least two 'cells' to allow for separation of each soil type;
- Should rain occur or should rain be forecast, the stockpile must be covered with HDPE plastic;
- A water collection system / sump should be implemented to capture any potential leaching from the stockpiled material;
- Should large quantities of water be identified in the sump, this water should be monitored at regular intervals and assessed prior to being released into the environment as outlined within **Section 8.6**;
- In accordance with the requirements of the short-term stockpiling outlined in the *Queensland Acid Sulfate Soil Technical Manual (2014)* the following time restrictions apply for length of time soil can be stockpiled before it has undergone initial neutralisation:
 - Sands and gravels: Overnight (18 hours);
 - Sandy loams and light clays: 2 nights (42 hours); and
 - Medium to heavy clays and silty clays: 3 nights (66 hours).
- Attempts should be made to minimise surface area of any ASS stockpiled on-site;
- A neutralising agent (i.e. Aglime) must be spread over the stockpile to limit the generation of acidity from the surface of the stockpile as per **Section 8.3.3**; and
- Daily visual inspections will be conducted by Site staff to confirm conformance with the above requirements.

An example of treatment pad design is presented in **Plate 2** below.

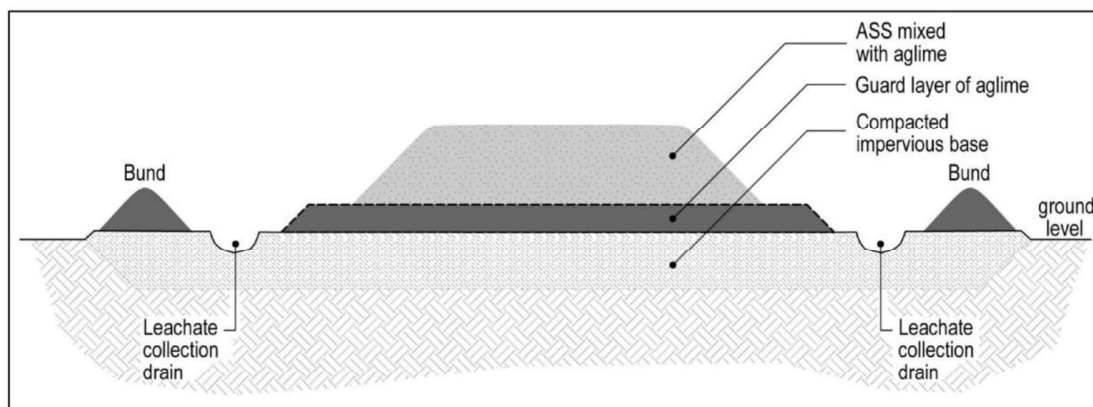


Plate 2 - Example cross section of treatment pad (*Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines V5, 2023*).

8.3.2 Calculated Liming Rates

All material excavated or otherwise disturbed as part of development works must be treated to neutralise the net acidity present. Excavated soils shall be mixed with a neutralising agent (fine agricultural lime) at predetermined rates, as calculated from quantitative testings results. As the level of treatment varies across the Site, the most conservative liming rate has been applied to all soils to be disturbed.

The Aglime purity should be 90% or greater (i.e. $NV > 90$, where NV is the neutralising value, a term used to rate the neutralising power of different forms of materials relative to pure, fine calcium

carbonate which is designated NV=100). There may be economic or availability justification for using a less pure grade of Aglime, however, under these circumstances, the liming rates would need to be increased by a factor of 100/NV.

Based on an assumed excavation volume of 180 m³ and an assumed bulk density of 1.6, the estimated volume of excavated soils is 288 tonnes. At a liming rate of 3.4 kg/tonne¹, a total of approximately **0.98 tonnes of lime²** will be required for the treatment of these soils.

Volumetrically this rate is ~5.5 kg lime per cubic meter.

Note: additional lime in excess of values stated above will be required for designated treatment area including associated treatment area resources (i.e. bunds, guard layer). Excess agricultural lime shall be stored at the Site as contingency for the treatment of additional acidity not previously identified.

8.3.3 Lime Incorporation

Soil shall be placed into the treatment area (atop the treatment pad), with stockpiles up to 300 mm in height generated for treatment (low stockpiles are considered most efficient for drying and mixing). Fine agricultural lime shall be incorporated into the stockpiled soil, with lime applied at rates outlined in **Section 8.3.2** above.

The lime shall be blended through the stockpile with earthmoving equipment (such as an excavator). Effective blending is essential to ensure the lime is sufficiently mixed throughout the soil.

Lime application shall be undertaken within 18 hours of excavation. This is required to ensure excessive oxidation does not occur, which would result in increased risk of acidic leachate generation.

As the soil treatment is classed as Category-M – Medium level of treatment – verification of treated soil is not required.

8.3.4 Liming of Base of Excavation

Upon reaching the maximum proposed depth of excavation (assumed ≤ 1.0 m bgl), all walls and bases of cut batters shall be coated with fine Aglime at a minimum rate of 5 kg/m² to ensure these soils have a buffering capacity should soils be oxidized. This amount is based on recommended dosing for excavated surfaces as outlined within *Queensland Acid Sulfate Soil Technical Manual (2014)*.

As the area of excavation is within an area impact by tidal fluctuations, liming of the base and walls of the excavated area should be applied as soon as reasonably practicable - where possible, prior to the next high-tide.

Additionally, the pre-cast footings shall be placed as soon as reasonably practicable. Where possible, this should occur upon completion of lime application and prior to the next high-tide occurrence.

If this is not possible and the excavated area becomes inundated by a high-tide, all walls and bases of cut batters are to be re-limed at the above rate every 24 hours until the excavation has been reinstated or sealed.

¹ Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using an additional safety factor of 1.5 and a neutralising value (NV) of 98% to allow for non-homogeneous mixing and poor reactivity of lime.

² Liming rate of excavated areas have been calculated using a similar approach to ASS Tip 16 within the *QLD Acid Sulfate Soil Technical Manual (2014)* and based on the highest sum of potential and existing acidity encountered within the expected maximum cut depth of an area. **Liming Rate kg CaCO₃ / m² = Liming Rate (kg CaCO₃/t) x Aglime NV 98% x BD 1.6 x Safety factor 1.5**

8.3.5 On Site Storage of Neutralising Agents

During construction, the contractor will have stored on site at all times, a sufficient additional volume Aglime to ensure that potentially hazardous situations can be controlled should the need arise.

In addition, for sudden drops in water pH across the site, it is recommended that the contractor has quicklime or slaked lime available for adding to any low pH waters.

Quicklime and slaked lime, although slightly more expensive than aglime, are recommended to neutralise water as they are more soluble. However, a strict pH monitoring program must be carried out to ensure an acceptable pH range is maintained. Aglime can also be used although it is far less effective and hence more expensive for this purpose than alternatives such as quicklime.

Occupational health and safety procedures outlined by the neutralising agent manufacturers will be followed for storage, handling and application of the neutralising agent by all personnel involved with the storage, handling and application of each product. These products are highly soluble and must be stored on-site under cover.

8.4 Disposal of Treated Soil

Treated soil shall be assessed for contamination in accordance with the *Queensland Environmental Protection (Regulated Waste) Amendment Regulation, 2018*, prior to offsite disposal. In the event that the lots from which the soils are excavated are listed on the Queensland Environmental Management Register (EMR), offsite disposal will require an approved disposal permit. Soil must be disposed of lawfully, to a facility licenced to accept the waste category.

Off-Site disposal of soil from the site should be conducted in accordance with Table 2 of the *Contaminated Soil and Waste Management Plan (CSWMP)* (Prensa, 2024).

8.5 Decommissioning of soil treatment areas

Decommissioning the stockpile area will be conducted at the end of the works to ensure the area has not been impacted or preclude the intended use.

When decommissioning of a stockpile area within an unsealed base (i.e. soil), the stockpile compound should be removed concurrently with the stockpiled material. The following should be undertaken to appropriately manage the waste on site to satisfy relevant guidance:

- Load the stockpiled material into an appropriately covered truck to be transported off-site;
- The soil comprising footprint of the containment pad should be excavated and loaded into the same permitted vehicle;
- An inspection should be completed subsequent to the containment pad and bund removal to confirm that no visible evidence of residual material or waste persists on-site;
- Two (2) validation samples are to be collected from the excavated surface and analysed for pH;
- One (1) sample is to be collected from a similar surface soil type in close proximity to the containment pad footprint to establish background pH levels enabling a meaningful comparison to be made; and
- Waste transport certificates should be completed for the load and records maintained on file in accordance with Table 2 of the *Contaminated Soil and Waste Management Plan (CSWMP)* (Prensa, 2024).

8.6 Management of Surface and Drainage Waters

8.6.1 Surface Water

To mitigate the potential impacts of exposed ASS to surface waters during high-tide periods, management of exposed surfaces should be conducted in accordance with Section 8.3.4. Monitoring and treatment of impacted surface water and pooled rainfall is essential to maintain an acceptable level of discharge water quality during excavation works. Monitoring of surface water will only be required when:

- Untreated and exposed ASS comes into contact with surface water through tidal fluctuations, surface water monitoring will be required;
- When there is significant rainfall event (+25 mm); or
- When visual observations of leaching or iron staining have been observed.

8.6.2 Groundwater

As groundwater is not expected to be encountered during the proposed works, the procedure in this ASSMP should be revised if groundwater is encountered during these works.

If unexpected groundwater intrusion is encountered during excavation, works should cease and an environmental consultant engaged. The quantity and quality of groundwater seepage should be evaluated to determine whether it has implications on the health of construction workers or sensitive ecological receptors.

8.6.3 Rainfall / Runoff

It should be noted that excavations often act as sediment basins, where overland flow of surface waters will drain towards during a rainfall event. As such, attempts should be made to conduct excavations at a time with no or low forecasted rain.

Erosion and sediment control measures are expected to be applied in accordance with current industry best practice to contain and control site runoff waters during construction. Proposed development plans have noted the provision of a temporary bund, silt curtain and two sumps to be utilised throughout the duration of the project (where required). If sediments are collected within the bund and silt curtain, this material should be stockpiled and treated in accordance with **Section 8.3**.

Water runoff generated from the ASS treatment area(s), including excavation activities, will be contained, tested and treated (if necessary) prior to discharge or re-use on site. Uncontrolled discharge of water from excavation areas, ASS treatment areas or exposed works areas is not permitted. If discharge from the site is required, performance criteria detailed in **Table 3** must be met prior to release.

8.6.4 Neutralising Acid Leachate and Drainage Water

In the unlikely event that any water becomes pooled within excavation areas, this water should be monitored for pH and treated with hydrated lime (Ca(OH)_2) at the rates outlined within **Table A4-1** of the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines V5, 2023* until the performance limits for pH is met.

Lime will be applied to acidified waters encountered during or after excavations. Aglime is the safest and cheapest neutralising agent and equilibrates around a pH of 8.2 and is not generally harmful to flora, fauna or aquatic species. Hydrated lime and quicklime are more soluble and may also be used. However, overshooting can occur if these more soluble, caustic neutralising agents are used, thereby posing a greater occupational health and safety risk

8.6.5 Verification Sampling

Prior to discharge into the receiving environment, under the Environmental Protection (Water and Wetland Biodiversity) Policy (2019, Environmental Values (EVs) and Water Quality Objectives (WQOs) water should meet the relevant criteria outlined in **Section 8.6.6**. The performance criteria is based on acceptable physico-chemical and chemical limits outlined within the QLD EPP (2009) for the Ross River Basin and Magnetic Island Environmental Value and Water Quality Objectives (2009) for moderately disturbed middle estuarine waters.

8.6.6 Performance Criteria

No water shall be discharged from Site unless it complies with the requirements of **Table 3**. If water quality fails to meet the below performance criteria it should be disposed off-site as regulated waste.

Table 3: Minimum Criteria for Water Testing	
Field Testing	Guideline Value
Visual Observation	No Visible oil, scum or litter
pH	Between 7.0 – 8.4
Dissolved Oxygen	Between 85% - 100%
Total Suspended Solids	< 20 mg/L
Turbidity	< 8 NTU
Copper	< 0.0013 mg/L
Zinc	< 0.008 mg/L
Lead	< 0.0044 mg/L
Aluminium (pH> 6.5): <0.055 mg/L	< 0.055 mg/L
Aluminium (pH<6.5): <0.0008 mg/L	< 0.0008 mg/L
Total and Dissolved Iron	0.3 mg/L (CCREM 1987. Canadian water quality guidelines. Canadian Council of Resource and Environment Ministers, Ontario)

9 Monitoring and Record Keeping

The environmental controls described in this ASSMP shall be regularly monitored for integrity to ensure that the protection measures are working effectively. Environmental controls (i.e. sediment bunds) shall also be inspected immediately at the onset and during a rain event, particularly those controls that relate to the management of surface water control or soils leaving the Site.

All monitoring and inspections should be recorded in a register to be maintained on-site, including date of inspection, a brief description of actions, checklists, lime delivery dockets, liming rates, stockpile locations, a description of non-conformances, a description of actions completed to rectify the non-conformance and the name and signature of the person completing the inspection and the person signing off the completed actions.

