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CITY COUNCIL

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Contract

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This report describes work commissioned by Nicole Buckley, on behalf of Redland City Council, by an instruction dated 18/02/2025. The Client's representative for the contract was Nicole Buckley. Maria Vittoria Mastronardi, Clare Yang, Brian Lam and Daniel Rodger of JB Pacific carried out this work.

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The methodology adopted and the sources of information used by JBP in providing its services are outlined in this Report. The work described in this Report was undertaken between February and August 2026 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

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Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

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Abbreviations

ACRS	Australasian Certification Authority for Reinforcing & Structural Steels Ltd
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
ASTM	American Society for Testing and Materials
BYDA	Before You Dig Australia
CBR	California Bearing Ratio
CCTV	Closed-circuit Television
CEMP	Construction Environmental Management Plan
CMS	Construction Method Statement
CPEng	Chartered Professional Engineer
Cth	Commonwealth
DCP	Dynamic Cone Penetrometer
DN	Nominal Diameter
DTMR	Department of Transport and Main Roads
EMP	Environmental Management Plan
EMP(C)	Contractor's Environmental Management Plan
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ESR	Electrical Safety Rules
GFRP	Glass Fibre Reinforced Polymer
HDPE	High-Density Polyethylene
IECA	International Erosion Control Association
ITP	Inspection & Test Plan
JBP	JB Pacific
kN	Kilonewton
kPa	Kilopascal
m	Metre
MDD	Maximum Dry Density
MEP	Marine Execution Plan
MGA	Map Grid of Australia
mm	Millimetre
MSQ	Maritime Safety Queensland
NATA	National Associations of Testing
NCR	Non-conformance Report
NNC	Notice of Non-conformance

NS	Network Standards
NSW RMS	New South Wales Roads and Maritime Services
OMC	Optimal Moisture Content
PCH	Precast Concrete Handbook
PEO Act	Protection of the Environment Operations Act 1997
PP	Polypropylene
PSM	Permanent Survey Mark
PVC	Polyvinyl Chloride Plastic
QECM	Queensland Electricity Connection Manual
QEMM	Queensland Electricity Metering Manual
QMP	Quality Management Plan
RCBC	Reinforced Concrete Box Culvert
RCC	Redland City Council
RCP	Reinforced Concrete Pipe
SI	The International System of Units
SN	Stiffness Rating
SWMS	Safe Work Method Statement
TCAWS	Traffic Control at Worksites
TfNSW	Transport for New South Wales
TMP	Traffic Management Plan
WHS	Work Health and Safety

Definitions

Batter: The uniform side slope of a cut or fill.

Spoil: Any surplus materials or any materials, which cannot be used in the works for any reason.

Subgrade or toe level: The surface of the formation, excluding batter slopes, upon which the structure is founded on.

Existing surface: Insitu surface prior to stripping and excavation or filling.

Formation level: The surface of the finished earthworks, excluding cut or fill batters.

Engineering services: Includes utilities, drains, power cables, network or control cables, sewers, water pipes, gas pipes, ducts or any other pipe, cable, associated structure or similar objects.

1 General

1.1 Definitions

The following applies throughout this Specification:

- Council; refers to Redland City Council.
- Principal; refers to Redland City Council.
- Superintendent; person(s) appointed by the Principal.
- Supplier; refers to a supplier of any product and/or proprietary product.
- Contractor; refers to the constructor, formally engaged by the Principal, to perform services in accordance with this Specification.
- Designer; refers to JB Pacific, responsible for the engineering design as represented on the Contract Drawings.
- Hold Point; refers to an identified point in a process past which the Contractor shall not proceed without a direction from the Superintendent.
- Witness Point; refers to an identified point in a construction process at which an activity is observed.
- Milestone; refers to a point within a project where progress is verified by the completion of an activity or a point which marks the start of an activity.
- Chainage; refers to the pre-identified length that is used to reference locations along the long section.
- Contract Drawings; refers to drawings that have been developed for this Contract and issued for construction.
- The Works: refers to the any activities, structures or associated activities as part of, and in relation to, this Contract during the construction phase.

1.2 Order of precedence

Unless otherwise stated, the following order of precedence shall apply in the event of any inconsistency, ambiguity, or discrepancy between the contract documents below and other specification and standards.

- The Contract
- This Specification
- Contract Drawings
- Principal Supplied Documentation
- Department of Transport and Main Roads (DTMR) Standards
- Australian Standards
- Local Government Standard Drawings
- International Standards
- Binding statutory approval permit conditions.

Any discrepancy shall be referred to the Superintendent for a decision before proceeding with the work.

1.3 Scope

This Specification sets out the construction and fabrication requirements for the manufacture, supply, and installation of works to the Moores Road foreshore protection works. Works include rock armour, toe stabilisation works which directly refers to as "the Works" and shown in the Contract Drawings.

