



Technical Paper - Soils

Lord Howe Island Critical Infrastructure Project

Prepared for: APP Corporation Pty Ltd
29 September 2025



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Document Control

Document Type	Technical Paper - Soils
Project Title	Lord Howe Island Critical Infrastructure Project
Project Number	30013573A_EN_R002
File Location	\\filer.nasuni.local\smecanz\Projects\300135\30013573 - Lord Howe Island\100 Stage B - Investigations-Approvals\22_EIS Specialist Studies\R002 Soils\Final
Revision Number	0

Revision History

Revision No.	Date	Prepared By	Reviewed By	Approved for Issue By
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Issue Register

Distribution List	Date Issued	Number of Copies
APP Corporation Pty Ltd	29/09/2025	01

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Executive Summary

This Soils Technical Paper supports the Environmental Impact Statement for the Lord Howe Island Critical Infrastructure Project. It documents:

- Whether acid sulfate soils are present and assesses the impacts of the Project on acid sulfate soils;
- Identifies whether soil salinity is an issue, and assesses the impacts of the Project on soil salinity and how it may affect groundwater resources and hydrology; and
- The potential impacts on soil and land resources (including erosion risk or hazard).

The Project Area comprises an area of approximately 2.52 hectares denominated as the North Zone (covering approximately 1.34ha) and the South Zone (covering approximately 1.18ha). The North Zone includes marine and land-based infrastructure, including a freight handling facility, a piled vessel ramp and biosecurity detection dog kennels. The South Zone includes the waste management facility, dog kennels and a fuel bowser.

The assessment has considered available mapping and a limited soil sampling Project, to characterise the existing environment and identify constraints within, and impacts arising from, the Lord Howe Island Project (the Project). The assessment recommends mitigation measures to reduce the impacts from the Project where possible.

The geology of Lord Howe Island is derived from its origins as a shield volcano that emerged approximately 7 million years ago on the largely submerged continent of Zealandia. The heavily eroded structures that now comprise Lord Howe Island include various geological units of basalt, calcarenite and alluvial soils with remnants of its volcanic history such as tuff and breccia. The Project is limited to the western coast of the Island, adjacent to the lagoon which is mapped as derivations of calcarenite and alluvium typical of low-lying coastal geology.

The soils within the Project Area were sampled and mapped. The North Zone is underlain by beach formations – described as cross-bedded, brown to yellow, fine- to coarse-grained calcarenite. The South Zone is underlain by coastal deposits - backbarrier flat facies, described as fine- to medium-grained quartz-lithic sand with carbonate and humic components (marine-deposited), indurated sand, silt, clay, gravel, organic mud, peat; coastal deposits - dune facies described as marine-deposited and aeolian-reworked coastal sand dune. Some areas of the South Zone are also noted as ground disturbed and/or excavated by quarrying including sand quarrying. Soil landscapes for both zones are considered as Aeolian comprised of sand and clayey sand with fine to coarse grained sub-rounded gravel.

The multiple lines of evidence investigated including, soil description, colour, geologic origins and laboratory analysis results indicated that there is an extremely low probability of occurrence of Potential ASS (PASS) within both zones. Similar findings were obtained through both desktop review and field sampling for salinity, confirming that dryland salinity is not present in the Project Area, noting that natural occurrence of salts given the close proximity to the marine environment.

Construction of the Project will result in approximately 2.52 ha of soil disturbance in stages for a period of up to 20 months. The soil disturbance during construction has the potential to result in the following impacts:

- Reduce soil stability and increase susceptibility to erosion due to vegetation removal or soil exposure, especially if the subsoil is sodic and dispersive;
- Loss or degradation of topsoil material viable for use in rehabilitation; and
- Introduce constraints into the topsoil material if soil is inadequately managed.

Impacts to soils during construction and operation are associated with:

- Land disturbance during the construction phase of the Project;
- Erosion of the shoreline due to removal of existing ground cover during the construction and operational phases; and
- Erosion downstream of the WMF and Cargo laydown area during major flow events.

The Project has been assessed as having a very low erosion hazard potential. Potential on site erosion and sedimentation impacts include but are not limited to:

- Erosion of constructed landform such as embankments, roads, power line pads, and stockpiles requiring rework to repair and increased maintenance costs during the construction and operational phases;
- Unsafe work conditions due to the presence of gullies, uneven surfaces, uncontrolled water and dust;
- Decrease in water quality due to deposition of eroded sediment; and
- Reputational damage and litigation costs associated with non-compliance and pollution events.

Potential impacts during both construction and operation can be mitigated and managed through appropriate engineering design, and the development and implementation of relevant management plans and sub plans including a Construction Soil and Water Management Plan (CSWMP) as part of the Construction Environmental Management Plan (CEMP) The CSWMP will include a material management plan to ensure a sustainable approach to re-use and minimise disposal of excess spoil / soil materials off-island.

Soil and land resources would be retained in situ within the defined Project boundaries. This approach allows to preserve the natural soil profile and minimise off-site impacts. However, as part of the planned earthworks, some redistribution of soil within zones would be required which may include the stripping, stockpiling, and reapplication of topsoil to facilitate construction activities, manage cut-and-fill balances, and support future rehabilitation or landscaping efforts.

Glossary

Term	Description
ASS	Acid Sulfate Soils
DPHI	Department of Planning, Housing and Infrastructure
EPL	Environment Protection Licence
LHIB	Lord Howe Island Board
LoLo	Lift-on Lift-off
MRF	Material Recovery Facility
NSW DCCEEW	New South Wales Department of Climate Change, Energy, the Environment and Water
RoRo	Roll-on Roll-off
SEARs	Secretary's Environmental Assessment Requirements
WMF	Waste Management Facility
WWTP	Wastewater Treatment Plant

1. Introduction

The NSW Department of Climate Change, Energy, the Environment and Water ('NSW DCCEEW' or 'Proponent'), on behalf of the Lord Howe Island Board (LHIB) proposes the construction, operation and maintenance of new marine infrastructure, cargo handling facility, biosecurity infrastructure and waste management facility on Lord Howe Island, and associated landscape and vegetation restoration.

The Proponent seeks development consent for the Project as Critical State Significant Infrastructure (CSSI) under Division 5.2, section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project is a controlled action (2025/10188) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) and will be assessed under the bilateral agreement between the NSW and Commonwealth Governments.

1.1 The Project

The Project is part of the broader Lord Howe Island Critical Infrastructure Project; however, the aspects being considered within this report comprise the construction, operation and maintenance of the following on Lord Howe Island:

- Freight handling facility which includes new and upgraded marine infrastructure (new piled vessel ramp and upgraded jetty and Wilsons Landing boat ramp), boat wash down and maintenance area, cargo loading/offloading areas, biosecurity infrastructure, adaptive reuse of the 'Old Cargo Shed' and 'Ocean View' heritage buildings, viewing area, picnic area, landscaping, retaining walls, amenities and vehicle and boat trailer parking;
- Waste management facility (WMF) upgrades which includes new storage sheds and materials processing plant (including for organic material), wastewater treatment plant (WWTP) and waste receival area (including chemical and hazardous waste), hardstand and roads, staff office, and selective dune restoration at the existing WMF;
- Dedicated dog kennels to house detection dogs; and
- Self-service fuel bowser along Old Lagoon Road.

1.2 Project location

The Project is on Lord Howe Island, which is a 1,455-hectare (ha) island located about 770 kilometres (km) to the northeast of Sydney, NSW, and about 570 km east from Port Macquarie, NSW. Port Macquarie is the nearest mainland port to Lord Howe Island and is the base for the current marine freight service. Lord Howe Island is part of the state of NSW and is regarded legally as an unincorporated area administered by the LHIB.

The Project Area comprises the North and South Zones, as shown in Figures 1 and 2, Appendix A. The North Zone includes marine and land-based infrastructure, including a freight handling facility, a piled vessel ramp and biosecurity infrastructure. The South Zone includes the waste management facility, dog kennels and fuel bowser.

1.3 Purpose of this report

Secretary's Environmental Assessment Requirements (SEARs) were issued by the Department of Planning, Housing and Infrastructure (DPHI) on 14 April 2025. Supplementary SEARs were issued on 08 August 2025.

In accordance with the Project SEARs, SMEC Australia Pty Ltd (SMEC) has prepared this Technical Paper: Soils on behalf of the Proponent to assess the risks arising from the disturbance and excavation of land and minimise disposal of soil as part of the Project. The scope of this assessment includes:

- Identifying whether acid sulfate soils are present and if so, assessing the impacts of the Project on acid sulfate soils;
- Identify whether soil salinity is an issue, and if so, assessing the impacts of the Project on soil salinity and how it may affect groundwater resources and hydrology; and
- Assessing potential impacts on soil and land resources (including erosion risk or hazard).