The following should be monitored during construction:

- pH of Surface water (rainfall dependant);

- Daily weather conditions;
- Quantities of material excavated or lime treated; and
- Stockpiled soil (i.e. excavated materials prior to treatment) and neutralised soils (soils post liming) (visual only).

The Contractor shall also monitor the site on a daily basis for evidence of:

- Iron staining at the batters of the excavation;
- Colour change of site water to pale blue-green or crystal clear;
- Bright yellow mottling on the soil surface; and
- Sulphurous odours.

If evidence of the above are present, relevant contingency actions as outlined in **Section 10** are to be implemented as soon as reasonably practicable.

10 Corrective Actions

Should soil and/or water monitoring indicate acidity levels exceed the desired levels, the following steps must be taken:

- A review of the ASSMP should be undertaken and immediately implemented;
- The Site Manager shall be notified and make the initial assessment of the severity and environmental risk of the release of acidic material. Operations involving filling and/or excavation should cease until remedial action is taken and the 'Performance Criteria' are complied with;
- If the pH of surface water or pooled rainfall falls outside the performance criteria detailed in **Table 3**, the pH shall be re-checked in 12 hours. If a 'non-compliance' still exists, the water shall be locally dosed with aglime. If no change occurs within a few hours, hydrated lime shall be added. When using hydrated lime, care should be taken as to not over dose, therefore, continue monitoring during dosing is recommended;
- The Environmental Consultant shall assess failures in the work procedures and implement changes to prevent reoccurrence of the incident in the future; and
- The Environmental Consultant will ensure all corrective actions have been successful and whether further mitigation measures are required.

10.1 Revision and Amendments to ASSMP

Should the ASSMP require amendment in the future, it must be amended and reviewed by a Suitably Qualified Person (SQP) to verify that the amended ASSMP is acceptable for managing the risks associated with ASS.

Appendix B: Environmentally Sensitive Areas Map



**Acid Sulfate Soil
Management Plan**
Former Curtain Bros Slipway
South Townsville, QLD

Port of Townsville Ltd
March 2024

Client No: P0221
Job No: 121817B

Statement of Limitations

This document has been prepared in response to specific instructions from Port of Townsville Ltd to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards, practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by Port of Townsville Ltd and the use of this report by other parties may lead to misinterpretation of the issues contained in this report. To avoid misuse of this report, Prensa advises that the report should only be relied upon by Port of Townsville Ltd and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part and Prensa should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

Prensa is not a professional quantity surveyor (QS) organisation. Any areas, volumes, tonnages or any other quantities noted in this report are indicative estimates only. The services of a professional QS organisation should be engaged if quantities are to be relied upon.

Sampling Risks

Prensa acknowledges that any scientifically designed sampling program cannot guarantee all sub-surface contamination will be detected. Sampling programs are designed based on known or suspected site conditions and the extent and nature of the sampling and analytical programs will be designed to achieve a level of confidence in the detection of known or suspected subsurface contamination. The sampling and analytical programs adopted will be those that maximises the probability of identifying contaminants. Port of Townsville Ltd must therefore accept a level of risk associated with the possible failure to detect certain sub-surface contamination where the sampling and analytical program misses such contamination. Prensa will detail the nature and extent of the sampling and analytical program used in the investigation in the investigation report provided.

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Soil contamination can be expected to be non-homogeneous across the stratified soils where present on site, and the concentrations of contaminants may vary significantly within areas where contamination has occurred. In addition, the migration of contaminants through groundwater and soils may follow preferential pathways, such as areas of higher permeability, which may not be intersected by sampling events. Subsurface conditions including contaminant concentrations can also change over time. For this reason, the results should be regarded as representative only.

Port of Townsville Ltd recognises that sampling of subsurface conditions may result in some cross contamination. All care will be taken and the industry standards used to minimise the risk of such cross contamination occurring, however, Port of Townsville Ltd recognises this risk and waives any claims against Prensa and agrees to defend, indemnify and hold Prensa harmless from any claims or liability for injury or loss which may arise as a result of alleged cross contamination caused by sampling.

Reliance on Information Provided by Others

Prensa notes that where information has been provided by other parties in order for the works to be undertaken, Prensa cannot guarantee the accuracy or completeness of this information. Port of Townsville Ltd therefore waives any claim against the company and agrees to indemnify Prensa for any loss, claim or liability arising from inaccuracies or omissions in information provided to Prensa by third parties. No indications were found during our investigations that information contained in this report, as provided to Prensa, is false.

Recommendations for Further Study

The industry recognised methods used in undertaking the works may dictate a staged approach to specific investigations. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further investigation or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of Port of Townsville Ltd and Prensa recognises that Port of Townsville Ltd will consider their specific needs and the business risks involved. Prensa does not accept any liability for losses incurred as a result of Port of Townsville Ltd not accepting the recommendations made within this report.

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1 Introduction

This Acid Sulfate Soil Management Plan (ASSMP) has been prepared by Prensa Pty Ltd (Prensa) for Port of Townsville (Port). The ASSMP outlines the management requirements for Acid Sulfate Soils (ASS) disturbance during excavation and constructions works associated with the HMAS Townsville Project.

This ASSMP is to be adhered to until the proposed development works have been completed at the Site. Upon completion of works, the author of this ASSMP (or a suitably qualified person) must verify in writing that all directions and conditions contained within the ASS have been satisfied.

1.1 Background

Projects involving the disturbance of ASS materials must assess the hazards associated with disturbance and consider potential impacts. As such, an ASS Investigation was carried out in March 2024 to inform the management recommendations within this ASSMP.

This ASSMP shall be adopted during all construction activities during the HMAS Townsville Project and aims to minimise and manage the disturbance of ASS in order to mitigate environmental impacts associated with acid production through the disturbance of ASS. Mitigation of potential environmental impacts will typically be achieved through:

- Neutralisation of any disturbed ASS material via a staged approach to minimise impacts to surface waters and active control of stormwater drainage/site runoff throughout site development.
- Containment, testing and treatment (where necessary) of any water collected during the excavation and/or during the treatment process; and
- Limitation of any alteration to the existing surface water conditions and appropriate treatment of any collected surface water before re-use, offsite discharge or disposal.

The appropriate application of these strategies will ensure that generation or release of acid and heavy metal contaminants, resulting from disturbance of ASS, will not adversely affect the natural and built environments or human health.

This ASSMP does not include general construction health and safety procedures which should be addressed within subcontractor procedures and safe work method statements (SWMS). Furthermore, this ASSMP does not represent an Environmental Management Plan for ongoing management of land contamination or ASS at the Site into the future. Rather, the ASSMP is limited to the management of ASS during the construction phase of the proposed works.

1.2 Acid Sulfate Soils

ASS are described in detail within the Department of Agriculture and Water Resources' *National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual*, 2018.

ASS materials are distinguished from other soil or sediment materials (referred to as 'soil materials' throughout this guideline) by having properties and behaviour that have either:

1. Been affected considerably by the oxidation of Reduced Inorganic Sulfur (RIS); or
2. The capacity to be affected considerably by the oxidation of their RIS constituents.

The factor common to all ASS materials is that RIS components have either had, or may have, a major influence on the properties or behaviour of these soil materials.

These soils are typically found in low-lying coastal areas and saline inland areas, however, they have been identified in a wide range of environmental settings.

In a waterlogged anoxic state (that is depleted of dissolved oxygen), these materials remain benign and do not pose a significant hazard to human health or the environment. However, ASS disturbance, and exposure to oxygen, may result in a wide range of environmental hazards, including:

- Severe acidification of soil and drainage waters (below pH 4 and often pH less than 3);
- Mobilisation of metals (for example iron, aluminium, copper, cobalt, zinc), metalloids (for example arsenic), nutrients (for example phosphate) and rare earth elements;
- Deoxygenation of water bodies;
- Production of noxious gases (for example hydrogen sulfide);
- Production of greenhouse gases; and
- Scalding (that is de-vegetation) of landscapes.

These hazards have the potential to cause a number of significant environmental and economic impacts such as fish kills, loss of biodiversity in wetlands and waterways, contamination of groundwater resources, loss of agricultural productivity, and corrosion of concrete and steel infrastructure.

2 Objectives

The objectives of this ASSMP is to:

- Outline appropriate control measures to manage Potential Acid Sulfate Soils (PASS) that is to be disturbed during the proposed works at the Site and control any acid leachate; and
- Minimise the potential ecological risks associated with ASS disturbance at the Site.

3 Technical Framework

This ASSMP was prepared in accordance with reference to the following technical framework.

- Dear SE, Williams KM, McElnea AE, Ahern CR, Dobos SK, Moore NG, and O'Brien LE, 2023, *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines*, Version 5, Department of Resources and Department of Environment and Science, Queensland;
- Queensland Department of Resources and the Department of Environment and Science, *Queensland Acid Sulfate Soil Technical Manual – Soil management guidelines version 5*, 2023;
- Queensland Government, *Planning Act 2016*;
- Queensland Government, *Environment Protection Act 1994*;
- Queensland Government, *Environment Protection Regulation 2019*;
- Queensland Government, *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*;
- Queensland Government Department of Infrastructure, *State Planning Policy 2017*;
- Queensland Government Department of Infrastructure, *State Planning Policy – State Interest Guideline Water Quality (Policy 9)*, April 2016;
- Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification and Laboratory Methods Manual*, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0.;
- The ANZG 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018';
- *Work Health and Safety Act*, 2011; and
- *Work Health and Safety Regulation*, 2011.

4 Site Description

The Site is located at the Former Curtain Bros Slipway located at Lot 1 and Lot 3 on SP126611 on Ross St, South Townsville (the Site) with a combined area of 1,921 m². The Site is roughly rectangular in shape, bound by Ross Creek to the south, Ross St to the east, a former laydown area to the west and general commercial/industrial activities to the north.

The Site extent, as illustrated in the proposed development documents attached as **Appendix A** outlines the proposed disturbance footprint associated with the HMAS Townsville Project. Disturbance works associated with the HMAS Townsville Project are outlined within **Section 5** below.

4.1 Receiving Environment

The Site is located along the Ross Creek, a shallow estuarine area that drains into the ocean at the Port of Townsville (approximately 2.0 km to the north east). It is located at the base of the slipway which is regularly inundated by natural tidal fluctuations. Under the Queensland Environmental Protection (Water) Policy (QLD EPP) (2009), Ross Creek has been defined as a moderately disturbed middle estuarine waterway with the following environmental values:

- Aquatic ecosystems;
- Human Consumer;
- Secondary Recreation;
- Visual Recreation;
- Industrial Use; and
- Cultural and Spiritual Values.

Ross Creek is noted to be within a Category R (GBR Riverine) Matters of State Environmental Significance (MSES) regulated vegetation management area.

There are also two Category B Environmentally Sensitive Areas (Marine Plants and the Seaward Side of Highest Astronomical Tide) which apply to Ross Creek (at the Site).

A copy of the Environmentally Sensitive Areas and MSES mapping is presented in **Appendix A**.

5 Proposed Development

Port provided a copy of the proposed development plans for the Site for review. Based on information provided, it is understood the proposed works include:

- Design of structural support;
- General clean-up of slipway;
- Servicing and repair of the rails;
- Prepare, fill, roll and level slipway ground / apron (possibly using coarse gravel mix) where vessel will be finally located to allow placement of jacking points to lift the two cradles; and
- Placement of two pre-cast in-ground concrete footings to a maximum depth of 1.0 m below ground level (bgl) at neap tide and provision of cyclone tie-down restraints.

It is estimated approximately **180 m³** of soil will be disturbed during the slipway clean-up, excavation and placement of the concrete footings.

Proposed development plans have been attached in **Appendix B**.

Proposed development plans have noted the provision of a temporary bund, silt curtain and two sumps to be utilised throughout the duration of the project (where required).

6 ASS Site Assessment

As part of the ASS Investigation undertaken by Prensa (March 2024), two boreholes were progressed until water ingress prevented further sampling (BH04 to 0.5 m bgl, and BH05 to 1.5 m bgl). In selecting these boreholes, Prensa selected two locations that represented the proposed locations of footings to be established for the HMAS Townsville project as outlined within the proposed development plans provided within **Appendix B**.

Samples were screened for pH 'field' screening ($\text{pH}_{(\text{F})}$ and $\text{pH}_{(\text{FOX})}$), and the results of the field screening were used to select samples for quantification of sulfur acidity via chromium suite analysis. Field screening was undertaken on all eight samples collected from BH04 and BH05. Where screening indicated the potential of PASS, samples were further analysed to quantify potential and/or actual sulfur acidity within the site soils.

6.1 Stratigraphy

Different subsurface lithology was observed between the two ASS investigation boreholes. The brown gravelly sands and clays observed within BH04 were consistent with soils noted across the Site during previous investigations. However, the soil profile observed within BH05 was characteristic of marine sediments, with minor yellow mottling, potentially indicative of Jarosite, observed from 0.0 to 0.7 m bgl. A generalised subsurface profile of each borehole has been summarised in **Table 1** below.

Table 1: Generalised Subsurface Profile		
Approximate Depth (m BGL)	Domain	Soil Description
BH04		
0.0 – 0.5	Fill	Brown gravelly sands and clays.
BH05		
0.0 – 0.7	Natural	Sandy clay, high plasticity, black/green with yellow mottling.
0.7 – 1.5	Natural	Clayey Sand, medium to coarse particles, dark grey/ yellow / green.