This Specification details the technical requirements for the above activities and associated preparation works. The objective of this Specification is to enable safe and efficient construction for construction personnel, visitors, and the public.

1.4 Contract Drawings

This Specification shall be read in conjunction with all Tender Documentation, associated Standard Specifications and the relevant Australian and International Standards. References to these documents are found throughout this Specification.

Contract Drawings included in the Tender Documentation are listed in Appendix A. The most current revision set of all drawings shall be used. The Contractor shall maintain a copy of the updated drawings on site throughout the duration of the Works. Work on site must follow “Issued for Construction” documentation.

1.5 Order of works

The works should progress in a logical sequence to minimise disturbance and avoid damage. The Contractor shall submit an order of works for review by the Superintendent in the Construction Methodology. Suggested construction sequence by Designer is included in Design Report.

1.6 Reference documents

Reference documents and standards forming part of this specification have been listed in relevant sections. This Technical Specification will take precedence if there are any discrepancies compared to referenced specifications. If no value or method is nominated, the referenced documents shall be used.

Specifications listed are applicable to the scope of this project at this time. IPWEA standard drawings, DTMR specifications form part of the reference documents when called out in this documentation and on the Contract Drawings.

Standard drawings from local governments called out in the Contract Drawings form part of the reference drawings.

1.7 Existing services

The Contractor shall ascertain and verify the location of all services prior to the commencement of work. No responsibility is taken by the Principal for services shown or not shown in the documents.

The Contractor shall take every precaution to protect all existing services, either above or below ground, from damage during construction and shall bear all costs resulting from damage to existing services.

The Contractor is to procure their own Before You Dig Australia (BYDA) search prior to commencement. Procurement of the BYDA drawing set does not alleviate Contractor's requirement to undertake service location on site by a suitably qualified Service Locator, prior to commencing on site construction activities. The Contractor is to note that a suitably qualified Service Locator may not detect all types of buried services, such as non-live wires, polyvinyl chloride plastic (PVC) reticulation pipe, high-density polyethylene (HDPE) reticulation pipe etc. The Contractor is to confirm their strategy for addressing unknown buried services during construction in their Construction Method Statement (CMS).

Excavation by machine within 1.0 m of existing underground services without prior approval from the relevant authority is not permitted.

If it is found necessary to alter the location or level of any existing mains or services to conform with construction under this Contract, the Contractor shall notify the Superintendent immediately.

1.8 Survey

Survey data available for the Site is shown on the Contract Drawings.

All survey data should be considered indicative only. The Contractor is to confirm all levels and the alignment of existing structures prior to commencement of the Works. Elevations are subject to variations over time, due to natural processes. Refer to Section 3 for further clauses relating to survey.

1.9 Damage to infrastructure and assets

The Contractor is responsible for rectification or repair of any damage to adjoining infrastructure, properties, trees and assets resulting from the Works or associated activities to an equal or better standard, including but not limited to roads, car parks, private properties, landscaping and accesses. All rectification or repair work shall be carried out to the satisfaction of the Superintendent. The Contractor shall not alter the structural integrity of existing structures or their assemblies unless specifically noted otherwise.

1.10 Dilapidation survey

The Contractor must undertake a dilapidation survey prior to mobilisation to site for all areas which may be affected by the Contractor's construction activities, including nearby private properties and key aspects along the nominated haulage route such as bends,

intersections and suspect pavement areas. It must include the pavement and kerbing around the Contractor's proposed site office and construction materials storage compound. The Contractor is to deliver the dilapidation survey to the extents and specification provided in the Tender Documentation. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Dilapidation survey.
Submission Details:	At least 10 working days prior to mobilisation to site, submit to the Superintendent the following: (a) As detailed in RFT Clause 5.12. (b) As detailed in Section 1.10 of this specification.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising the release of the HOLD POINT.

The dilapidation survey must be replicated prior to Practical Completion and submitted to the Superintendent for review. The purpose of this survey is to confirm the pre- and post-construction condition of these areas.

The dilapidation survey must consist of photographic record as a minimum, with the provision of a site survey if requested by the Superintendent.

1.11 Structures to be removed

All demolition works shall be in accordance with the relevant codes, practices, regulations, and safety orders of all public authorities having jurisdiction. The Contractor shall field verify all existing conditions prior to the commencement of work. Any discrepancies shall be brought to the attention of the Superintendent. No demolition work shall commence without field verification by the Contractor. The Contractor shall protect all existing structures and adjacent areas affected by the Contractor's operation. Any portion of the project to remain which is damaged shall be repaired or replaced to match the existing condition. The Contractor shall leave no debris and is to immediately remove all debris and salvage from the Site before Practical Completion. The Contractor shall maintain and protect clear exit paths to the public way at all times. The Contractor shall ensure all fire protection systems are maintained in working order at all times.