1.3.1 Assessment guidelines and requirements

This Technical Paper has been prepared having regard to the SEARs and the following guidelines:

- Acid Sulfate Soil Manual (August, 1998);
- Guidelines on the Duty to Report Contamination (NSW EPA, 2015);
- National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013;
- Managing Urban Stormwater: Soils and Construction; and
- Site Investigation for urban Salinity (Department of Land and Water Conservation, 2002).

Table 1: SEARs requirements

Requirement	Description	Section Addressed
1	Identify whether acid sulfate soils are likely to be an issue and if so, verify the risk of acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Risk Map) within the Project area, and assess the impacts of the Project on acid sulfate soils.	5.3.2
2	Identify whether soil salinity is likely to be an issue and if so, determine the presence, extent and severity of soil salinity within the Project area, and assess the impacts of the Project on soil salinity and how it may affect groundwater resources and hydrology.	5.3.3
3	The impacts on soil and land resources (including erosion risk or hazard). Particular attention must be given to soil erosion and sediment transport consistent with the practices and principles in the current guidelines.	6

2. Description of the project

This chapter outlines the permanent infrastructure required to operate the Project, as well as the key construction elements and activities required to construct the Project. A comprehensive and detailed description of the Project is provided in the EIS, which has been relied upon for the basis of this technical assessment.

2.1 Project Overview

The indicative project layout is shown on Figures 2-1 and 2-2. The Project includes the following components:

North Zone

- Freight Handling Facility
 - New and upgraded marine infrastructure (e.g., jetty and landing facilities) and cargo interface areas for freight service operations;
 - Upgraded roads and hardstand areas to facilitate safe movement of cargo from the vessel to the Island via the freight handling facilities;
 - Biosecurity infrastructure including quarantine facilities;
 - Adaptive reuse of the existing Ocean View and Old Cargo Shed buildings;
 - Upgraded boat ramp and boat parking for recreational vessels; and
 - New public amenities (e.g., viewing area and parking).

South Zone

- Waste Management Facility
 - Relocation and reconfiguration of the organics processing infrastructure
 - Construction of a waste receival area/shed to facilitate community waste disposal;
 - Construction of a hardstand dedicated for waste storage and facilities/areas to adequately store liquid and hazardous wastes;
 - Construction of a new materials recycling facility (MRF) and new working platform to provide secure, safe operating conditions;
 - Perimeter fencing, security and restricted access upgrades; and
 - Wastewater Treatment Plant (WWTP).
- Dedicated kennel for housing detection dogs near the airport; and
- A self-service fuel bowser on Old Lagoon Road
- Detailed design, site investigations and construction of the Project, inclusive of the North Zone and South Zones, is expected to occur over a period of approximately 20 months.



Figure 2-1 Project Layout (North Zone)



Figure 2-2 Project Layout (South Zone)

2.2 Project Description

2.2.1 Freight Handling Facility – Marine Infrastructure

The proposed marine infrastructure includes upgrades to the existing jetty, construction of a new piled fixed vessel ramp adjacent to the jetty, and upgrades to the existing boat ramp at Wilsons Landing. The marine infrastructure would in general facilitate the safe docking of the new marine freight vessel, safe and efficient cargo loading and unloading, and allow the existing public boat ramp to be used by a wider variety of recreational vessel sizes and types.

New piled fixed vessel ramp

A new piled fixed vessel ramp is proposed that would accommodate the landing of the new marine freight vessel and allow for “roll-on roll-off” (RoRo) cargo handling. RoRo relies on vessels with ramps so that cargo can be driven onto and off the vessel making loading and unloading of cargo easier and faster than traditional container shipping which uses cranes to lift cargo onto and off vessels.

The new piled fixed vessel ramp would be located on the southern side of the existing jetty to enable safe docking and efficient loading and unloading of the marine freight vessel, while allowing the existing jetty to continue being used for “lift-on lift-off” (LoLo) cargo handling.

The new piled fixed vessel ramp would be constructed on piles, elevating the structure(s) above the beach profile to minimise the impact of the structure(s) on the adjacent shoreline.

The new piled fixed vessel ramp would be subject to further engineering design and operational assessments and would generally comprise the following materials and supporting infrastructure:

- New piles;
- Precast concrete headstocks;
- Precast concrete planks;
- Mooring and breasting piles;
- Breasting and mooring dolphins;
- Adequate fendering system as required; and
- Upgrades to the existing rock revetment wall.

Upgrades to the existing jetty

The existing jetty would be retained to support LoLo cargo handling should this capability be required. The existing jetty would be upgraded with the addition of berthing and mooring bollards and public domain furniture. The upgrades to the existing jetty would be subject to further engineering design and operational assessments.

The existing public boat ramp refurbishment

The existing public boat ramp at Wilsons Landing is currently used by smaller recreational vessels and would be refurbished to make it suitable for larger recreational vessels up to 18 m in length. The refurbishment works would include:

- Refurbishing the existing public boat ramp to generally comply with the applicable codes and standards including the NSW Boat Ramp Guidelines;
- Increasing the overall dimensions of the existing public boat ramp by approximately 8.5 m in length and 1 m in width;
- Rotating the existing public boat ramp by approximately 9 degrees to minimise the amount of rock reef clearing required to accommodate the extended length of the ramp (some trimming of the rock reef may still be required); and
- Installing mooring infrastructure such as breasting and mooring dolphins.

2.2.2 Freight Handling Facility – Land based Infrastructure

New, modern freight handling and biosecurity infrastructure would be constructed near the existing public boat ramp to facilitate the Island's biosecurity and quarantine requirements to screen incoming materials. The freight handling facility will be integrated with new biosecurity infrastructure to allow safe transport of cargo from the vessel to the biosecurity and quarantine facility.

Laydown and staging area

A new dedicated laydown area is proposed for the temporary storage, staging, and handling of cargo upon arrival to the Island and prior to its departure to the mainland. Some existing vegetation may be removed to ensure sufficient area to manoeuvre forklifts and vehicles used to load and unload the vessel.

A bunded hardstand surface and/or paved area with drainage would be provided. The laydown area would provide a structured location for organising and managing cargo and freight and would be designed to accommodate various freight types including containers, bulk goods, and bulk fuel. The laydown area would be accessed via Lagoon Road.

The perimeter of the laydown and staging area would be temporarily secured during vessel loading and unloading. At other times, the area would generally be accessible to the public.

Container unstuffing/stuffing shed

A new container unstuffing/stuffing shed is proposed to serve as a cargo and handling area for the freight vessel operators. The shed would be built on a reinforced concrete slab and would be constructed of compressed fibre cement cladding, with a profiled metal roof sheeting and high level operable glazed louvres. Roller doors would be provided to accommodate forklift access. The shed would be approximately 6.7 m high and approximately 182 m² in area.

Biosecurity and quarantine facility

A new, dedicated, biosecurity and quarantine facility is proposed to support biosecurity and quarantine operations on the Island. The facility would allow biosecurity officers to inspect freight items identified as potential threats and for routine testing. The facility would be fully sealed to contain any biosecurity materials that are detected and would be always closed to the public.

The facility would be constructed on a reinforced concrete slab with compressed fibre cement cladding and profiled metal roof. High level operable glazed louvres may be provided. The facility would be designed with roller doors to allow forklift access and operations. The facility would be approximately 50 m² in area. Fencing, bunding and containment measures would also be included.

Australia Post and TfNSW storage area

A new Australia Post facility and a storage area for LHIB would be provided. The Australia Post facility would be approximately 17 m² and would be used to store uncollected mail. The LHIB storage area would be approximately 10 m² in area and would be used to store mooring maintenance equipment and materials

Ocean View Boatshed and Old Cargo shed

The existing 'Ocean View' Boatshed would be used to support Marine Parks and TfNSW operations, including mooring, maintenance and storage of equipment and materials including emergency response equipment (e.g first aid kits, chemical spill clean-up equipment etc) to. The existing annex and above-ground water tanks would be removed from the northwestern side of the boatshed to provide space for at-grade boat parking for two vessels. The new boat parking area will be on a sealed concrete slab with a finished area of approximately 100 m². A new water below ground tank would be provided. A new viewing deck would be constructed on the southern side of the Old Cargo Shed to provide pedestrian access to the existing jetty.

Boat trailer parking area

A new driveway and removal of a Norfolk Island pine tree would be required on the northern side of the proposed stuffing/unstuffing shed to provide public access to the boat ramp from Lagoon Road while the vessel is being loaded and unloaded. Boat trailer parking would be provided adjacent to the laydown area. Parking would be designed in accordance with AS2890.1 Off-Street Parking Facilities.

2.2.3 Freight Handling Facility – Landscaping and Public Domain Works

Landscaping and public domain improvements are proposed as part of the Project. Public access will be incorporated into the upgraded existing public boat ramp including for pedestrians and vehicles, but excluding the new fixed pile vessel ramp. Landscaping is proposed north and south of the existing jetty.