Ground disturbance associated with site development is anticipated to occur within the first 1.0 m bgl.

6.2 Actual and Potential ASS Hazard

On the basis of the qualitative field pH screening results, the presence of *Actual Acid Sulfate Soils* (AASS) was unlikely (due to the high pH_{F} results in all samples analysed); however, the presence of *Potential Acid Sulfate Soils* (PASS) was considered to be likely at both sample locations due to the significant pH drop following oxidation at samples collected BH04 at 0.25 m bgl and BH05 at 0.5 m bgl. Both total actual acidity and potential acidity were analysed as part of the chromium suite analysis. The net acidity was determined such that a liming rate could be calculated. Samples analysed were from BH04 at 0.25 m bgl and BH05 at 0.5 m bgl.

While **actual acidity** was noted to be below the action criteria within both samples, the chromium reducible sulfur analysis identified **potential acidity** above the criteria in both samples. The **net acidity** in both BH04 at 0.25 m bgl (23 mol H^+ /tonne / 0.04 %S) and BH05 at 0.5 m bgl (45 mol H^+ /tonne / 0.07 %S) exceed the applicable action criteria. The corresponding liming rates (calculated from the net acidity) were 1.7 kg CaCO_3 /tonne in the sample collected from BH04 and 3.4 kg CaCO_3 /tonne in the

sample collected from BH05. **Plate 1** below illustrates the generalised soil profile encountered during previous investigations, together within indicative lime treatment rates.

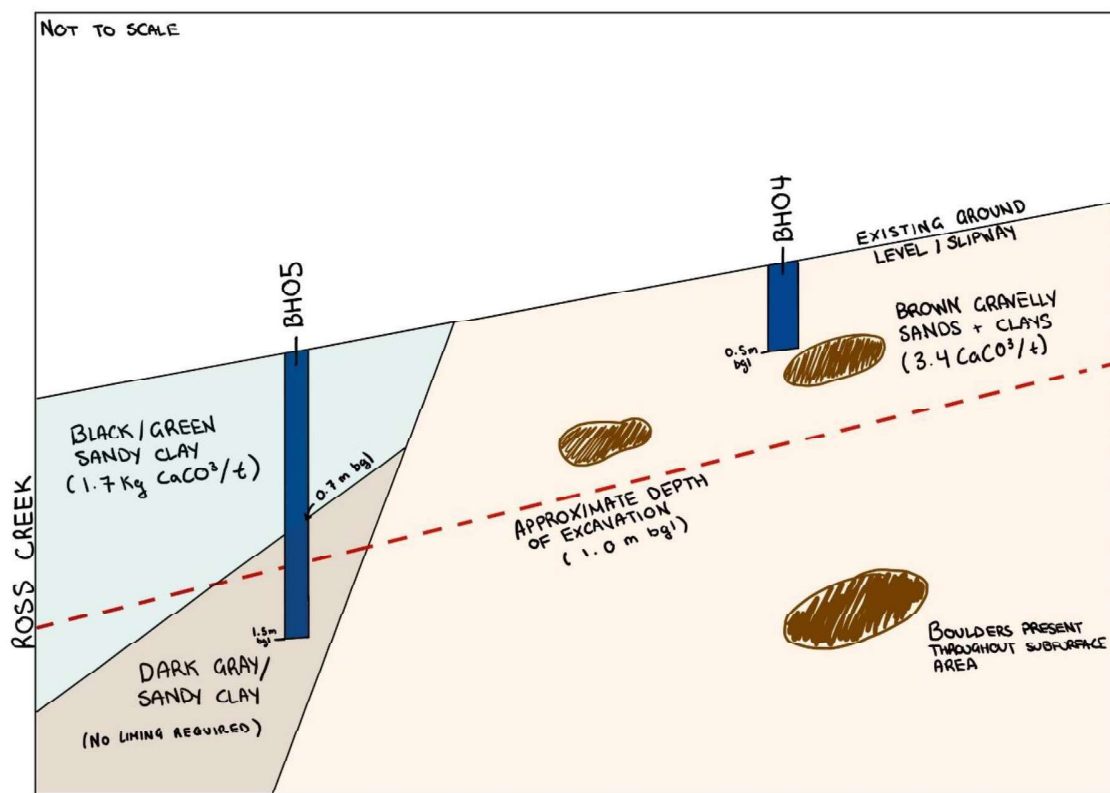


Plate 1 - Expected subsurface conditions (including liming rates)

6.3 ASS Treatment Category

Based on the proposed excavation volume of 180 m³ and the highest liming rate of 3.4 kg CaCO₃/tonne, the material has been classified as **Category-M – Medium level of treatment** as per the Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines V5, 2023.

Management of Category-M ASS require the following:

- Soils are treated with an amount of neutralising agent that will counter Net Acidity (up to the equivalent of 1 t of fine CaCO₃)
- The neutralising agent is thoroughly mixed with the soil, but **verification testing is not required**;
- Site run-on, run-off and infiltration of water and leachate that is percolating through the soil is managed (any bunding must be made from non-ASS material); and
- Documentation and records of the ASS management strategies that were implemented on site. These may need to be provided to the regulatory decision maker upon request.

7 Acid Sulfate Soil Management

Management strategies outlined within this ASSMP are to be implemented to minimise the risk of *Environmental Harm*¹ to the receiving environment (including any acidic leachate generated), and limit any *Environmental Nuisance*² that may result from:

- Disturbance of ASS during excavation and filling construction works;
- Treatment, handling and temporary placement of spoil ASS on-site;
- Resulting impacts on surface waters in Ross Creek either directly, or via off-site migration of impacted surface water;
- In-situ treatment of water contained within excavations prior to connection with existing water courses; and
- Off-site disposal of any soil or surface or drainage water from the Site.

As no groundwater was encountered during initial investigative works, this ASSMP does not outline groundwater or associated dewatering management procedures. If any subsurface water is encountered upon excavation, revision and further guidance on management will be required.

7.1 Training and Orientation

Appropriate training should be provided to all contractors' staff involved in earthworks on the Site, to be delivered as part of Site induction / toolbox talks. Sessions should be conducted prior to the commencement of earthworks and at other such intervals as required to ensure staff are fully aware of the requirement for field management of ASS and associated waters, the management strategies to be implemented, and their roles and responsibilities in achieving the desired management outcomes.

This ASSMP should be included in the site induction, with details of all persons completing the induction being recorded using an induction register.

7.2 Roles and Responsibilities

The key stakeholders responsible for the implementation of the control measures outlined within the ASSMP are presented in **Table 2**.

¹ EP Act 1994: ***Environmental Harm*** "Any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance.

² EP Act 1994: ***Environmental Nuisance*** "Is unreasonable interference or likely interference with an environmental value caused by:

- A) Aerosols, fumes, light, noise, dust, litter etc.;
- B) An unhealthy, offensive or unsightly condition because of contamination; or
- C) Another way prescribed by regulation.

Table 2: Summary of Responsibilities

Role	Company and Representative	Responsibilities
Site Owner	Port of Townsville Ltd	• Appointment of site management personnel / construction contractor for administration of requirements stipulated in the ASSMP; and • Provision of ASSMP to guide site management / construction contractor.
Site Management / Manager/Construction Contractor	To be appointed at the discretion of Port of Townsville Ltd	• Ensure appropriate implementation and management of the ASSMP during the construction phase of development; • Ensure compliance with ASSMP during the construction phase of development; • Ensure construction workers performing works in contact with ASS soil and potentially groundwater at the Site are inducted into the ASSMP; • Ensure all parties involved in the construction phase are aware of roles and responsibilities associated with the implementation and maintenance of this ASSMP; • Notify Environmental Consultant in the event that suspect materials are encountered on the Site during construction works; • Review and seek revision to ASSMP (as and if required) to meet current/relevant Site conditions; and • It should be noted that Department of Environment, Science and Innovation (DESI) must be notified within 24 hours of an incident which has the potential to cause environmental harm.
Site Contractors	To be appointed at the discretion of Port of Townsville Ltd	• Site contractors must operate under the direction of site management; • Site contractors are responsible for obtaining any relevant permits (i.e. tidal works permits, vegetation disturbance permits, excavation and trenching works etc); and • Once inducted, site contractors engaged in works on-site are responsible for compliance with the requirement of the ASSMP.
Environmental Consultant	To be appointed at the discretion of Port of Townsville Ltd	• Provide guidance to Site Management/Manager (if required) in regard to the ASSMP; • Attend Site (as, and if required) to inspect suspect materials and conduct sampling (where appropriate) and/or other environmental works (as required); and • Revise the ASSMP (as and if required) to meet current/relevant Site conditions.

8 Implementation of Management Strategies

8.1 Site preparation

Prior to the commencement of any excavation works at the Site, the area where treatment is expected to be undertaken should be adequately prepared to ensure runoff control is implemented such as (but not limited to):

- Sediment bund using non ASS material;
- Silt curtain; and
- Sumps/water pumps and treatment area.

8.2 Soil Disturbance Staged Works

It is not possible that disturbance of ASS can be avoided. As such, a staged approach is recommended for any soil disturbance. A staged approach will:

- Limit the potential effects on any area disturbed at any one time and help manage any acid generating conditions;
- Minimise the amount of time that ASS are exposed to the atmosphere (i.e. minimise the time that excavations are left open); and
- Allow for the rapid neutralisation of ASS materials in accordance with the liming and capping procedures outlined below.

It is envisaged that a stage of works would comprise:

1. The excavation of any pits/batters within the construction zone **during low-tide**;
2. Loading of excavated soil into the designated treatment area for liming as per **Section 8.3**;
3. Liming of excavated area within the same low tide period as excavation has occurred; and
4. Installation of pre-cast concrete footings as soon as practicably possible.

8.3 Treatment of Excavated Soils - Neutralisation

Material excavated or otherwise disturbed during construction shall be treated to neutralise the potential and/or actual acidity present. Neutralisation of disturbed soils shall be undertaken in specially prepared treatment areas. These areas must be adequately prepared to ensure potential runoff or leachate from the area is contained and controlled.

8.3.1 Designated Treatment Area

A dedicated treatment pad shall be constructed for the treatment of ASS. Soil stockpiles should be separated as outlined within Table 3 of the *Contaminated Soil and Waste Management Plan (CSWMP)* (Prensa, 2024).

The following items shall apply to the construction and maintenance of the treatment pad throughout the duration of the HMAS Townsville project:

The treatment pad shall consist of a 300 mm thick basal layer, consisting of fine-textured, non-sodic natural soils (fine texture required to minimise hydraulic conductivity);

- This basal layer shall be covered by a guard layer, consisting of 5 kg/m² of agricultural lime. The guard layer must include 5 kg/m² of agricultural lime to support neutralisation of any leachate resulting from the soils placed into the treatment pad.
- The treatment pad shall be hydrologically isolated through the implementation of appropriate bunding. Examples include the use of hay bales, sandbags or non-ASS soils lined with an

impermeable barrier and/or lined with agricultural lime at the same 5 kg/m² rate used for the guard layer. The bund should be established to a height that will sufficiently contain the soil being treated within the treatment pad area;

- Stockpiled ASS should **NOT** be located in overland flow areas or within 50 m of a water body (where possible);
- The containment pad needs to be large enough to accommodate the soil, and is to be divided into at least two 'cells' to allow for separation of each soil type;
- Should rain occur or should rain be forecast, the stockpile must be covered with HDPE plastic;
- A water collection system / sump should be implemented to capture any potential leaching from the stockpiled material;
- Should large quantities of water be identified in the sump, this water should be monitored at regular intervals and assessed prior to being released into the environment as outlined within **Section 8.6**;
- In accordance with the requirements of the short-term stockpiling outlined in the *Queensland Acid Sulfate Soil Technical Manual (2014)* the following time restrictions apply for length of time soil can be stockpiled before it has undergone initial neutralisation:
 - Sands and gravels: Overnight (18 hours);
 - Sandy loams and light clays: 2 nights (42 hours); and
 - Medium to heavy clays and silty clays: 3 nights (66 hours).
- Attempts should be made to minimise surface area of any ASS stockpiled on-site;
- A neutralising agent (i.e. Aglime) must be spread over the stockpile to limit the generation of acidity from the surface of the stockpile as per **Section 8.3.3**; and
- Daily visual inspections will be conducted by Site staff to confirm conformance with the above requirements.

An example of treatment pad design is presented in **Plate 2** below.

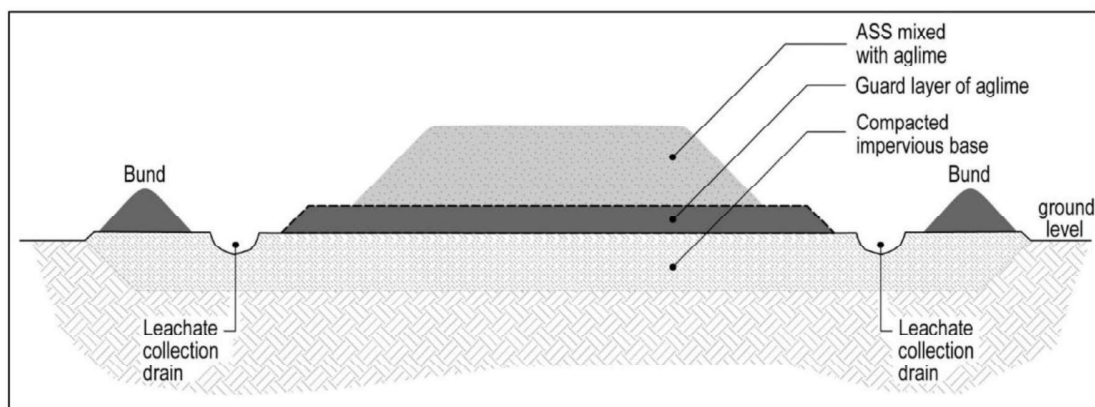


Plate 2 - Example cross section of treatment pad (*Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines V5, 2023*).