The proposed landscaping and public domain works would include:

- Upgrade the Wilsons Landing Picnic Area including new interpretive signage and furniture;
- Retain the two existing Norfolk Island Pine trees located between the Old Cargo Shed and the Marine Rescue buildings;
- Retain the existing mooring anchor adjacent to the southern car park area;
- Bicycle parking adjacent to the southern car park area;
- Feature tree planting adjacent to the vehicle entrance from Lagoon Road;
- New screen planting in a bioswale along the Lagoon Road frontage; and
- Maintain existing access points to the beach.

2.2.4 Waste Management Facility

The Project would include upgrades to the existing Waste Management Facility (WMF) to provide a fully functioning waste reception and processing facility to service the needs of the residents of Lord Howe Island.

The WMF would include the following:

- Waste-receival area comprising a dedicated, one-way, drive-through waste drop-off facility for commercial and residential waste with clearly demarcated areas to segregate waste types (e.g., mixed-recyclables, paper and cardboard, food and organics etc.);
- A Chemical Shed with separate storage zones for the safe containment, handling, and temporary storage of waste such as paint, used oil, batteries, domestic gas cylinders, phosphorescent and other lighting tubes and smoke detectors;
- A Materials Recovery Facility (MRF), which would include a new working platform to provide secure, safe operating conditions. The MRF equipment would consist of two balers, a wrapper, hoppers, conveyors, picking station, sorting conveyor/trommel, capture bins, glass crusher and sorter. The MRF will also house a baler for steel and aluminium cans and other waste;
- Open bunkers and dedicated storage areas to hold baled waste material, bulky goods and organics, and waste containers and/or skips awaiting shipment. These areas will be located at the northwest end of the WMF, the furthest area from public access;
- A dedicated organics processing workshop with specialised equipment to mechanically and biologically break down organic materials and include curing and storage areas for final products. The final products will be managed for odours, leachates and quality control in accordance with the Environment Protection Licences (EPL);
- A new, dedicated WWTP, which will include settling and aeration tanks, clarifiers, disinfection equipment and sludge treatment. The WWTP will be constructed within the WMF to service the Island; and
- An office/amenities building will be located adjacent to the public limit of the WMF.

The WMF will be fully fenced and secured. Access by the public will be restricted to fixed hours of operation. The design of the facility will facilitate the processing and secure storage of waste, with hardstands constructed of permeable and impermeable surfaces such as pavers, concrete or asphalt. The public will not have access to the WMF beyond the waste-receival area unless via appointment.

2.2.5 Dog Kennels and a Fuel Bowser

Detection dog kennels are proposed to house the detection dogs used for biosecurity checks at the airport (daily) and freight handling facility (fortnightly). The kennels would be constructed on an existing grass area

adjacent to the BoM weather station at 16 Old Lagoon Road (Lot 219 DP45732). The facility would include kennels for up to four dogs and an outdoor and indoor training area.

The proposed fuel bowser would include a concrete hard stand area and two above ground fuel containers with self-serve bowser with credit card facilities.. The self-serve fuel bowser would be accessed via a driveway from Old Lagoon Road.

2.2.6 Construction Sites

Two main construction sites would be required for the Project. The North Zone is where the freight handling facility would be located and includes marine and land-based infrastructure. The South Zone is where the WMF, dog kennels and fuel bowser would be located. The construction sites would be located within existing operational footprints, where possible, to minimise the construction footprint and disruption to the surrounding areas.

The final construction staging, sequencing, and methodology would be determined by the contractor following determination of the application. The following sections provide a summary of the likely activities and sequencing for each construction site.

2.2.7 Operation

Upon completion of construction, the new/upgraded marine infrastructure, WMF and biosecurity infrastructure will operate continuously and in tandem to facilitate the Project and the broader Lord Howe Island Critical Infrastructure Project objectives.

Operation of the Project is proposed to involve:

- Cargo unloading to the cargo unstuffing facility and onward for distribution to the Island;
- Biosecurity inspection of incoming cargo, with designated quarantine room and protocols enacted as necessary to contain any identified biosecurity risks; and
- Receipt, processing, and storage of waste in a manner that minimises environmental and human health risk and facilitates the efficient movement of waste to the cargo laydown area in the North Zone for removal from the Island.

2.2.8 Operation - Freight Handling Facility

The vessel generally travels to the island every fortnight. The time and day that the vessel can dock is dependent on tides and weather conditions and may vary. Cargo would be transported on the vessel using 20-foot dry containers and 20-foot reefer containers, each with a maximum load of up to 6.8 tons.

Cargo from the vessel would be either driven off or unloaded with forklifts and cranes and uncontainerised items would be placed in the loading unloading area. Containers would be transported straight from ship into unstuffing shed for unstuffing and sorting . Once the cargo has been fully unloaded, the vessel would be loaded with cargo and empty containers for transportation back to the mainland. This would include general cargo as well as waste from the WMF that requires disposal on the mainland.

Cargo requires additional biosecurity inspections and any cargo that require further inspection and would be moved into the biosecurity quarantine room for further inspection by a quarantine officer prior to release. Quarantine and monitoring procedures would be implemented to minimise the risk of serious incursions that could threatened the island's biodiversity and agricultural assets.

The loading and unloading of the vessel typically take two days to complete. During this time, the freight handling facility must remain secure. Public access to the jetty and fixed pile vessel ramp, laydown areas and buildings within the freight handling facility would be restricted at these times. Once the vessel has departed, these areas would be publicly accessible.

2.2.9 Operation - Waste Management Facility

The operation of the existing WMF is regulated under EPL No. 10466 (EPL 10466), which regulates the types of waste and the volume and mass limits that can be processed by the WMF. The WMF would be designed to accommodate a 50% increase per month in the volume of waste that can be received (compared to the average

volumes of waste received between 2019 and 2022). This was achieved through upgrades to equipment size and throughput and processing areas.

The hours of operation for the WMF would be between 6:30am to 3pm Monday to Saturday. Reception of waste (i.e., waste drop off by public) would generally occur between 6:30am to 10am Monday, Wednesday and Saturday during the winter months with an additional day (Friday) provided during summer for general domestic and chemical waste drop off.

Waste storage would be designed to provide one additional month of storage capacity as a contingency in the event that waste is unable to be processed during a given month. This also applies to the outcomes of some processes like recyclables and glass from the MRF (bales and maxi-bags).

The operation of the WMF would include:

- Receiving area and site office;
- Material Recovery Facility;
- Chemical storage;
- Organics shed;
- Bulky waste storage;
- Wastewater Treatment Plant;
- Stormwater collection;
- Access and security; and
- Utilities and services.

3. Soils impact assessment methodology

The soil assessment has been undertaken using the following steps:

- A desktop review of existing information and the current state of the environment within the Project footprint. The following information was reviewed:
 - SMEC (2025a) Detailed Site (contamination) Investigation Lord Howe Island Critical Infrastructure Project – Waste Management Facility.
 - SMEC (2025b) SMEC (2025b) Contamination Assessment – Lagoon Road, Lord Howe Island.
 - Seamless Surface Geology (<https://minview.geoscience.nsw.gov.au/>).
 - The NSW Water Groundwater bore dataset.
 - Information from the Australian bureau of Meteorology (BOM) climate station (Lord Howe Island Aero: station ID 200839).
 - NSW Soil and Land Information (SALIS) System (DPIE 2015–2020) through the ‘eSPADE’ Soil Profile Database (Version 2.2, DPIE 2020).
 - eSPADE system (v2.2 accessed 11 August 2025) to assess the potential presence of acid sulfate soils and salinity.
- A site walkover was carried out between the 21-25 October 2024 concurrently with the contamination assessments carried out for the site;
- A field soil survey to validate and inform the soil types present within the Project footprint; and
- Determination of the soil mapping units (SMUs) present in the operational footprint of the Project and their key physical and chemical characteristics.

Table 2 summarises the test pits and boreholes carried out in each zone and the number of samples collected for acid sulfate soil and salinity analysis.

Table 2: Summary of samples and analysis per zone

Soil Characteristic Assessment	Project Zone		Locations	Analysis	Number of primary samples
Acid Sulfate Soils	North Zone	SAL01-SAL10		pH field Screen	34
				CRS and SPOCAS	12
	South Zone	BH01-BH12		pH Field Screen	20
				CRS and SPOCAS	6
Soil Salinity	North Zone	SAL01-SAL10		Aggressivity	12
				Cation Exchange Capacity	12
	South Zone	BH01-BH12		Aggressivity	11
				Cation Exchange Capacity	11

3.1 Sampling Methodology

3.1.1 General

As part of the contamination sampling Project in June 2025, acid sulfate soil and salinity samples were collected. Sampling was conducted from:

- North Zone:
 - Ten (10) borehole locations for sampling of soil media for salinity and acid sulfate analysis.
- South Zone:
 - Twelve (12) borehole locations for sampling of soil media for salinity and acid sulfate analysis.

The approximate sample locations are shown in Figures 1 and 2, Appendix A.

3.1.2 Soil Sampling Procedure

The following soil sampling method was adopted for the field investigation:

- All fieldwork was performed by trained SMEC Environmental scientist in accordance with SMEC's standard operating procedures/field instructions;
- Samples were collected from boreholes advanced by a geoprobe using the following methodology:
 - Within the North Zone, boreholes were advanced by a solid flight auger.
 - Within the South Zone push tubes with dedicated liners were used.
- A new pair of nitrile gloves were worn during the collection of each sample;
- Acid sulfate soil samples consisted of approximately 250ml of soil, wrapped within layers of cling film wrap and compressed using hand pressure to expel air voids. This was then be sealed within an airtight plastic zip lock bag after expelling air;
- Salinity samples consisted of a 250ml of soil placed into clean Teflon lid laboratory supplied jars;
- During fieldwork, samples were placed in an ice-filled chest to keep the samples cool;
- At the end of the sampling, the samples were either sent direct to the laboratory or taken to the SMEC office and placed in a freezer to freeze the samples overnight or over several days; and
- Samples were transported to the NATA accredited subcontracted laboratory, Eurofins, with relevant Chain of Custody (CoC) documentation. The CoC forms were completed with the sample names, sampling date and required analyses. The samples were sent in an ice chest to the laboratory for analysis within the prescribed analyte holding times.

4. Legislation, policy and guidelines

The following legislation, policy and guidelines were referenced to assess soils within the Project footprint:

- Stone Y, Ahern C R and Blunden B (1998). Acid Sulfate Soils Manual 1998. Acid Sulfate Soils Management Advisory Committee (ASSMAC), Wollongbar, NSW, Australia;
- Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0.;
- Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018a, National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0.;
- Hazelton, P & Murphy, B 2016, *Interpreting soil test results – what do all the numbers mean?*, 3rd Edition, CSIRO Publishing, Victoria;
- Urban and regional salinity – guidance given in the Local Government Salinity Initiative booklets, which includes the Site Investigations for Urban Salinity (DLWC 2002);
- Landslide risk management guidelines presented in Australian Geomechanics Society (2007); and
- Soil and Landscape Issues in Environmental Impact Assessment (DLWC 2000).

5. Project setting and existing environment

5.1 Environmental Setting

The geology of Lord Howe Island is derived from its origins as a shield volcano that emerged approximately 7 million years ago on the largely submerged continent of Zelandia. The heavily eroded structures that now comprise Lord Howe Island include various geological units of basalt, calcarenite and alluvial soils with remnants of its volcanic history such as tuff and breccia. The Project is limited to the western coast of the Island, adjacent to the lagoon which is mapped as derivations of calcarenite and alluvium typical of low-lying coastal geology.

5.1.1 Climate and Rainfall

Lord Howe Island has an Australian Bureau of Meteorology (BOM) climate station (Lord Howe Island Aero: station ID 200839). Climate records from this station from 1988 to 2025 showed a mean maximum temperature of 25.8°C in February and mean minimum temperature of 19.1°C in July/August.

Rainfall records showed a mean annual rainfall of 1476.7mm with the highest mean rainfall of 162.7mm in June and lower mean rainfall of 100.4mm in December. This indicates a tropical climate with a distinct wet season between March and July.

5.2 Regional Geology

5.2.1 North Zone

Reference to the Seamless Surface Geology (<https://minview.geoscience.nsw.gov.au/>) indicates that the Site is likely to be underlain by beach formations – described Brown to yellow, fine- to coarse-grained calcarenite; cross-bedded. Consists of coralline algae fragments, less abundant coral, foraminifera & molluscs. Common clay-rich palaeosols with bird bones, land snail shells & common rhizoliths & solution pipes

The geology map is shown in Plate 1 below.

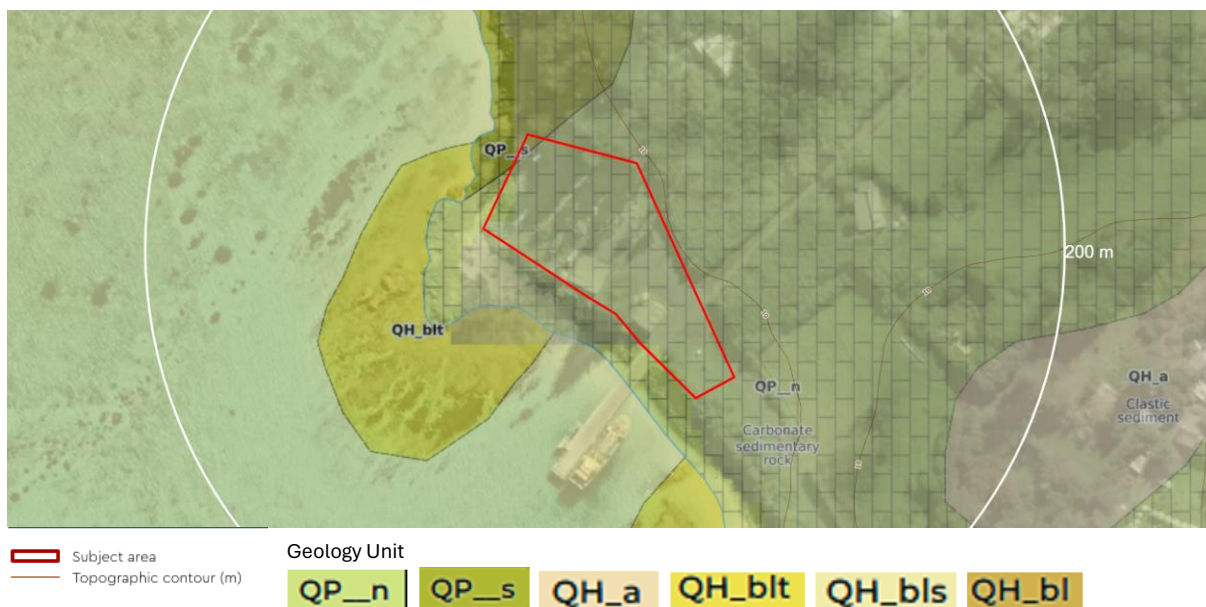


Plate 1: Geology map

5.2.2 South Zone

Reference to the Seamless Surface Geology (<https://minview.geoscience.nsw.gov.au/>) indicates that the Site is likely to be underlain by coastal deposits - backbarrier flat facies described as fine- to medium-grained quartz-lithic sand with carbonate and humic components (marine-deposited), indurated sand, silt, clay, gravel, organic mud, peat; coastal deposits - dune facies described as marine-deposited and aeolian-reworked coastal sand dune; and quarries described as ground disturbed and/or excavated by quarrying including sand quarrying.

The geology map is shown in Plate 2 below.

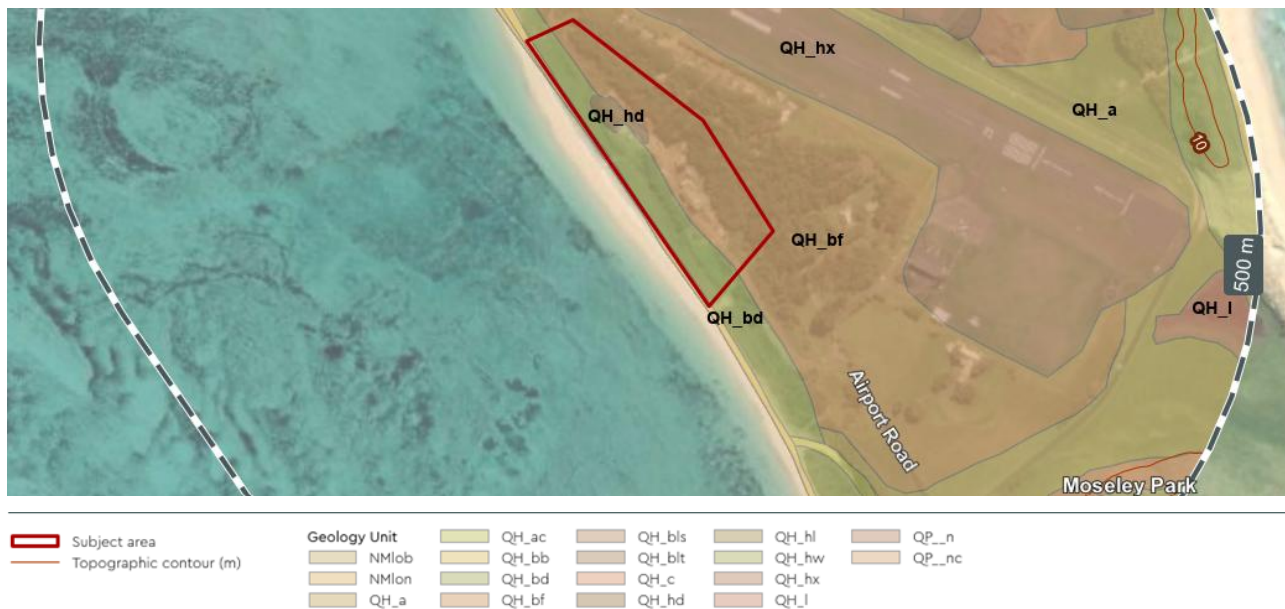


Plate 2: Geology map

5.3 Soils

5.3.1 Soil landscape

The ASC scheme (Isbell 2016) is a multi-category scheme with soil classes defined based on diagnostic horizons and their arrangement in vertical sequence as seen in an exposed soil profile.