8.3.2 Calculated Liming Rates

All material excavated or otherwise disturbed as part of development works must be treated to neutralise the net acidity present. Excavated soils shall be mixed with a neutralising agent (fine agricultural lime) at predetermined rates, as calculated from quantitative testings results. As the level

of treatment varies across the Site, the most conservative liming rate has been applied to all soils to be disturbed.

The Aglime purity should be 90% or greater (i.e. $NV > 90$, where NV is the neutralising value, a term used to rate the neutralising power of different forms of materials relative to pure, fine calcium carbonate which is designated $NV = 100$). There may be economic or availability justification for using a less pure grade of Aglime, however, under these circumstances, the liming rates would need to be increased by a factor of $100/NV$.

Based on an assumed excavation volume of 180 m^3 and an assumed bulk density of 1.6, the estimated volume of excavated soils is 288 tonnes. At a liming rate of 3.4 kg/tonne^1 , a total of approximately **0.98 tonnes of lime**² will be required for the treatment of these soils.

Volumetrically this rate is ~5.5 kg lime per cubic meter.

Note: additional lime in excess of values stated above will be required for designated treatment area including associated treatment area resources (i.e. bunds, guard layer). Excess agricultural lime shall be stored at the Site as contingency for the treatment of additional acidity not previously identified.

8.3.3 Lime Incorporation

Soil shall be placed into the treatment area (atop the treatment pad), with stockpiles up to 300 mm in height generated for treatment (low stockpiles are considered most efficient for drying and mixing). Fine agricultural lime shall be incorporated into the stockpiled soil, with lime applied at rates outlined in **Section 8.3.2** above.

The lime shall be blended through the stockpile with earthmoving equipment (such as an excavator). Effective blending is essential to ensure the lime is sufficiently mixed throughout the soil.

Lime application shall be undertaken within 18 hours of excavation. This is required to ensure excessive oxidation does not occur, which would result in increased risk of acidic leachate generation.

As the soil treatment is classed as Category-M – Medium level of treatment – verification of treated soil is not required.

8.3.4 Liming of Base of Excavation

Upon reaching the maximum proposed depth of excavation (assumed $\leq 1.0 \text{ m bgl}$), all walls and bases of cut batters shall be coated with fine Aglime at a minimum rate of 5 kg/m^2 to ensure these soils have a buffering capacity should soils be oxidized. This amount is based on recommended dosing for excavated surfaces as outlined within *Queensland Acid Sulfate Soil Technical Manual (2014)*.

As the area of excavation is within an area impact by tidal fluctuations, liming of the base and walls of the excavated area should be applied as soon as reasonably practicable - where possible, prior to the next high-tide.

Additionally, the pre-cast footings shall be placed as soon as reasonably practicable. Where possible, this should occur upon completion of lime application and prior to the next high-tide occurrence.

¹ Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO_3) and using an additional safety factor of 1.5 and a neutralising value (NV) of 98% to allow for non-homogeneous mixing and poor reactivity of lime.

² Liming rate of excavated areas have been calculated using a similar approach to ASS Tip 16 within the *QLD Acid Sulfate Soil Technical Manual (2014)* and based on the highest sum of potential and existing acidity encountered within the expected maximum cut depth of an area. ***Liming Rate $\text{kg CaCO}_3 / \text{m}^2 = \text{Liming Rate (kg CaCO}_3/\text{t}) \times \text{Aglime NV } 98\% \times \text{BD } 1.6 \times \text{Safety factor } 1.5$***

If this is not possible and the excavated area becomes inundated by a high-tide, all walls and bases of cut batters are to be re-limed at the above rate every 24 hours until the excavation has been reinstated or sealed.

8.3.5 On Site Storage of Neutralising Agents

During construction, the contractor will have stored on site at all times, a sufficient additional volume Aglime to ensure that potentially hazardous situations can be controlled should the need arise.

In addition, for sudden drops in water pH across the site, it is recommended that the contractor has quicklime or slaked lime available for adding to any low pH waters.

Quicklime and slaked lime, although slightly more expensive than aglime, are recommended to neutralise water as they are more soluble. However, a strict pH monitoring program must be carried out to ensure an acceptable pH range is maintained. Aglime can also be used although it is far less effective and hence more expensive for this purpose than alternatives such as quicklime.

Occupational health and safety procedures outlined by the neutralising agent manufacturers will be followed for storage, handling and application of the neutralising agent by all personnel involved with the storage, handling and application of each product. These products are highly soluble and must be stored on-site under cover.

8.4 Disposal of Treated Soil

Treated soil shall be assessed for contamination in accordance with the *Queensland Environmental Protection (Regulated Waste) Amendment Regulation, 2018*, prior to offsite disposal. In the event that the lots from which the soils are excavated are listed on the Queensland Environmental Management Register (EMR), offsite disposal will require an approved disposal permit. Soil must be disposed of lawfully, to a facility licenced to accept the waste category.

Off-Site disposal of soil from the site should be conducted in accordance with Table 2 of the *Contaminated Soil and Waste Management Plan (CSWMP)* (Prensa, 2024).

8.5 Decommissioning of soil treatment areas

Decommissioning the stockpile area will be conducted at the end of the works to ensure the area has not been impacted or preclude the intended use.

When decommissioning of a stockpile area within an unsealed base (i.e. soil), the stockpile compound should be removed concurrently with the stockpiled material. The following should be undertaken to appropriately manage the waste on site to satisfy relevant guidance:

- Load the stockpiled material into an appropriately covered truck to be transported off-site;
- The soil comprising footprint of the containment pad should be excavated and loaded into the same permitted vehicle;
- An inspection should be completed subsequent to the containment pad and bund removal to confirm that no visible evidence of residual material or waste persists on-site;
- Two (2) validation samples are to be collected from the excavated surface and analysed for pH;
- One (1) sample is to be collected from a similar surface soil type in close proximity to the containment pad footprint to establish background pH levels enabling a meaningful comparison to be made; and
- Waste transport certificates should be completed for the load and records maintained on file in accordance with Table 2 of the *Contaminated Soil and Waste Management Plan (CSWMP)* (Prensa, 2024).

8.6 Management of Surface and Drainage Waters

8.6.1 Surface Water

To mitigate the potential impacts of exposed ASS to surface waters during high-tide periods, management of exposed surfaces should be conducted in accordance with Section 8.3.4. Monitoring and treatment of impacted surface water and pooled rainfall is essential to maintain an acceptable level of discharge water quality during excavation works. Monitoring of surface water will only be required when:

- Untreated and exposed ASS comes into contact with surface water through tidal fluctuations, surface water monitoring will be required;
- When there is significant rainfall event (+25 mm); or
- When visual observations of leaching or iron staining have been observed.

8.6.2 Groundwater

As groundwater is not expected to be encountered during the proposed works, the procedure in this ASSMP should be revised if groundwater is encountered during these works.

If unexpected groundwater intrusion is encountered during excavation, works should cease and an environmental consultant engaged. The quantity and quality of groundwater seepage should be evaluated to determine whether it has implications on the health of construction workers or sensitive ecological receptors.

8.6.3 Rainfall / Runoff

It should be noted that excavations often act as sediment basins, where overland flow of surface waters will drain towards during a rainfall event. As such, attempts should be made to conduct excavations at a time with no or low forecasted rain.

Erosion and sediment control measures are expected to be applied in accordance with current industry best practice to contain and control site runoff waters during construction. Proposed development plans have noted the provision of a temporary bund, silt curtain and two sumps to be utilised throughout the duration of the project (where required). If sediments are collected within the bund and silt curtain, this material should be stockpiled and treated in accordance with **Section 8.3**.

Water runoff generated from the ASS treatment area(s), including excavation activities, will be contained, tested and treated (if necessary) prior to discharge or re-use on site. Uncontrolled discharge of water from excavation areas, ASS treatment areas or exposed works areas is not permitted. If discharge from the site is required, performance criteria detailed in **Table 3** must be met prior to release.

8.6.4 Neutralising Acid Leachate and Drainage Water

In the unlikely event that any water becomes pooled within excavation areas, this water should be monitored for pH and treated with hydrated lime (Ca(OH)_2) at the rates outlined within **Table A4-1** of the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines V5, 2023* until the performance limits for pH is met.

Lime will be applied to acidified waters encountered during or after excavations. Aglime is the safest and cheapest neutralising agent and equilibrates around a pH of 8.2 and is not generally harmful to flora, fauna or aquatic species. Hydrated lime and quicklime are more soluble and may also be used. However, overshooting can occur if these more soluble, caustic neutralising agents are used, thereby posing a greater occupational health and safety risk

8.6.5 Verification Sampling

Prior to discharge into the receiving environment, under the Environmental Protection (Water and Wetland Biodiversity) Policy (2019, Environmental Values (EVs) and Water Quality Objectives (WQOs) water should meet the relevant criteria outlined in **Section 8.6.6**. The performance criteria is based on acceptable physico-chemical and chemical limits outlined within the QLD EPP (2009) for the Ross River Basin and Magnetic Island Environmental Value and Water Quality Objectives (2009) for moderately disturbed middle estuarine waters.

8.6.6 Performance Criteria

No water shall be discharged from Site unless it complies with the requirements of **Table 3**. If water quality fails to meet the below performance criteria it should be disposed off-site as regulated waste.

Table 3: Minimum Criteria for Water Testing	
Field Testing	Guideline Value
Visual Observation	No Visible oil, scum or litter
pH	Between 7.0 – 8.4
Dissolved Oxygen	Between 85% - 100%
Total Suspended Solids	< 20 mg/L
Turbidity	< 8 NTU
Copper	< 0.0013 mg/L
Zinc	< 0.008 mg/L
Lead	< 0.0044 mg/L
Aluminium (pH> 6.5): <0.055 mg/L	< 0.055 mg/L
Aluminium (pH<6.5): <0.0008 mg/L	< 0.0008 mg/L
Total and Dissolved Iron	0.3 mg/L (CCREM 1987. Canadian water quality guidelines. Canadian Council of Resource and Environment Ministers, Ontario)

9 Monitoring and Record Keeping

The environmental controls described in this ASSMP shall be regularly monitored for integrity to ensure that the protection measures are working effectively. Environmental controls (i.e. sediment bunds) shall also be inspected immediately at the onset and during a rain event, particularly those controls that relate to the management of surface water control or soils leaving the Site.

All monitoring and inspections should be recorded in a register to be maintained on-site, including date of inspection, a brief description of actions, checklists, lime delivery dockets, liming rates, stockpile locations, a description of non-conformances, a description of actions completed to rectify the non-conformance and the name and signature of the person completing the inspection and the person signing off the completed actions.

The following should be monitored during construction:

- pH of Surface water (rainfall dependant);

- Daily weather conditions;
- Quantities of material excavated or lime treated; and
- Stockpiled soil (i.e. excavated materials prior to treatment) and neutralised soils (soils post liming) (visual only).

The Contractor shall also monitor the site on a daily basis for evidence of:

- Iron staining at the batters of the excavation;
- Colour change of site water to pale blue-green or crystal clear;
- Bright yellow mottling on the soil surface; and
- Sulphurous odours.

If evidence of the above are present, relevant contingency actions as outlined in **Section 10** are to be implemented as soon as reasonably practicable.

10 Corrective Actions

Should soil and/or water monitoring indicate acidity levels exceed the desired levels, the following steps must be taken:

- A review of the ASSMP should be undertaken and immediately implemented;
- The Site Manager shall be notified and make the initial assessment of the severity and environmental risk of the release of acidic material. Operations involving filling and/or excavation should cease until remedial action is taken and the 'Performance Criteria' are complied with;
- If the pH of surface water or pooled rainfall falls outside the performance criteria detailed in **Table 3**, the pH shall be re-checked in 12 hours. If a 'non-compliance' still exists, the water shall be locally dosed with aglime. If no change occurs within a few hours, hydrated lime shall be added. When using hydrated lime, care should be taken as to not over dose, therefore, continue monitoring during dosing is recommended;
- The Environmental Consultant shall assess failures in the work procedures and implement changes to prevent reoccurrence of the incident in the future; and
- The Environmental Consultant will ensure all corrective actions have been successful and whether further mitigation measures are required.

10.1 Revision and Amendments to ASSMP

Should the ASSMP require amendment in the future, it must be amended and reviewed by a Suitably Qualified Person (SQP) to verify that the amended ASSMP is acceptable for managing the risks associated with ASS.