The Project footprint is outside mapped data with reference to the NSW Soil and Land Information (SALIS) System (DPIE 2015–2020) through the ‘eSPADE’ Soil Profile Database (Version 2.2, DPIE 2020). The soil surveys undertaken as part of the SMEC (2025) Waste Management Facility Detailed Site Investigation and SMEC (2025a) Northern Jetty Contamination Investigation identified soil types are summarised in Table 3.

Table 3: Regional ASC Soil Mapping

Project Area	Soil Type	description
North Zone	Aeolian	SAND and clayey SAND, fine to coarse grained with sub-rounded gravel (white concretions)
South Zone	Aeolian	SAND, fine to medium grained, brown, pale brown, with shell and shell fragments

5.3.2 Acid Sulfate Soil

There are no Acid Sulfate Soils (ASS) mapped in the Project footprint, as per the Guidelines for the *Use of Acid Sulfate Soil Risk Maps* (DLWC 1998) including the eSPADE system (v2.2 accessed 11 August 2025). However, due to the proximity of the Site to the coastal areas of the island, soil sampling for ASS was included as part of SMECs (2025a) Waste Management Facility Detailed Site Investigation (DSI) and SMEC (2025b) Northern Jetty Contamination Investigation (refer to Section 5.4 for a summary of these reports).

Observations during the field investigations (SMEC, 2025a and b) did not identify surface or subsurface indicators of ASS (such as iron staining, jarosite or sulfidic odours). The soils in both the North and South Zone were logged as Aeolian and residual soils. During sampling, no indicators of acid sulfate oxidation mineral products such as jarosite were observed. The majority of Aeolian soils were logged to include some form of white concretions (shell, crushed shell and crushed coral).

Results from sample analysis undertaken are presented in Appendix B and are summarised as follows:

- North Zone:
 - Samples analysed for field pH (pH_F) ranged from 8.1 to 9.4. Samples screened were above a pH_F result of 4.0 indicating a low likelihood for the presence of actual ASS;
 - All samples showed a pH_{FOX} result above 3 with results ranging from 7.5 to 8.7;
 - In all samples, pH_{FOX} was greater than pH_F indicating the possible presence of carbonates;
 - Twelve soil samples were selected for testing using the chromium reducible sulfur suite and suspension peroxide oxidation combined acidity and sulfur suite. The net acidity (excluding ANC) (being the sum of TAA + S_{CR} + S_{NAS}) in all samples was below the laboratory limit of reporting of and the adopted criteria of 18molH⁺/t. The following is noted:
 - Retained Acidity (analysed as net acid soluble sulfur (S_{NAS})) was not measured due to pH_{KCl} being greater than 4.5; and
 - Chromium reducible sulfur (S_{CR}) results were below the limit of reporting in all samples.
- South Zone
 - Field pH (pH_F) values ranged from 7.5 to 7.9. All samples screened were above a pH_F result of 4.0 indicating a low likelihood for the presence of actual ASS;
 - The pH_{FOX} results ranged from 9.0 to 9.5. Of the 20 samples screened for ASS, no samples returned a pH_{FOX} result below 3 or with a 'moderate' and 'extreme' reaction;
 - In all samples pH_{FOX} was greater than pH_F indicating the possible presence of carbonates;
 - Six soil samples selected for testing using the chromium reducible sulfur suite and suspension peroxide oxidation combined acidity and sulfur suite recorded did not exceed the criteria for net acidity (excluding ANC) (being the sum of TAA + S_{CR} + S_{NAS}) of 18molH⁺/t with all samples below the laboratory limit of reporting. The following is noted:
 - Retained Acidity (analysed as net acid soluble sulfur (S_{NAS})) was not measured due to pH_{KCl} being greater than 4.5; and
 - Chromium reducible sulfur (S_{CR}) results were below the limit of reporting in all samples.

The multiple lines of evidence investigated including, soil description, colour, geologic origins and laboratory analysis results show that there is an extremely low probability of occurrence of ASS within both zones.

5.3.3 Salinity

Salinity occurs naturally in many parts of Australia due to a combination of biophysical conditions including:

- The geology and climate has generated and stored high levels of salt;
- A relatively flat landscape which can result in salt accumulation and concentration in certain areas; and
- Long term changes in groundwater levels resulting in salt mobilisation.

There are no salinity data sets mapped within the Project footprint based on the eSPADE system (v2.2 accessed 11 August 2025).

A detailed salinity assessment was undertaken during SMECs (2025a and b) investigations. Table 4 provides a summary of the sampling undertaken and associated results, with the sampling locations shown on Figures 1 and 2, Appendix A and the laboratory data include in Appendix C. Typically, a soil is classed as saline when it has an ECe value of greater than 4 dS/m (Hazelton & Murphy 2016):

- Non – saline (ECe <2 dS/m);
- Slightly saline (ECe 2-4 dS/m);
- Moderately saline (ECe 4-8 dS/m);
- Very saline (ECe 8-16 dS/m); and
- Highly saline (ECe >16 dS/m).

As the soils across both zones are mainly comprised of sandy material, the conversion rate applied to was $ECE = EC_{1.5} \times 9$.

The ECe results for the analysed soils are displayed in Table 4.

Table 4: Soil Salinity – Electrical Conductivity Results

Zone	Sample Id	EC (dS/m)	ECe (dS/m)
North Zone	SAL03_0.3	0.083	0.747
	SAL03_6.5	1.1	9.9
	SAL04_0.5	0.067	0.603
	SAL04_6.0	1.1	9.9
	SAL06_3.0	0.085	0.765
	SAL07_7.0	0.4	3.6
	SAL08_3.0	0.06	0.54
	SAL01_2.0	0.14	1.26
	SAL02_6.0	0.64	5.76
	SAL05_7.5	0.76	6.84
South Zone	SAL09_3.0	0.17	1.53
	SAL10_4.0	0.048	0.432
	BH07_3.0	0.055	0.495
	BH08_2.0	0.065	0.585
	BH09_1.0	0.08	0.72
	BH10_0.7	0.071	0.639
	BH04_4.5	0.077	0.693
	BH05_5.0	0.066	0.594

Zone	Sample Id	EC (dS/m)	ECe (dS/m)
	BH06_1.0	0.061	0.549
	BH11_1.2	0.13	1.17
	BH01_4.0	0.076	0.684
	BH02_0.5	0.11	0.99
	BH03_2.0	0.052	0.468

Based on the above, SMEC concluded that soils at the Site are considered as non-saline with the exception of soils collected at depths greater than 6m bgl in the North Zone. Elevated salinity at this depth may be related to the presence of groundwater impacted by sea water in the intertidal zone.

5.4 Previous Soils Assessments

Soils within Lord Howe Island has been investigated through the following studies:

- Haskoning Australia Pty (2014). Lord Howe Island Coastline Hazard Definition and Coastal Management Study;
- SMEC (2025a), Detailed Site Investigation Lord Howe Island Critical Infrastructure Project – Waste Management Facility; and
- SMEC (2025b) Contamination Assessment Lord Howe Island Critical Infrastructure Project – Northern Jetty.

The findings of the reports are summarised below.

5.4.1 Haskoning Australia Pty (2014). Lord Howe Island Coastline Hazard Definition and Coastal Management Study

Haskoning Australia was commissioned by the Lord Howe Island Board to conduct a Coastal Hazard and Management Study, focusing on coastal erosion risks near Lagoon Beach that threaten Lagoon Road and underground infrastructure.

The study states that there are a number of coastline management issues at the island, in particular erosion/recession threatening Lagoon Road, which provides access to the North Zone. Haskoning Australia recommended the following immediate management actions to reduce the risk of undermining at Lagoon Road:

- Discontinue beach scraping;
- Develop Emergency Action Plan;
- Alongshore sand relocation;
- Beach nourishment;
- Beach profile surveys; and
- A sand tracing study.

The report also recommends that a natural entrance opening regime is maintained, including Cobby's Creek located near the South Zone.

5.4.2 SMEC (2025a) Detailed Site Investigation Lord Howe Island Critical Infrastructure Project – Waste Management Facility

Within the south zone referred to as the Waste Management Facility (WMF) in the DSI, seven potential Areas of Environmental Interest (AEI) and associated potentially contaminating sources were identified, including the following:

- AEI1: Burn Pile and Surrounds;
- AEI2: Former Effluent Drying Beds;
- AEI3: WMF Building and Former Burn Pit;
- AEI4: Septic Treatment Area;
- AEI5: Chemical Shed;
- AEI6: Historical Stockpiling and Mounds Including Concrete Stockpile; and
- AEI7: Uncontrolled Historical Fill

To assess potential contamination in the seven AEIs, the following was undertaken:

- Advancement of 36 test pits within fill mounds and below ground surface across the Site to a maximum depth of 3.2m bgl;
- Advancement of 12 boreholes to a maximum of 6.0 mbgl, with conversion of 3 boreholes to groundwater monitoring wells and nested gas monitoring wells;
- Advancement of 3 boreholes to a maximum of 11.5 mbgl for the proposes of investigation depth of rock, contamination samples were not collected from these locations;
- Groundwater monitoring and sampling from the 3 newly installed groundwater wells;
- Sediment sampling and surface water monitoring and sampling from 3 locations, located upstream, mid-stream and downstream;
- Subsurface gas monitoring at 3 newly installed locations over three rounds; and
- Submission of soil, surface water and sediment samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis.

Based on the results of the DSI, the following was concluded that the risk to receptors is considered to be low, and manageable under standard site operations and construction practices of the WMF and subject to the recommendations in the DSI.

5.4.3 SMEC (2025b) Contamination Assessment Lagoon Road, Lord Howe Island Project

The assessment identified one AEI near former building structure from weathering and/or ineffective demolition of hazardous building materials and filling.

To assess potential contamination in the identified in AEI, the following was undertaken:

- Excavation of 11 test pits to a maximum depth of 3.0 metres below ground level (m bgl);
- Drilling of 10 boreholes to a maximum of 10.5 mbgl with conversion of 1 borehole to groundwater monitoring wells (not sampled for contamination);
- One round of surface water monitoring and sediment sampling from 3 locations; and
- Submission of soil, material samples, surface water and sediment samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis.

Based on the results of the contamination assessment, the following was concluded:

- Based on the results of this preliminary investigation the potential for widespread contamination at the Site appears to be low (Refer the results summary tables in Appendix B);

- A preliminary waste classification carried out on samples assessed the material encountered would likely be classified as general solid waste; and
- Acid sulfate sampling and testing soils did not indicate the presence of acid sulfate soils.

6. Impact Assessment

6.1 Construction Activities

6.1.1 North and South Zone

The proposed construction works will disturb soils through the following activities:

- Clearing, topsoil stripping and earthworks (cutting and filling) across the construction footprint; and
- Decommissioning of the existing WMF.

The soil disturbance during construction has the potential to result in the following impacts:

- Reduce soil stability and increase susceptibility to erosion due to vegetation removal or soil exposure, especially if the soil is dispersive;
- Unsafe work conditions due to uneven surfaces, uncontrolled water and dust;
- Decrease in water quality due to deposition of eroded sediment;
- Reputational damage and litigation costs associated with non-compliance and pollution events;
- Loss or degradation of topsoil material viable for use in rehabilitation; and
- Risk of exposing buried contaminants (metals and asbestos).

6.2 Operation activities

6.2.1 North and South Zone

Impacts to soils during operation and maintenance are expected to include:

- Localised soil erosion associated from increased hardstand areas resulting in overland and concentrated flow over exposed soils:
 - Some localised erosion may occur from discharge water from the drainage infrastructure in the WMF and Cargo laydown area.
- Erosion and subsequent sedimentation potential from disturbed areas such as unsealed tracks and drainage structures; and
- Soil disturbance from maintenance activities such as machinery and vehicle traffic and excavation.

7. Avoidance and Mitigation Measures

7.1 Avoidance Measures

The Project proposes to refine the disturbance boundary to minimise soils that will be disturbed during construction and operation of the Project. It is important to optimise the Project's disturbance footprint to ensure that only the minimum area necessary for construction and operational activities is impacted. This involves delineating the boundary of disturbance to avoid unnecessary clearing or excavation of soil, particularly in areas with erosion potential.

By refining the disturbance boundary, the Project can reduce the volume of soil that is exposed, displaced, or compacted, and therefore minimising the risk of erosion, sedimentation, and potential mobilisation of contaminants.

7.2 Mitigation measures

- Preparation of a Construction Soil and Water Management Plan (CSWMP) and implemented as part of the Construction Environmental Management Plan (CEMP). The CSWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction. The CSWMP will:
 - Assess and detail the requirements to comply with relevant policies guidelines, legislation and other approvals;
 - Be developed in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and other relevant volumes;
 - Contain Erosion and Sediment Control Plans (ESCPs) for all work sites. ESCPs will be implemented in advance of site disturbance and will be updated as required as the work progresses and the sites change;
 - Contain management procedures for activities, which may result in water pollution or to minimise the risk of erosion and sedimentation;
 - Detail a material management plan to ensure a sustainable approach to re-use and minimise disposal of excess spoil / soil materials off-island;
 - Detail the review and inspection processes for onsite measures to mitigate erosion and sedimentation and water quality risks;
 - Detail the responsibilities for the management and implementation of the CSWMP; and
 - Be complementary to the Landscaping and Revegetation Plan.
- Mark out clearing limits to minimise the extent of clearing and disturbance.
- Install clean water diversions (drains and sediment basins) prior to undertaking other land disturbance activities.

8. Conclusions

8.1 Acid Sulfate Soils

There are no ASS mapped within or in the vicinity of the Project footprint. This assessment captured multiple lines of evidence including, soil description, colour, geologic origins and laboratory analysis results and concluded that there is an extremely low probability of occurrence of ASS within Project footprint.

8.2 Salinity

Based on the sampling carried out by SMEC across both zone in 2025, dryland salinity is not present in the Project Area, noting that there is natural occurrence of salts given the close proximity to the marine environment.

8.3 Potential impacts on soil and land resources

Based on SMEC (2025a), contamination in the WMF was considered to present a low risk to receptors and be manageable under standard site operations and construction practices of the WMF. With regard to the contamination identified within the Northern Jetty Area, the preliminary investigation (SMEC 2025b) indicates that a low potential for widespread contamination to be present.

Erosion impacts have been identified in Section 6 of the report and relate to the temporary removal of existing infrastructure and ground cover during the construction stage of the Project. As the footprint of the ground disturbance in the North Zone and South Zone is generally within already modified areas (i.e. the WMF and Cargo layout), the proposed works are unlikely to have a negative impact on the soil and land resources.

SMEC considers implementing the mitigation measures outlined in Section 7, including a Construction Soil and Water Management Plan (CSWMP) and recommendations outlined in both SMEC (2025 a and b) reports to minimise and manage any potential impacts on the soil.

Soil and land resources would be retained in situ within the defined Project boundaries. This approach allows to maintain the natural soil profile and minimise off-site impacts. However, as part of the planned earthworks, some redistribution of soil within zones would be required which may include the stripping, stockpiling, and reapplication of topsoil to facilitate construction activities, manage cut-and-fill balances, and support future rehabilitation or landscaping efforts.

9. References

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Isbell, R 2016, *The Australian soil classification*, Australian Soil and Land Survey Handbooks Series, 2nd Edition, CSIRO Publishing, Victoria

Landcom, (2004), Managing Urban Stormwater: Sils and Construction Volume 1.

National Environment Protection (Assessment of Site Contamination) Measure (1999), as amended in 2013, National Environment Protection Council.

National Environment Protection Council (2013) Assessment of Site Contamination NEPM Toolbox.

NSW EPA (2015), Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997

NSW EPA (2022), Contaminated land guidelines: Sampling design

SMEC (2025a) Detailed Site (contamination) Investigation Lord Howe Island Critical Infrastructure Project – Waste Management Facility.

SMEC (2025b) Contamination Assessment Project– Lagoon Road, Lord Howe Island.

State Environmental Planning Policy (Resilience and Hazards, 2021)

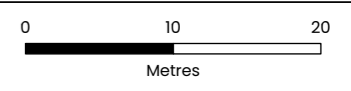
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Sullivan, L, Ward, N, Toppler, N and Lancaster, G (2018a), National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0.