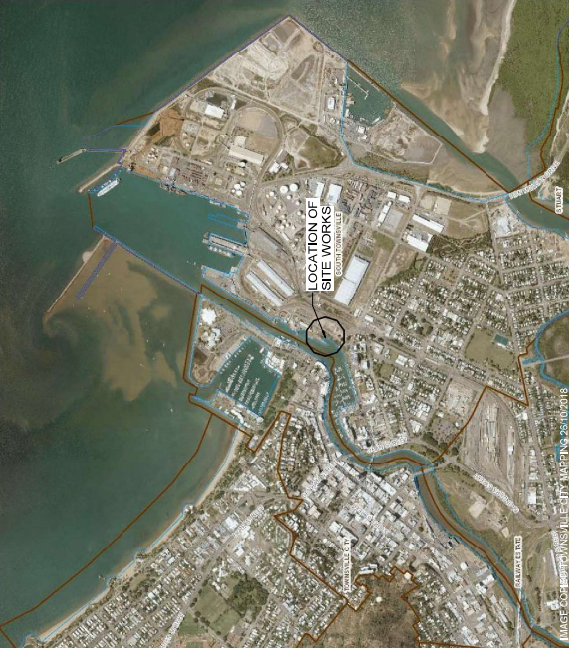
Appendix A: Environmentally Sensitive Areas and MSES maps

Appendix B: Proposed Development Plans

HMAS TOWNSVILLE PERMANENT DOCKING AT PORT OF TOWNSVILLE



IMAGE HMAS TOWNSVILLE COTED GOOGLE IMAGES 26/07/2016



LOCALITY PLAN

SAFETY DESIGN INFORMATION
THERE MAY BE ADDITIONAL
INFORMATION ASSOCIATED WITH THE TYPES OF WORK
SHOWN ON THIS DRAWING. REFER TO
THE LATEST INSTRUCTIONS FOR
DRAWING.

REV	DESCRIPTION	DATE
A	PRELIMINARY ISSUE	18/03/2016

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A	PRELIMINARY ISSUE	18/03/2016

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DRAWN	JA	DESIGNED	LW
APPROVED			

CLIENT
PORT OF TOWNSVILLE LIMITED
PROJECT
HMAS TOWNSVILLE PERMANENT
DOCKING

DRAWING			COVER SHEET		
JOB NUMBER		SHEET No.		REVISION	
TPAA055		S0.01		A	

DRG No.	DESCRIPTION
S0.01	COVER SHEET
S0.02	CONSTRUCTION NOTES - SHEET 1
S0.03	CONSTRUCTION NOTES - SHEET 2
S0.04	PORT OF TOWNSVILLE - SUPPLYING HMAS TOWNSVILLE
S0.05	SAFETY AND DESIGN NOTES - SHEET 1
S0.06	SAFETY AND DESIGN NOTES - SHEET 2
S1.01	EXISTING SITE LAYOUT PLAN
S1.02	TEMPORARY BUILDING PLAN AND DETAILS
S1.03	FOOTING PLAN
S1.04	FOOTING DETAILS
S1.11	RETAINING WALL SECTION AND DETAILS
S1.12	FOOTING DETAILS
S1.13	PRECAST DETAILS

NORSHIP - DRAWING REGISTER T.B.C.

GENERAL NOTES

7. THIS SET OF DRAWINGS SHALL BE IN FULL CONFORMANCE WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS AND WITH ALL OTHER WRITTEN INSTRUCTIONS OR SPECIES THAT MAY BE ISSUED FOR A DECISION BEFORE PROCEEDING WITH THE WORK.
8. ALL DIMENSIONS RELATIVE TO SETTING OUT AND CONSTRUCTION SHALL NOT BE AN AUTHORITY FOR AN EXTRA ANY EXTRA WORK FABRICATIONS BE COMENCED. THE ENGINEERS DRAWINGS SHALL NOT BE SCALED.
9. THE CONTRACTOR SHALL DETERMINE THE CORRECT LOCATIONS OF THE EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS.
10. NO SUBSTITUTIONS SHALL BE MADE OR SIZES OF STRUCTURAL MEMBERS VARIED WITHOUT OBTAINING THE APPROVAL OF THE ENGINEER. ANY SUBSTITUTIONS SHALL BE MADE IN WRITING AND SHALL NOT BE AN AUTHORITY FOR AN EXTRA ANY EXTRA WORK FABRICATIONS BE COMENCED. THE ENGINEERS DRAWINGS SHALL NOT BE SCALED.
11. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT CURRENT AUSTRALIAN STANDARDS AND THE CLAWS. OTHER MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT CURRENT AUSTRALIAN STANDARDS AND THE CLAWS. THE CONTRACTOR SHALL DETERMINE THE CORRECT LOCATIONS OF THE EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS.
12. ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
13. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
14. NO HOLES, RECESSES OR CHASES OTHER THAN THOSE SHOWN ON THE DRAWINGS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER. ANY SUCH APPROVAL SHALL BE IN WRITING AND SHALL NOT BE AN AUTHORITY FOR AN EXTRA ANY EXTRA WORK FABRICATIONS BE COMENCED. THE ENGINEERS DRAWINGS SHALL NOT BE SCALED.
15. THE CONTRACTOR SHALL SUBMIT A METHOD STATEMENT FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
16. WHERE CONSTRUCTION CERTIFICATIONS REQUIRED, INSPECTIONS ARE TO BE PERFORMED BY A CERTIFIED ENGINEER. THE CONTRACTOR SHALL SUBMIT A METHOD STATEMENT FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
17. BEFORE FABRICATION HAS COMMENCED THE CONTRACTOR SHALL SUBMIT ANY SUCH DRAWINGS AND NOTES TO THE ENGINEER FOR APPROVAL. THE CONTRACTOR SHALL SUBMIT A METHOD STATEMENT FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
18. THE CONTRACTOR SHALL PROVIDE SIZES OF ALL CHEMICALS TO THE ENGINEER. NO CHEMICALS SHALL BE BROUGHT ON SITE UNTIL THEY ARE ON THE DRAWINGS. THE CONTRACTOR SHALL SUBMIT A METHOD STATEMENT FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
19. THIS SITE MAY CONTAIN HAZARDOUS MATERIAL (INCLUDING BUT NOT LIMITED TO ASBESTOS) AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE IDENTIFICATION, ASSESSMENT, AND REMEDIATION OF SUCH MATERIALS IN ACCORDANCE WITH THE RELEVANT REGULATIONS, ACTS AND STANDARDS.

GEOTEXTILES

1. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
2. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
3. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
4. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
5. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
6. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
7. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
8. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
9. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
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16. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
17. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
18. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
19. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.
20. THE GEOTEXTILES SHALL BE SUBMITTED AS AN EQUIVALENT APPROVED BY THE ENGINEER. IT SHALL BE BASED ON THE EXTENT OF REMOVAL OF THE EXISTING MATERIAL AND THE TYPE OF SOIL TO BE REMOVED.

CONCRETE

1. ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH AS 3600 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. CONCRETE ELEMENT SIZES ARE MINIMUM VALUES AND DO NOT INCLUDE APPLIED FINISHES.
3. BEAM DEPTHS ARE GIVEN FIRST AND INCLUDE SLAB THICKNESS IF ANY. CAST BEAMS AND SLABS TOGETHER UNLESS APPROVED OTHERWISE.
4. CONCRETE GRADES AND COVER TO REINFORCEMENT SHALL BE AS FOLLOWS UNLESS SPECIFIED OTHERWISE
- | ELEMENT | EXPOSURE | COVER | GRADE |
|----------------|--------------------|-------|-------|
| FOOTINGS | --- AGAINST GROUND | A2 | N25 |
| SLAB ON GROUND | --- EXTERNAL | A2 | N25 |
| SLAB ON GROUND | --- INTERNAL | B1 | N20 |
| SLAB ON GROUND | --- EXTERNAL | B1 | N20 |
5. ALL STRUCTURE CAST AGAINST GROUND SHALL BE LAID ON AN APPROVED VAPOUR BARRIER EXCEPT FOR FOOTINGS.
6. PROPERLY FORM ALL CONSTRUCTION JOINTS AND LOCATE THEM ONLY WHERE NECESSARY AND APPROVED BY THE ENGINEER.
7. EXPOSED FLEXIBLE CONCRETE SHALL HAVE OUTSIDE DIMENSIONS NOT GREATER THAN ONE-FOURTH OF THE DEPTH OF THE EMBEDDING. EXPOSED FLEXIBLE CONCRETE SHALL HAVE OUTSIDE DIMENSIONS NOT GREATER THAN ONE-FOURTH OF THE DEPTH OF THE EMBEDDING.
8. NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN THE CONCRETE WITHOUT THE WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.
9. ALL CONCRETE SUPPLIED SHALL HAVE A SLUMP OF 80-150mm AND A MAXIMUM NOMINAL AGGREGATE SIZE OF 20mm UNLESS SPECIFIED OTHERWISE.
10. NO ADMIXTURES SHALL BE USED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER. ADMIXTURES SHALL BE USED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
11. CONCRETE SAMPLING AND TESTING SHALL BE BY PROJECT CONTRACTOR TO AS SHOWN AND NOT UNLESS SPECIFIED OTHERWISE.
12. CONCRETE SHALL BE PLACED DURING PLACEMENT USING MECHANICAL VIBRATORS.
13. CURE ALL CONCRETE SURFACES EXPOSED WITHIN 7 DAYS OF INITIAL SETTING USING A METHOD APPROVED BY AS 3600 OR THE STRUCTURAL ENGINEER. CURE ALL CONCRETE SURFACES EXPOSED WITHIN 7 DAYS OF INITIAL SETTING USING A METHOD APPROVED BY AS 3600 OR THE STRUCTURAL ENGINEER.
14. THE PROCEDURES OUTLINED IN THE FOLLOWING DATA SHEETS SHALL BE USED FOR THE CONSTRUCTION OF ALL CONCRETE. THE CONTRACTOR SHALL SUBMIT A METHOD STATEMENT FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SERVICES AND UTILITIES. ANY DAMAGE TO SERVICES OR UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

PRECAST CONCRETE

1. ALL PANELS ARE TO HAVE TWO LAYERS OF REINFORCEMENT THROUGHOUT AND A MINIMUM COVER OF 25mm TO ALL REINFORCEMENT. ALL PANELS ARE TO HAVE TWO LAYERS OF REINFORCEMENT THROUGHOUT AND A MINIMUM COVER OF 25mm TO ALL REINFORCEMENT.
2. CONCRETE CLASS AND STRENGTH GRADE AND EXOR NO. 07 AS NECESSARY. CONCRETE COMPRESSION STRENGTH AT THE TIME OF LIFTING - f_{cm} = 25MPa MIN.
3. REINFORCEMENT COVER
- EXTERNAL FACES - 30mm
 - INTERNAL FACES - 20mm
4. BAR CHAIRS USED TO SUPPORT REINFORCEMENT ARE TO BE NON-CORROSIVE.
5. ALL PANELS ARE TO HAVE 20mm CHAIRS.
6. ALL MATERIALS, COMPONENTS AND EQUIPMENT USED IN THE MANUFACTURING AND PLACEMENT OF PRECAST/CAST CONCRETE ELEMENTS SHALL COMPLY WITH AS 3600.
7. ALL PANELS SHALL BE CAST WITH AN APPROVED BONDING AGENT APPLIED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
8. INSTALLATION OF JOINTS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS WITH N2 BARS x 300 LONG MINIMUM THROUGH CROSS HOLES TO BE TIED TO REINFORCEMENT.
9. ANY CLARIFICATION OF DETAILING OR DISCREPANCIES ON SITE SHALL BE REFERRED TO THE SUPERINTENDENT.
10. LESS ON L AND U BARS SHALL BE 800 LONG MINIMUM UNLESS OTHERWISE NOTED.
11. ALL CAST-IN HARDWARE AND OTHER FITTINGS SHALL BE HOT-DIPPED GALVANIZED.

DESIGN DATA

1. THE STRUCTURAL COMPONENTS DETAILING ON THESE DRAWINGS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE FOLLOWING LOADING REQUIREMENTS
2. WIND LOADS
3. PROBABILITY OF EXCEEDANCE
4. REGIONAL GUST WIND SPEED
5. TERRAIN CATEGORY
6. EXPOSURE FACTOR
7. PROBABILITY FACTOR
8. EARTHQUAKE DESIGN CATEGORY
9. ALL STRUCTURAL AND NON-STRUCTURAL ITEMS SHALL BE DESIGNED TO SUIT THE ABOVE EARTHQUAKE DESIGN CATEGORY
10. LESS ON L AND U BARS SHALL BE 800 LONG MINIMUM UNLESS OTHERWISE NOTED.
11. ALL CAST-IN HARDWARE AND OTHER FITTINGS SHALL BE HOT-DIPPED GALVANIZED.

SHEET DESIGN INFORMATION

THERE MAY BE ADDITIONAL INFORMATION ASSOCIATED WITH THE TYPES OF WORK SHOWN ON THIS DRAWING. REFER TO THE LATEST REVISIONS OF THE DRAWING.