Appendix A

Figures



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LEGEND

- Site Boundary
- Borehole

Project Location

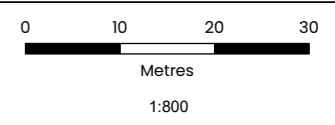


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Sources:
1. Light Gray Base: Esri, TomTom, Garmin, METI/NASA, USGS
Light Gray Reference: Esri, TomTom, Garmin, METI/NASA, USGS

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Figure Name: Soil Testing Locations - Northern Zone
Version: 1
Date: 11/08/2025
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LEGEND

-  Site Boundary
- Proposed Sample Locations**
-  Borehole
-  Groundwater Monitoring Well
-  Testpit
-  Sediment & Surface Water Location
-  Geotech Borehole

Project Location



Sources:
1. Light Gray Reference: Esri, © OpenStreetMap contributors, TomTom, Garmin, METI/NASA, USGS
Light Gray Base: Esri, © OpenStreetMap contributors, TomTom, Garmin, METI/NASA, USGS

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Project No: 30013573
Figure No: 2
Figure Name: Soil Testing Locations - Southern Zone
Version: 1
Date: 3/07/2025
Created by: LL16284
Page Size: A3

Appendix B

Result Summary Tables

EQI	Acid Sulphate Soils - Field			Acid Sulphate Soils - Acidity Trail									Acid Sulphate Soils -		Acid Sulphate Soils - ANC				SPOCAS		Acid Sulphate Soils - Sulfur Trail						
	pHF	pHFox	Reaction Rate	pH-OX	pH (KCl)	Acid Neutralising Capacity equivalent % pyrite	Titration Actual Acidity (sulfur units)	Titration Peroxide Acidity (sulfur units)	Titration Sulfidic Acidity (sulfur units)	Titration Actual Acidity	Titration Peroxide Acidity	Titration Sulfidic Acidity	Chromium Reducible Sulphur (acidity units)	Chromium Reducible Sulfur	ANC as CaCO3	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity	Acid Neutralising Capacity (sulfur units)	Acid Neutralising Capacity - Acidity units	HCl Extractable Sulfur Correction Factor	Peroxide Oxidisable Sulfur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur	Acidity - Acid Reacted Calcium		
EQI	0.1	0.1	0	0.1	0.1	0.02	0.003	0.02	0.02	2	2	2	3	0.005	0.02	2	0.01	0.02	10	1	2	0.005	0.005	0.005	0.005		
Assessment Criteria (ASSMAC 1998 - >1000 t)																											
Date	Field ID	Lab Report Number																									
04 Jul 2025	ASS01	1244299	9.3	7.6	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
04 Jul 2025	SAL01_1.0	1249006	-	-	-	9.5	8.9	18	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	58	11,000	57	18	12,000	2.0	23	<0.005	0.040	0.037	11,000
04 Jul 2025	SAL02_6.0	1249006	-	-	-	8.9	9.6	27	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	85	17,000	83	27	17,000	2.0	28	0.020	0.070	0.045	16,000
04 Jul 2025	SAL03_0.3	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
04 Jul 2025	SAL03_0.5	1244299	9.2	7.6	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
04 Jul 2025	SAL03_0.5	1249006	-	-	-	8.7	9.5	27	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	85	16,000	80	26	17,000	2.0	55	0.010	0.090	0.088	16,000
04 Jul 2025	SAL03_3.0	1244299	9.1	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
04 Jul 2025	SAL03_5.0	1244299	9.1	7.6	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
04 Jul 2025	SAL03_6.5	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
04 Jul 2025	SAL04_4.0	1249006	-	-	-	8.4	9.5	28	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	87	17,000	83	27	17,000	2.0	22	0.010	0.040	0.035	16,000
04 Jul 2025	SAL05_2.0	1249006	-	-	-	8.3	9.7	27	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	85	16,000	82	26	17,000	2.0	64	0.010	0.11	0.10	16,000
04 Jul 2025	SAL06_1.0	1249006	-	-	-	9.1	8.9	15	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	46	9,600	48	15	9,200	2.0	56	0.010	0.10	0.090	8,600
04 Jul 2025	SAL06_7.0	1249006	-	-	-	8.8	9.6	26	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	81	17,000	84	27	16,000	2.0	42	0.020	0.090	0.067	14,000
04 Jul 2025	SAL07_2.0	1249006	-	-	-	8.5	9.6	27	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	84	16,000	80	26	17,000	2.0	80	0.010	0.14	0.13	15,000
04 Jul 2025	SAL08_5.0	1249006	-	-	-	8.5	9.6	26	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	81	16,000	79	25	16,000	2.0	80	0.010	0.14	0.13	15,000
04 Jul 2025	SAL09_3.0	1249006	-	-	-	10	9.3	25	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	79	16,000	78	25	16,000	2.0	69	0.010	0.12	0.11	15,000
04 Jul 2025	SAL10_1.0	1249006	-	-	-	9.9	9.3	26	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	81	16,000	82	26	16,000	2.0	74	0.010	0.13	0.12	15,000
04 Jul 2025	SAL0A01	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL04_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL04_4.0	1244299	9.4	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL04_5.0	1244299	9.2	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL04_6.0	1244299	9.2	7.6	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL06_0.5	1244299	8.1	7.8	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL06_1.0	1244299	8.6	8.2	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL06_2.0	1244299	8.2	7.8	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL06_3.0	1244299	9.2	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL06_7.0	1244299	9.2	8.2	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL07_0.5	1244299	8.5	7.6	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL07_2.0	1244299	9.2	7.6	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL07_5.0	1244299	9.4	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL07_6.0	1244299	9.2	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL07_7.0	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL08_0.5	1244299	8.5	7.7	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL08_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL08_4.0	1244299	8.8	8.3	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL08_5.0	1244299	9.2	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
05 Jul 2025	SAL08_6.0	1244299	9.4	7.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL01_0.5	1244299	8.3	8.6	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL01_1.0	1244299	8.6	8.7	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL01_2.0	1244299	9.0	8.2	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL02_0.5	1244299	9.1	7.9	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL02_3.0	1244299	8.8	7.9	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL02_6.0	1244299	9.0	8.0	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL05_0.5	1244299	8.4	8.2	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL05_2.0	1244299	9.4	7.6	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL05_5.0	1244299	9.3	8.1	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL05_7.5	1244299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL09_0.5	1244299	8.7	7.5	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL09_3.0	1244299	8.7	7.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
07 Jul 2025	SAL09_5.0	1244299	9.4	7.6	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
08 Jul 2025	SAL10_1.0	1244299	8.6	7.8	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
08 Jul 2025	SAL10_3.0	1244299	9.2	7.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
08 Jul 2025	SAL10_4.0	1244299	-	-	-	-	-																				

	Acid Sulphate Soils - Calcium Values				Acid Sulphate Soils - Magnesium Values					Acid Sulphate Soils - Acid	
	Acid Reacted Calcium	KCl Extractable Calcium	Calcium in Peroxide	Sulfidic - Acid Reacted Calcium	Acid Reacted Magnesium (acidity units)	Acid Reacted Magnesium	KCl Extractable Magnesium	Magnesium in Peroxide	Acid Reacted Magnesium (sulfur units)	Net Acidity (excluding F-ANC)	Net Acidity (sulfur units)
	%	%	%	% S	mole H+/l	%	%	%	%S	mole H+/l	%S
EQL	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	10	0.02
Assessment Criteria (ASSMAC 1998 - >1000 t)										≥ 18	

Date	Field ID	Lab Report Number	Acid Reacted Calcium	KCl Extractable Calcium	Calcium in Peroxide	Sulfidic - Acid Reacted Calcium	Acid Reacted Magnesium (acidity units)	Acid Reacted Magnesium	KCl Extractable Magnesium	Magnesium in Peroxide	Acid Reacted Magnesium (sulfur units)	Net Acidity (excluding F-ANC)	Net Acidity (sulfur units)
04 Jul 2025	ASS01	1244299	-	-	-	-	-	-	-	-	-	-	-
04 Jul 2025	SAL01_1.0	1249006	22	0.38	23	18	120	0.14	0.020	0.16	0.19	<10	<-0.02
04 Jul 2025	SAL02_6.0	1249006	33	0.16	33	26	350	0.42	0.030	0.46	0.56	<10	<-0.02
04 Jul 2025	SAL03_0.3	1244299	-	-	-	-	-	-	-	-	-	-	-
04 Jul 2025	SAL03_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
04 Jul 2025	SAL03_0.5	1249006	33	0.20	33	26	610	0.74	0.020	0.76	0.98	<10	<-0.02
04 Jul 2025	SAL03_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-
04 Jul 2025	SAL03_5.0	1244299	-	-	-	-	-	-	-	-	-	-	-
04 Jul 2025	SAL03_6.5	1244299	-	-	-	-	-	-	-	-	-	-	-
04 Jul 2025	SAL04_4.0	1249006	33	0.15	33	26	280	0.34	0.020	0.36	0.45	<10	<-0.02
04 Jul 2025	SAL05_2.0	1249006	31	0.14	31	25	880	1.1	0.040	1.1	1.4	<10	<-0.02
04 Jul 2025	SAL06_1.0	1249006	17	0.43	18	14	300	0.36	0.030	0.39	0.48	<10	<-0.02
04 Jul 2025	SAL06_7.0	1249006	29	0.17	29	23	240	0.29	0.020	0.32	0.39	<10	<-0.02
04 Jul 2025	SAL07_2.0	1249006	30	0.19	30	24	970	1.2	0.040	1.2	1.6	<10	<-0.02
04 Jul 2025	SAL08_5.0	1249006	30	0.17	30	24	1,100	1.3	0.040	1.4	1.8	<10	<-0.02
04 Jul 2025	SAL09_3.0	1249006	30	0.29	31	24	510	0.62	0.020	0.64	0.81	<10	<-0.02
04 Jul 2025	SAL10_1.0	1249006	31	0.30	31	25	470	0.57	0.020	0.59	0.75	<10	<-0.02
04 Jul 2025	SAL0A01	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL04_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL04_4.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL04_5.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL04_6.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL06_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL06_1.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL06_2.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL06_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL06_7.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL07_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL07_2.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL07_5.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL07_6.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL07_7.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL08_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL08_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL08_4.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL08_5.0	1244299	-	-	-	-	-	-	-	-	-	-	-
05 Jul 2025	SAL08_6.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL01_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL01_1.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL01_2.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL02_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL02_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL02_6.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL05_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL05_2.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL05_5.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL05_7.5	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL09_0.5	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL09_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-
07 Jul 2025	SAL09_5.0	1244299	-	-	-	-	-	-	-	-	-	-	-
08 Jul 2025	SAL10_1.0	1244299	-	-	-	-	-	-	-	-	-	-	-
08 Jul 2025	SAL10_3.0	1244299	-	-	-	-	-	-	-	-	-	-	-
08 Jul 2025	SAL10_4.0	1244299	-	-	-	-	-	-	-	-	-	-	-
08 Jul 2025	SAL10_6.0	1244299	-	-	-	-	-	-	-	-	-	-	-

*Net Acidity = potential sulfidic acidity + Actual acidity + Retained acidity (where v<

**Reaction Rate legend: 1.0 No reaction to slight
2.0 Moderate reaction
3.0 Strong reaction with persisten froth
4.0 Extreme reaction

	pH Field Screen				Acid Sulphate Soils - Acidity Trail									Potential Acidity		Acid Neutralising Capacity				Peroxide Oxidisable Sulfur (acidity units)
	pHF	pHFox	pH Change	Reaction Rate**	pH-OX	pH (KCl)	Acid Neutralising Capacity equivalent % pyrite	Titration Actual Acidity (sulfur units)	Titration Peroxide Acidity (sulfur units)	Titration Sulfidic Acidity (sulfur units)	Titration Actual Acidity	Titration Peroxide Acidity	Titration Sulfidic Acidity	Chromium Reducible Sulphur (acidity units)	Chromium Reducible Sulfur	ANC as CaCO3	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity	Acid Neutralising Capacity (sulfur units)	
	-	-	COMMENT	COMMENT	-	-	%S	%S	%S	%S	mole H+/t	mole H+/t	mole H+/t	mole H+/t	%S	% CaCO3	mole H+/t	%CaCO3	%S	mole H+/t
EQL	0.1	0.1	0	0	0.1	0.1	0.02	0.003	0.02	0.02	2	2	2	3	0.005	0.02	2	0.01	0.02	2
Assessment Criteria (ASSMAC 1998 - >1000 t)																				

Date	Field ID	Lab Report Number	pHF	pHFox	pH Change	Reaction Rate**	pH-OX	pH (KCl)	Acid Neutralising Capacity equivalent % pyrite	Titration Actual Acidity (sulfur units)	Titration Peroxide Acidity (sulfur units)	Titration Sulfidic Acidity (sulfur units)	Titration Actual Acidity	Titration Peroxide Acidity	Titration Sulfidic Acidity	Chromium Reducible Sulphur (acidity units)	Chromium Reducible Sulfur	ANC as CaCO3	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity	Acid Neutralising Capacity (sulfur units)	Peroxide Oxidisable Sulfur (acidity units)	
30 Jun 2025	BH07_0.5	1240933	7.6	9.3	-1.7	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_1.0	1240933	7.6	9.2	-1.6	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_2.0	1240933	7.7	9.5	-1.8	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_2.0	1248271	-	-	-	-	8.2	10	14	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	44	6,600	33	11	43	
30 Jun 2025	BH07_3.0	1240933	7.7	9.4	-1.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_4.0	1240933	7.6	9.2	-1.6	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_4.0	1248271	-	-	-	-	8.2	9.8	22	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	68	13,000	68	22	68	
30 Jun 2025	BH07_5.0	1240933	7.7	9.5	-1.8	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_0.7	1240933	7.5	9.5	-2	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_0.7	1248271	-	-	-	-	7.9	9.9	19	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	58	8,700	43	14	59	
30 Jun 2025	BH10_1.5	1240933	7.5	9.4	-1.9	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_2.0	1240933	7.8	9.1	-1.3	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_2.5	1240933	7.7	9.0	-1.3	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_3.0	1240933	7.9	9.4	-1.5	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_3.0	1248271	-	-	-	-	8.2	9.9	26	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	80	14,000	69	22	78	
30 Jun 2025	BH10_4.0	1240933	7.7	9.4	-1.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_5.0	1240933	7.8	9.5	-1.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_6.0	1240933	7.8	9.5	-1.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_0.5	1240933	7.6	9.4	-1.8	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_1.2	1240933	7.6	9.2	-1.6	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_2.2	1240933	7.7	9.4	-1.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_3.0	1240933	7.9	9.4	-1.5	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_3.0	1248271	-	-	-	-	8.2	10	25	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	79	14,000	70	22	70	
02 Jul 2025	BH02_4.0	1240933	7.8	9.3	-1.5	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_5.2	1240933	7.8	9.5	-1.7	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_5.2	1248271	-	-	-	-	8.1	9.9	24	<0.003	<0.02	<0.02	<2	<2	<2	<3	<0.005	76	14,000	69	22	69	

*Net Acidity = potential sulfidic acidity + Actual acidity + Retained acidity (where value was below limit of reporting it was set to zero - calculated by SMEC)

**Reaction Rate legend: 1.0 No reaction to slight
2.0 Moderate reaction
3.0 Strong reaction with persisten froth
4.0 Extreme reaction

	Sulfur Trail			Calcium Values					Magnesium Values					Acid Base Accounting	
	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur	Acidity - Acid Reacted Calcium	Acid Reacted Calcium	KCl Extractable Calcium	Calcium in Peroxide	Sulfidic - Acid Reacted Calcium	Acid Reacted Magnesium (acidity units)	Acid Reacted Magnesium	KCl Extractable Magnesium	Magnesium in Peroxide	Acid Reacted Magnesium (sulfur units)	Net Acidity (acidity units)	Net Acidity (sulfur units)
	%	%	%	mole H+/t	%	%	%	% S	mole H+/t	%	%	%	%S	mole H+/t	%S
EQL	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	10	0.02
Assessment Criteria (ASSMAC 1998 - >1000 t)														≥ 18	

Date	Field ID	Lab Report Number	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur	Acidity - Acid Reacted Calcium	Acid Reacted Calcium	KCl Extractable Calcium	Calcium in Peroxide	Sulfidic - Acid Reacted Calcium	Acid Reacted Magnesium (acidity units)	Acid Reacted Magnesium	KCl Extractable Magnesium	Magnesium in Peroxide	Acid Reacted Magnesium (sulfur units)	Net Acidity (acidity units)	Net Acidity (sulfur units)
30 Jun 2025	BH07_0.5	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_1.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_2.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_2.0	1248271	0.010	0.080	0.070	8,400	17	0.14	17	14	550	0.67	0.030	0.70	0.88	<10	<0.02
30 Jun 2025	BH07_3.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_4.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH07_4.0	1248271	0.010	0.12	0.11	12,000	25	0.16	25	20	770	0.94	0.040	0.98	1.2	<10	<0.02
30 Jun 2025	BH07_5.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_0.7	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_0.7	1248271	0.010	0.10	0.095	11,000	22	0.12	22	18	720	0.87	0.030	0.91	1.2	<10	<0.02
30 Jun 2025	BH10_1.5	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_2.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_2.5	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_3.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_3.0	1248271	0.010	0.13	0.13	14,000	28	0.13	28	22	1,200	1.5	0.040	1.5	1.9	<10	<0.02
30 Jun 2025	BH10_4.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_5.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Jun 2025	BH10_6.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_0.5	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_1.2	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_2.2	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_3.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_3.0	1248271	0.010	0.12	0.11	15,000	29	0.13	29	23	1,000	1.3	0.050	1.3	1.7	<10	<0.02
02 Jul 2025	BH02_4.0	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_5.2	1240933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02 Jul 2025	BH02_5.2	1248271	0.010	0.12	0.11	14,000	28	0.13	28	22	950	1.2	0.040	1.2	1.5	<10	<0.02

*Net Acidity = potential sulfidic acidity + Actual acidity + Retained acidity (where \

**Reaction Rate legend: 1.0 No reaction to slight
 2.0 Moderate reaction
 3.0 Strong reaction with persisten froth
 4.0 Extreme reaction

Appendix C

Laboratory Certificates

Refer to the Laboratory reports in Appendix F of the Technical Paper Contamination

REFER TO THE LABORATORY REPORTS IN APPENDIX F OF THE TECHNICAL PAPER –
CONTAMINATION



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