REV	DESCRIPTION	APPRO	DATE
A	PRELIMINARY ISSUE	DEJ	08/03/24

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DRAWN	JA	DESIGNED	LWJ
APPROVED			DATE

CLIENT
PORT OF TOWNSVILLE LIMITED

PROJECT
HMAS TOWNSVILLE PERMANENT DOCKING

DRAWING
CONSTRUCTION NOTES - SHEET 1

JOB NUMBER	SHEET NO.	REVISION
TPAA055	S0.02	A

TASK HEADING	ITEM NO.	DESCRIPTION OF TASK	NOTES	PARTY RESPONSIBLE
PREPARE SITE - CB SUPWAY	1	CLEAN UP AND REMOVE ANY VEGETATION, MUD, SCRAP METAL ITEMS ETC. FROM SITE TO PREVENT OBSTACLES ON PERSONNEL, MACHINERY AND PROVIDE SUITABLE WORKING ENVIRONMENT. CLEARED AREA WILL REQUIRE FOR A 20m x MINCH OR HAULING VEHICLE TO PULL VESSEL UP SUPWAY.	POTL ENVIRONMENTAL PLANNING TO BE CONSULTED PRIOR TO COMMENCEMENT OF WORKS. LOW WATER IS CONSIDERED MAINTENANCE ONLY.	
	2	ABOVE LOW WATER MARK - REMOVE RUST OFF RAILS, ANY AREAS TOO DAMAGED OR RAILS WITH CRACKS OR DEFECTS. CHECK THE OUTER RAILS ARE SPACED EVENLY AT 6.33m SPACING.	NORSHIP TO PROVIDE EXTENT OF RAIL REMOVAL. NORSHIP ENVIRONMENTAL PLANNING TO BE CONSULTED AGAIN POTL ENVIRONMENTAL PLANNING TO BE CONSULTED MAINLY DUE TO METHOD OF WORK FOR NOISE CONCERNS.	
	3	BELOW HIGH WATER MARK - REMOVE MUD AND DEBRIS ALONG RAILS TO WIDTH OF THE RAIL BED. REPAIR CRACKS IN RAILS AS REQUIRED. WHERE NECESSARY, RAILS MUST BE WELDED INTO ONE PIECE. WHERE THERE ARE THREE RAIL JOINTS PER 10M, THESE MUST BE REPAIRED. "BUMPS" LIKELY TO DETAIL THE GRADLES ON THE DAY THAT A SUBSTANTIAL LIEGAMTS SCRAPPED DOWN THE FULL EXTENT OF TRAVEL REQUIRED, UNDERSTAND MAY USE MACHINE FROM LAND AT LOWEST TIDE AND POSSIBLY EXCAVATOR OFF FLAT TOP BARGE.	NORSHIP TO PROVIDE EXTENT OF RAIL REMOVAL. NORSHIP ENVIRONMENTAL PLANNING TO BE CONSULTED AGAIN POTL ENVIRONMENTAL PLANNING TO BE CONSULTED MAINLY DUE TO METHOD OF WORK FOR NOISE CONCERNS.	
	4	DIVER INSPECTION OF RAIL BELOW LOW WATER MARK AND DETERMINE IF HAIL DOWN BLOCK STILL IN PLACE AND USABLE.	THIS MAY BE DONE AT SOME TIME AFTER INITIAL MUD REMOVAL.	
	5	ROLL AND LEVEL SUPWAY GROUND (FROM POSSIBLY USING COURSE GRAVEL) WITH RAIL BED. RAILS TO BE LAYED OUT IN LINE WITH THE SUPWAY. RAILS TO BE LIFTED BY TWO PEOPLE WORKING IN SUCH A WAY THAT THERE IS AN EQUAL TENSION ON ALL FOUR "BUMPS" LIKELY TO DETAIL THE GRADLES ON THE DAY THAT A SUBSTANTIAL LIEGAMTS SCRAPPED DOWN THE FULL EXTENT OF TRAVEL REQUIRED, UNDERSTAND MAY USE MACHINE FROM LAND AT LOWEST TIDE AND POSSIBLY EXCAVATOR OFF FLAT TOP BARGE.	NORSHIP TO PROVIDE LAUNCH DRAWING FOR AREA JUST INSIDE THE RAILS AND POSSIBLY 8 KEEL BLOCKS AT THE DOUBLE OLD CENTRE RAILS AND 6 BLICE STANDS (3 EACH SIDE).	
	6	SITE SUPERVISOR (ONLY) CONTRACTOR INSTALLATION OF CYCLONE HOLD-DOWN ANCHORS. MINIMUM 4x MAXIMUM 6 ANCHORS EMBEDDED.	DOUGLAS PARTNERS TO DESIGN AND CONTRACTOR TO SUPPLY AND INSTALL ANCHORS AND RD BINDERS SUPPLIED BY OTHERS.	
PRIOR TO VESSEL HAUL OUT	7	IN-WATER SCRUB / CLEAN VESSEL HULL WHERE IT IS LOCATED AT COMMON USER FACILITY.	POTL ENVIRONMENTAL PLANNING TO BE CONSULTED PRIOR TO UNDERTAKING WORK TO PREPARE ENVIRONMENTAL APPROVALS.	
	8	SUPPLY AND FILL ICBS ON DECK AND FILL WITH WATER TO FORM VESSEL AS REQUIRED, ALLOW FOR 6 OFF ICBS	NORSHIP TO ADVISE LOCATION AND CONFIRM NUMBER OFF.	
	9	OFFLOAD EQUIPMENT AND GEAR AS SUPPLIED FROM CAIRNS INCLUDING: • 2 x SUPPING CRADLES WITH BOGGIES (APPROX. 11 TONNES EACH). • 2 x SUPPING CRADLES WITH BOGGIES (APPROX. 11 TONNES EACH). • ABOUT 10 x 1.5 TONNE CONCRETE HAND STAND BLOCKS • 0.5m HIGH FORKLIFTABLE, • 2 x HYDRAULIC POWER PACKS • FORKLIFT TIRE EXTENSION BAR, • 2 PALLETES OF TIMBER BLOCKS, WEDGES, BINDERS AND CHAIN TIES. • PALLET WITH LIFTING JACKS (4), CONTROLS AND LONG HYDRAULIC HOSES AND SUPPING CREW TOOLS.	NORSHIP SUPPLY GEAR AND ARRANGE TRUCKING FROM CAIRNS TO CB SUPWAY. HYDRAULIC POWER PACK WITH 4 x 100 TONNE JACKS ARRANGED BY NORSHIP.	
	10	PREPARE AND SUPPLY EQUIPMENT AT CB SUPWAY AND SUPPLY MANPOWER INCLUDING: • VESSEL UP CUPWAY / GENERATOR, EMP AND / OR CRANE CAGE, FLOOD LIGHTING (IF REQUIRED), DIMMY ETC. • QUALITY WELDING EQUIPMENT, COMPRESSOR, TOOLS, AND QUALIFIED LABOUR TO ASSEMBLE SUPPLIED SUPPING CRADLES WITH THEIR BOOGIES ON RAILS THEN FIT TO SUPPLY CRADLES WITH BOGGIES ON TOP OF GRADLES (MIGHT NEED WELD OF FLATBARS TO NAIL CHOCKS FROM FLOATING AWAY). • FABRICATE AND FIT COW SCOOPS TO FRONT OF LOWER BOGGIE SET WHEELS.	NORSHIP PERSONNEL WILL BE ON SITE THEN TO PREPARE AND SUPPLY EQUIPMENT AND CORRECT SETUP OF SUPPING EQUIPMENT.	
	11	ARRANGE HEAVY HAUL CONTRACTOR OR WINCH SUPPLIER FOR WINCH TRUCK / CRANE OR SIMILAR FOR HAULING VESSEL UP SUPWAY. REQUIRE APPROXIMATELY 20 TONNES MINIMUM PULL FORCE.	MINIMUM OF RESTRICTED SPACE TO MANOEUVRE POTL CAN ASSIST WITH ANY ROAD CLOSURES, FENCE REMOVALS ETC.	
	12	TRAIL LOWER THE ASSEMBLED CRADLES DOWN RAILS, POSSIBLY USE THE EXISTING CRADLES DON'T ROLL EASY.	NORSHIP ACCREDITED SUPPING MASTER TO PREPARE AND SUPPLY EQUIPMENT AND PREPARATIONS AND FINAL SUPPING.	
SUPPING / HALLOUT OPERATIONS	13	DAY PRIOR TO SUPPING ARRANGE TOW VESSELS (FOR MOVE FROM CREEK WHARF TO CB SUP AND SUPPLY SOME FENDERS FOR OVERNIGHT BERTHING.	POTL SAID THEY WOULD MOVE VESSEL FROM QUIT TO INNER WHARF IN PREPARATION FOR HALLOUT NEXT DAY. POTL WILL ARRANGE REGIONAL HARBOUR MASTER TO COORDINATE FOR THE 2 VESSEL MOVES AND SUPPING OPERATIONS.	
	14	PREPARE FOR ARRIVAL OF VESSEL INCLUDING LOWERING SUPWAY CRADLE TO DESIGNATED LOCATION DOWN RAILS PREPARING EQUIPMENT FOR HALLOUT.	REFER SEPERATE TIDE CHARTS FOR LIKELY SLIPPING DATE.	
	15	PREPARE FOR ARRIVAL OF VESSEL INCLUDING LOWERING SUPWAY CRADLE TO DESIGNATED LOCATION DOWN RAILS PREPARING EQUIPMENT FOR HALLOUT.	WILL REQUIRE MEN ON VESSEL, DECK AT LEAST 2 NORSHIP SUPPING CREW TO MAN LINES, HAVE AT READY FENDERS AND GOAL POST WEDGES.	
	16	NEARING HIGH TIDE MANOEUVRE VESSEL BETWEEN AND GOAL POSTS THEN LASH AND CHOCK TO THEM.		
	17	HAUL SUPWAY CRADLES AND VESSEL UNTIL BOW TOUCHES DOWN, HAVE ENVER CONFIRM LOCATION OF AFT CRADLE TO AFT END OF SKEG MEASURE STICK, IF NECESSARY LOWER CRADLES TO AFT END OF SKEG MEASURE STICK. WHEN HAULING VESSEL TO OCCUPANCY DOCK CONTRAINED OXYMEOTE GREEN OFF VESSEL THEN HALL UP SUPWAY TO DESIGNATED POSITION.	NORSHIP DOCKMASTER TO BE IN CHARGE OF HALLOUT DRAIN ICS TO REDUCE WEIGHT AFTER HALLOUT.	
	18	ASSIST NORSHIP CREW TO RAISE VESSEL USING HYDRAULIC SYSTEM SO KEEL HARDSTAND BLOCKS CAN BE FORKLIFTED INTO PLACE BY PMG.	NORSHIP CREW TO OPERATE HYDRAULIC JACKS AND SUPERVISE INSTALL OF CONCRETE BLOCKS FOR KEEL BLOCKS AND BLICE STANDS. NORSHIP WILL BE RESPONSIBLE FOR ENSURING THE CHAIN / BINDERS TO ENSURE VESSEL PROPERLY SUPPORTED.	
HARDSTAND VESSEL AND PACKUP	19	FIT EXTERNAL HOLD DOWN LUGS OR OTHER FITMENTS AND CONNECT TO CYCLONE TEDOWN HARDPOINTS.	THIS WOULD BE DONE AFTER ALL NORSHIP EQUIPMENT REMOVED FROM SITE.	
	20	REMOVE GOAL POSTS FROM GRADLES INCLUDING GRINDING WELDS FLUSH AND PRIMING BARE STEEL, REMOVE SUPWAY CRADLES AND THEIR BOGGIES SDEWAYS.	METHOD OF REMOVAL TO BE FORMULATED AS THEY ARE HEAVY ITEMS.	
	21	LOAD NORSHIP CRADLES, SPREADER BARS, FORKLIFT EXTENSION TINES, JACKING SYSTEM AND TOOLS ONTO TRUCK FOR RETURN TO CAIRNS.		

[illegible]

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PROJECT
MAS TOWNSVILLE PERMANENT
DOCKING

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1. THE WORK HEREIN UNDER AGREEMENT NO. _____, DATED _____, PROVIDES A WRITTEN REPORT OUTLINING THE HAZARDS IDENTIFIED BY THE DESIGNER ACTUALLY REQUIRED TO REDUCE THOSE RISKS AND ANY OTHER REMAINING HAZARDS.
2. HAZARDS OUTLINED IN THIS REPORT ARE STRUCTURAL AND/OR CIVIL ENGINEERING IN NATURE WHICH HAVE BEEN IDENTIFIED SO AS TO ALLOW THE CLIENT AND CONTRACTOR TO TAKE APPROPRIATE ACTION TO REDUCE OR ELIMINATE THEM.
3. RELEVANT DISCUSSIONS OF THESE HAZARDS ARE PROVIDED HEREIN. THE DESIGNERS MAY IDENTIFY ADDITIONAL HAZARDS AND RELEVANT PERSONS MUST BE MADE AWARE OF THEM.
4. THE BUILDING OWNER, CLIENT AND CONTRACTOR MUST ENSURE THAT ALL RELEVANT PERSONS ARE MADE AWARE OF THE PROVISIONS OF THE REPORT.
5. THIS REPORT APPLIES TO ALL STAGES OF THE STRUCTURE UP TO INCLUDING CONSTRUCTION, MAINTENANCE, USE AND DEMOLITION.
6. EACH LIFE CYCLE STAGE MAY APPLY TO DIFFERENT STAGES. RELEVANT PERSONS SHALL REVIEW ALL STAGES.

1. THE PURPOSE OF THIS STRUCTURE IS TO SUPPORT HMAS TOWNVILLE.
2. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS LISTED ON THE FORM 15.
3. THE FOLLOWING TESTING HAS BEEN UNDERTAKEN:
 - GEOTECHNICAL REPORT 1/GEOT/GRAB 10/046 23/04/2024 10:07 BY COFFEY GEOTECHNICS
 - GEOTECHNICAL INVESTIGATION 227066.00 23/02/2024 BY DOUGLAS PARTNERS

HAZARDS ARE CONTROLLED THROUGH RISK CONTROL MEASURES AS FOLLOWS:

ELIMINATION	- REMOVE THE HAZARD THROUGH DESIGN MEASURES
ENGINEERING	- PROVIDE AN ENGINEERING SOLUTION TO CONTROL THE RISK
ADMINISTRATIVE	- USE OF ADMINISTRATION CONTROLS TO INFLUENCE PEOPLE
CODES OF PRACTICE	- CURRENT CODES OF PRACTICE ARE AVAILABLE AT WORKSAFEQLD.GOV.AU

HAZARD/RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK SHOWN ON THIS DRAWING. REFER TO THE SAFETY IN DESIGN REPORT.

HAZARDS	CONTROL MEASURE	ELIMINATION	CONTROL ENGINEERING	ADMINISTRATION/ CODES OF PRACTICE	PERSON RESPONSIBLE FOR CONTROL	ADDITIONAL NOTES
FALLS, SLIPS AND TRIPS	WORK AT HEIGHT	✓			ENGINEER/ARCHITECT	
CONFINED SPACE	ENCLOSED SPACES		✓		ENGINEER/ARCHITECT	
	MINIMIZE THE REQUIREMENT TO ENTER CONFINED SPACES FOR MAINTENANCE	✓			ENGINEER/ARCHITECT	REFER CODE OF PRACTICE
	PROVIDE INFRASTRUCTURE THAT CAN BE MAINTAINED WITHOUT CONFINED SPACE ENTRY			✓	ENGINEER/ARCHITECT	CONSIDER ALTERNATE SOLUTIONS
MATERIAL SELECTION AND DESIGN	STORMWATER DEVICES		✓		ENGINEER/ARCHITECT	
	MATERIAL DURABILITY		✓		ENGINEER/ARCHITECT	
	SELECT MATERIALS WHICH REQUIRE MINIMAL MAINTENANCE DURING DESIGN LIFE		✓		ENGINEER	
	DESIGN SURFACE FOR APPROPRIATE MAINTENANCE LOADS - ELEVATED WORK PLATFORMS ETC.		✓		ENGINEER	
	LOADS ON STRUCTURE		✓		ENGINEER/ARCHITECT	
	WHERE POSSIBLE PROVIDE LEVEL WORKING SURFACE FOR MAINTENANCE		✓		ENGINEER/ARCHITECT	

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PROJECT
HMAS TOWNSVILLE PERMANENT
DOCKING

JOB NUMBER	SHEET No.	REVISION
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J:\TPAA\TPAA055 HMAS Townsville Cradle Structure\CAD\Structure\TPAA055.NVT

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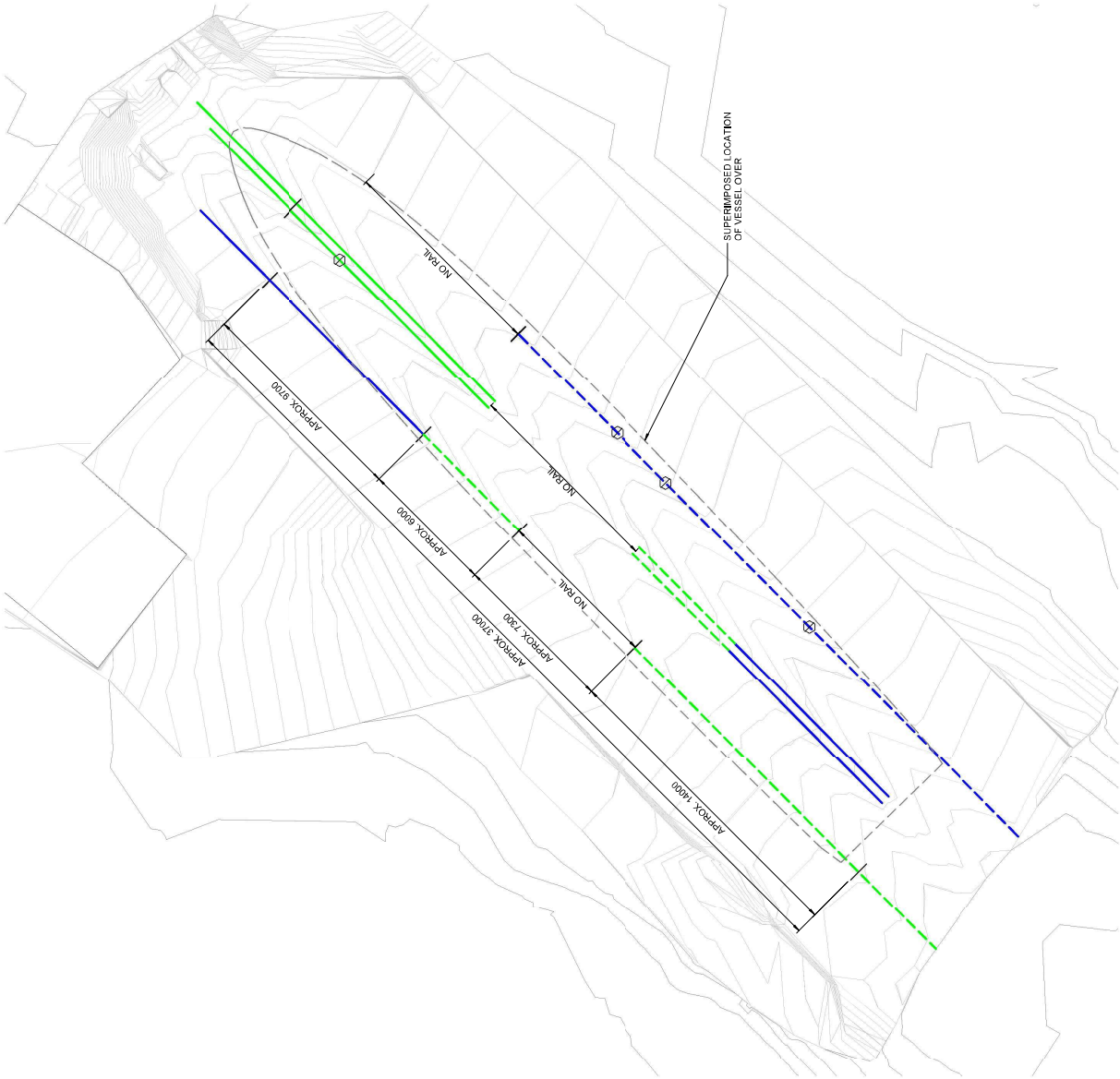
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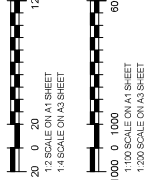
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LEGEND:

- DENOTES RAIL - TYPE 1
REFER CROSS SECTION
- DENOTES CONDITION ASSESSED
AS DAMAGED NOT USABLE
- - - DENOTES CONDITION ASSESSED
AS MAYBE REUSABLE
- DENOTES RAIL - TYPE 2
REFER CROSS SECTION
- DENOTES CONDITION ASSESSED
AS DAMAGED NOT USABLE
- - - DENOTES CONDITIONS ASSESSED
AS MAYBE REUSABLE
- ⊗ DENOTES MISALIGNMENT IN RAIL

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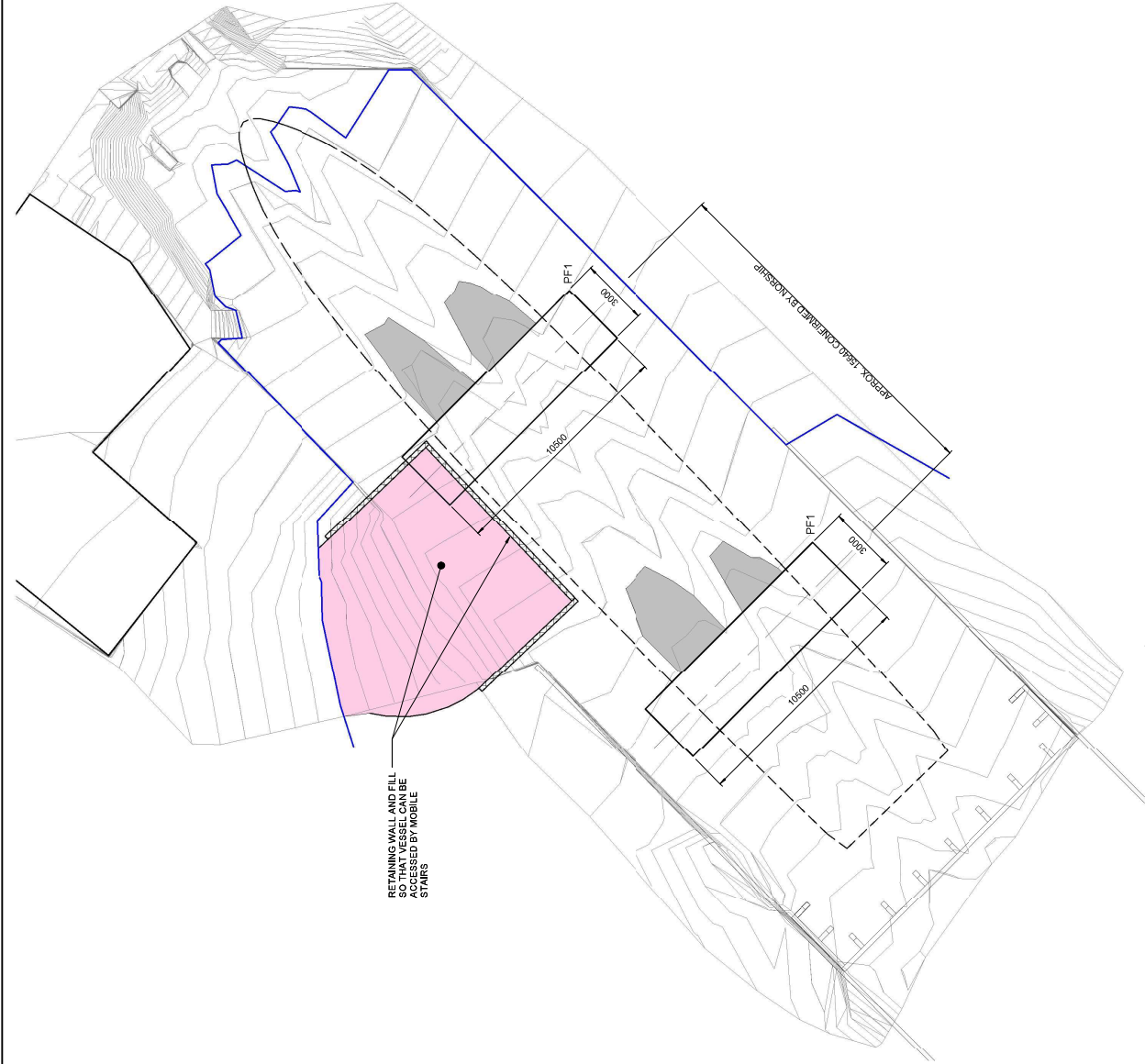
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EXISTING SITE LAYOUT PLAN

SCALE 1:100

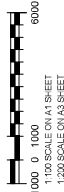


FOOTING PLAN
SCALE 1:100

LEGEND:

- DENOTES CONCRETE RETAINING WALL
- DENOTES FILL WITH CAPPING TO BE DETERMINED
- DENOTES LOCALISED OSGUT INFILL TO ENSURE SUPPLY REMAINS FREE DRAINING
- DENOTES HAT CONTOUR
- DENOTES APPROXIMATE VESSEL LOCATION

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- LEGEND:**
- XXXXX DENOTES CONCRETE RETAINING WALL
 - DENOTES FILL WITH CAPPING TO BE DETERMINED
 - DENOTES EXTENT OF CRS SURVEY
 - DENOTES HAT CONTOUR
 - - - DENOTES APPROXIMATE SITE BOUNDARY



SITE PLAN
SCALE 1:200

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1:200 SCALE ON A1 SHEET
1:400 SCALE ON A3 SHEET

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SITE LAYOUT PLAN

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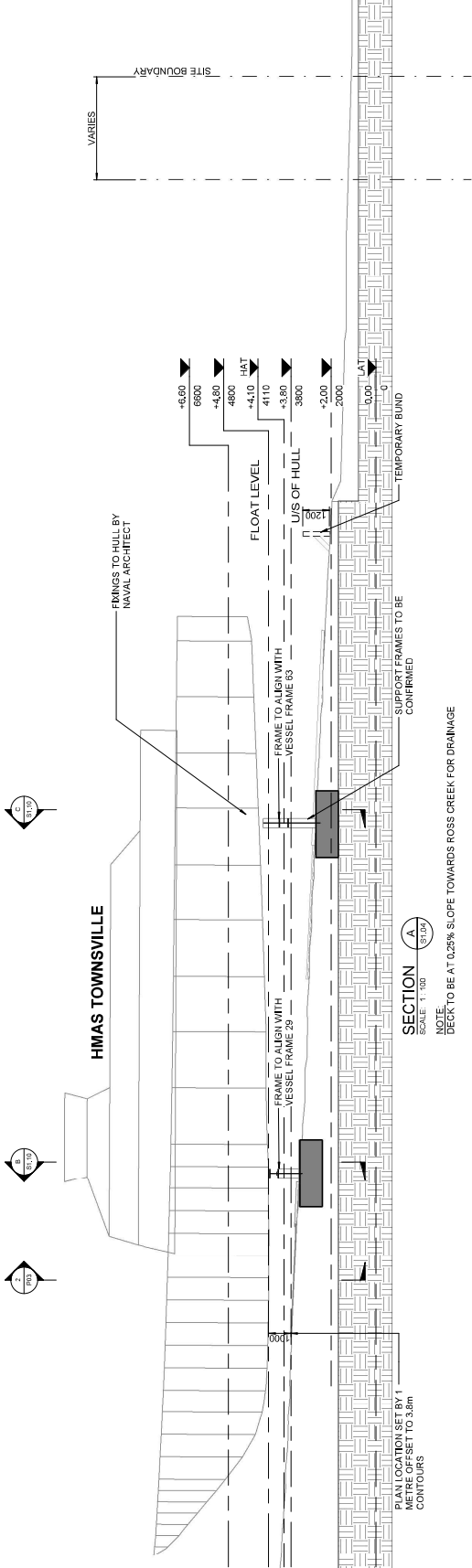
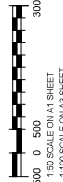
- HMAS TOWNSVILLE DRY DOCK**
LOCAL VESSEL LIFT AND DOCKING JACKING (4.80LAT UNDERSIDE OF HULL)
1. RAMP POCKET IS BLOCKED OFF WITH TEMPORARY BUND TO ALLOW RAILS AND THE SUPPORT FRAME CONCRETE PADS TO BE PREPARED AND SUPPORT FRAME CUT IN POSITION.
 2. ONCE COMPLETED POCKET BARRIERS REMOVED TO ALLOW WATER INTO THE RAMP POCKET.
 3. VESSEL FLOATED IN -4.80LAT TIDE. (UNDERSIDE OF HULL AT +2.0LAT) ONTO SUPPORT FRAMES. TBC.
 4. RAMP POCKET BARRIER IS REINSTALLED TO ALLOW WORK IN DRY DOCK.
 5. VESSEL DRAGGED INTO HORIZONTAL POSITION
 6. VESSEL SUPPORT FRAMES ARE RAISED TO +4.80LAT (UNDERSIDE OF HULL).
 - RAISING CAN BE WITH HYDRAULIC JACKS AND 4 X VSL JACKS USED.
 7. LOWER SUPPORT FRAMES ARE INSTALLED AND VESSEL SECURED.
 8. POCKET BARRIER CAN THEN BE REMOVED.
 9. FINAL POSITION UNDERSIDE OF HULL AT +4.80LAT.

HMAS TOWNSVILLE

DISPLACEMENT = 220T (APPROX.)
LENGTH OVERALL = 42.0m
DEPTH MOULDED = 4.23m

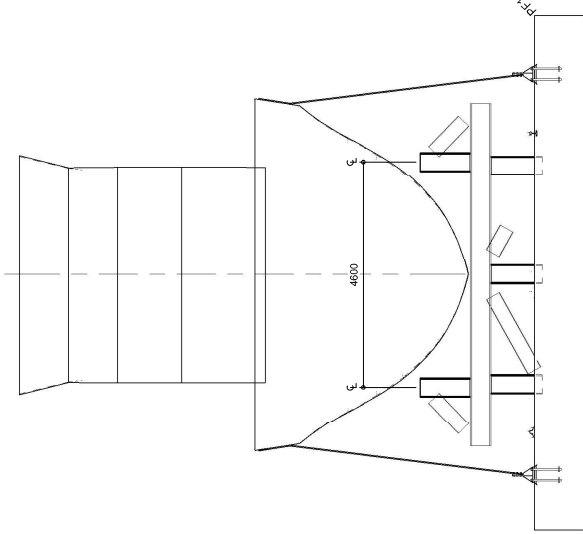
AHD CHART DATUM	
MAT	+4.11
MHWS	+4.24
MHWN	+4.11
MSL	+0.00
MLWS	+1.94
MLWN	+1.86
MLWS	+1.83
MLWS	+1.77
LAT	-1.896
TOWNSVILLE QUEENSLAND	
TIDE TABLE 5076	

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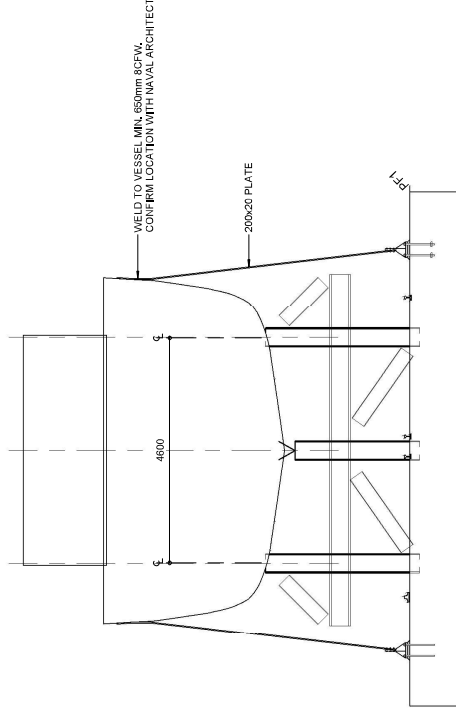


SECTION A
SCALE: 1:100

NOTE:
DECK TO BE AT 0.25% SLOPE TOWARDS ROSS CREEK FOR DRAINAGE



SECTION B
SCALE: 1:50



SECTION C
SCALE: 1:50

NOTES:
1. LAT LEVELS SHOWN.
2. STEEL SUPPORT FRAME MEMBER RATE = 250kg/m (APPROX.)

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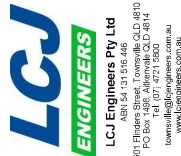
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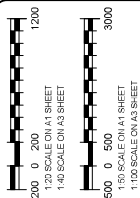
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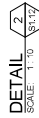
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DRAWING RETAINING WALL SECTION AND DETAILS

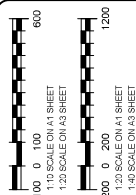
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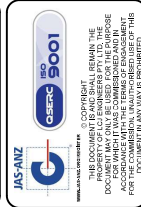




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BF	BOTH FACES
NF	NEAR FACE - INSIDE
FF	FAR FACE - OUTSIDE

NOTES

-

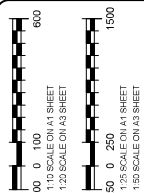
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DRAWING PRECAST DETAILS	JOB NUMBER	SHEET No.	REVISION
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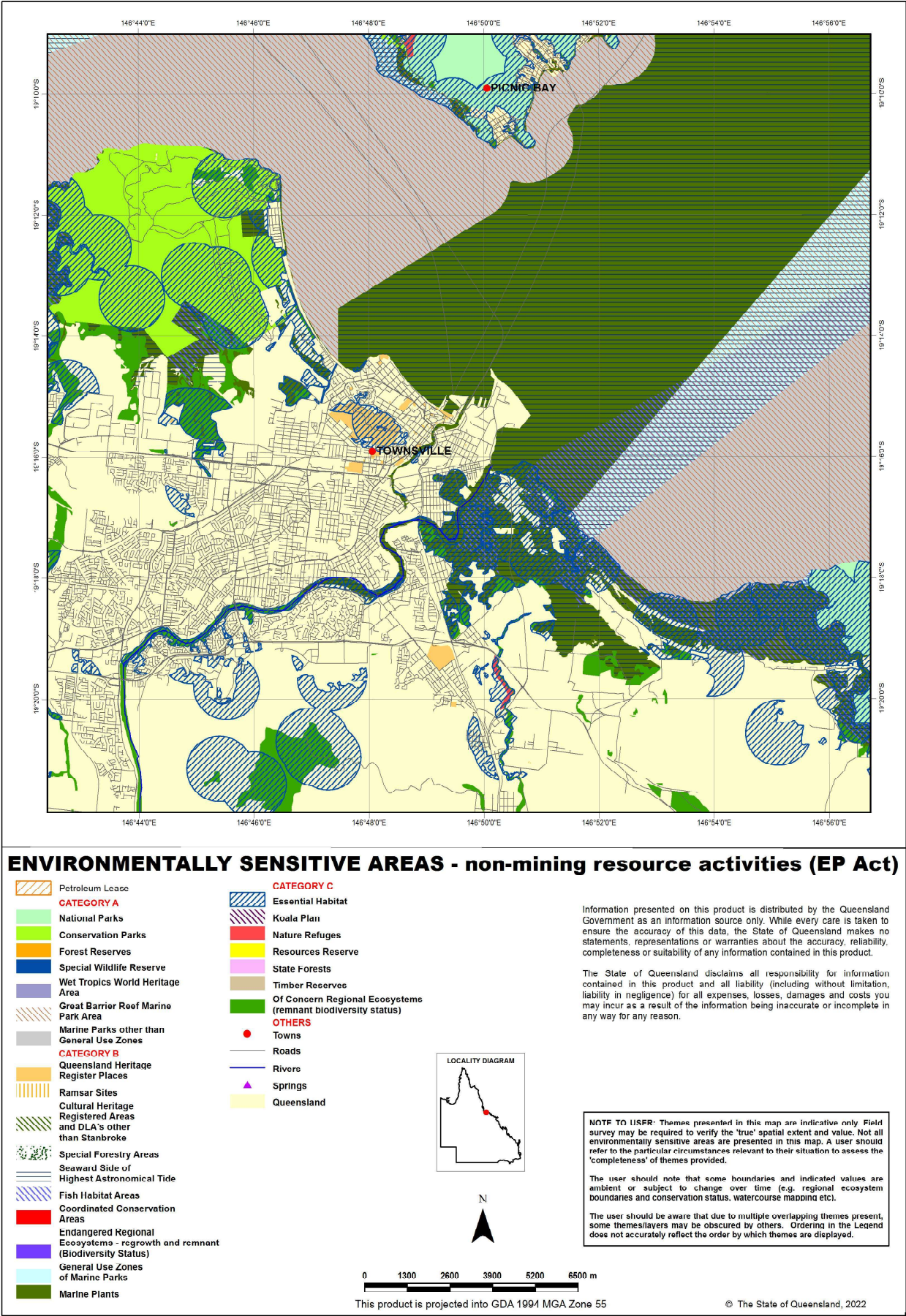
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Appendix B: Environmentally Sensitive Areas Map



Appendix C: Water Quality Objectives

Ross River Basin and Magnetic Island Environmental Values and Water Quality Objectives

Water area/type (refer plans WQ1181, WQ1183)	Management intent (level of protection)	Water quality objectives to protect aquatic ecosystem EV
Mid estuary waters outside Townsville State Development Area (other than Bohle and Sandfly mid estuaries - refer separate row below) Including mid estuary waters of Ross Creek, Ross River, Townsville Yacht Club Marina (Note: for Townsville Port sub-zone waters, refer to 'MD2241 Townsville Port sub-zone waters' in this table)	Aquatic ecosystem—moderately disturbed (MD)	Note: For waters shown on the plan as being mid estuary (orange colour) and occurring within inter-tidal zone adjacent to the enclosed coastal/lower estuary water type, these waters may have water quality characteristics more in common with the adjacent enclosed coastal/lower estuary water type. Under such circumstances, reference should be made to the WQOs for enclosed coastal/lower estuary water type. • ammonia N: <10 µg/L^{c, d} • oxidised N: <10 µg/L^{c, d, f} • dissolved inorganic N (DIN): <20 µg/L^{d, g} • organic N: <260 µg/L^{c, d} • total N: <300 µg/L^{c, d} • filterable reactive phosphorus (FRP): <8 µg/L^{c, d} • total P: <25 µg/L^{c, d} • chlorophyll a: <4 µg/L^c • dissolved oxygen: 85%–100% saturation^{c, h} • turbidity: <8 NTU^c • Secchi depth: >1.0 m^c • suspended solids: <20 mg/L^c • pH: 7.0–8.4^c • temperature: nd^{b, k} • toxicants: refer to toxicants row below
Toxicants for ALL estuarine waters within this table	Aquatic ecosystem—all	Toxicants in water and sediment as per AWQG: • Toxicants in water^c: refer to AWQG section 3.4—'water quality guidelines for toxicants' (including tables 3.4.1, 3.4.2, and Figure 3.4.1) and AWQG volume 2 (section 8) • Toxicants in sediments: refer to AWQG section 3.5—'sediment quality guidelines' (including Table 3.5.1, Figure 3.5.1) and AWQG volume 2 (section 8) Release of sewage from vessels to be controlled in accordance with requirements of the <i>Transport Operations (Marine Pollution) Act 1995</i> and Regulations. Comply with Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance, ANZECC.

Appendix D: Unexpected Finds Protocol

Flow Chart – Unexpected Finds Protocol