The Contractor shall identify provisions to control dust and noise and submit them to the Superintendent for approval prior to commencement of work, including the following measures:

- All concrete cutting to be wet cutting, dry cutting is not permitted.
- All demolition works undertaken that create dust are to have dust mist control measures implemented. Proposed measures are to be provided to the Superintendent for approval in writing prior to implementation.

- Notwithstanding the above, the Contractor shall undertake all works (demolition or other) that would result in airborne crystalline silica particles in accordance with all relevant codes and standards.
- The Superintendent reserves the right to terminate works in the instance that dust control measures are deemed ineffective or not being implemented as agreed. The Contractor will then present a revised dust mitigation plan in writing for approval by the Superintendent prior to recommencement of works.

Table 1-1 gives reference to the list of structures to be demolished or partially demolished as part of the Works. Prior to commencement of the works, the Contractor is to give the Superintendent a minimum of ten (10) days' notice of their intention to perform the removal. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Notice of intention to perform the removal of a structure.
Submission Details:	At least 10 working days prior to removal, submit to the Superintendent the written notice indicating the structures, date and time of the intended demolition.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising the release of the HOLD POINT.

The removal or demolition works may be inspected by the Superintendent. This is a **WITNESS POINT.**

WITNESS POINT	
Process Witnessed:	Demolition or removal.
Submission Details	At least two (2) working days prior, provide notice of demolition works. Thereafter, give the Superintendent the opportunity to inspect and witness the demolition process.

Table 1-1: List of structures to be demolished or partially demolished

Description	Drawing number	Requirements
Historic concrete wall/ debris	100	Removal of the informal concrete wall unless confirmed by an RPEQ to be stable and not to compromise the performance of the permanent seawall.
Vegetation	100	Remove vegetation within the seawall permanent footprint.

1.11.1 Removal and disposal of materials

Recycling and disposal off site shall comply with statutory requirements. The Contractor shall be responsible for meeting all costs associated with recycling/ disposing of materials, including any tipping and haulage fees which may be levied.

The Contractor shall adopt the waste management hierarchy of avoidance, reuse, recycling, energy recovery and disposal of waste generated under the Contract. No waste, including vegetative waste or litter, shall be burnt or buried on site. Upon completion of the Works, the Contractor shall ensure that all waste has been removed from the Site.

1.12 "As-Built" information

An ‘As-Built’ submission of the following information shall be made by the Contractor ten (10) working days prior to Practical Completion, as defined in the Contract:

- Electronic copies of updated Management Plans and Method Statements.
- Traffic Management Plan.
- All relevant signed off Inspection & Test Plans, and other checklists.
- Shop drawings.
- “As-Built” Drawings.
- Digital ground model in both DWG or DXF and PDF format.
- Close out of all Non-Conformance Reports.
- Post construction dilapidation survey.

1.12.1 “As-Built” drawings

"As-Built" drawings include information recorded after construction including site directions, service locations, variations, and hidden works. These shall be certified by a Chartered Professional Engineer (CPEng) or a Licensed Surveyor engaged by the Contractor, for accuracy of information. “As-Built” drawings shall be submitted in a digital form following the Superintendent's standards at Practical Completion.

The digital form shall be provided electronically, or by alternative medium approved by the Superintendent. The data shall be supplied in an "AutoCAD" drawing format or as a compatible DXF file suitable for conversion to "AutoCAD".

The positions of all structures and key features shall be referenced to the horizontal and vertical datums used by the Designer. The "As-Built" survey shall be undertaken within ten (10) days following completion of the Works, picking up the following details as a minimum:

- General:
  - Levels, location and geometry of the Works.
  - Changes in grade
  - Contours and features within five metres beyond the footprint of the Works, or to a greater extent if required to capture important features.
- Project specific:
  - Invert levels of pipe networks.

- Invert level of spillway.

1.13 Site facilities

The Contractor shall make all arrangements for any temporary services that may be required for the execution of all Works under this Contract.

The Contractor will liaise with the Principal for power, water, and amenities. The Contractor shall provide any other statutory and necessary amenities and sanitary facilities for workers and other persons lawfully on or near the Site and remove them upon completion of Works. The location of establishment of the Contractor's site facilities shall be approved by the Superintendent.

1.14 Project completion

Prior to project completion, the Contractor is to give the Superintendent a minimum of ten (10) days' notice of the handover. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Notice of completion and handover.
Submission Details:	At least 10 working days prior to completion, clean-up.
Release of Hold Point:	The Superintendent will consider the condition of site, all required documentation and may carry out audit, prior to authorising the release of the HOLD POINT.

1.14.1 Reinstatement

The Contractor shall reinstate all areas disturbed and any structures damaged during the Works to their pre-construction condition, except to the extent that the Site has been upgraded in accordance with the Works. The pre-construction dilapidation survey shall be used by the Superintendent in assessing the acceptability of any reinstated areas.

1.14.2 Disestablishment

Upon completion of the Works, the Contractor shall clear the Site of all surplus materials, plant, fencing, notice boards etc. to the satisfaction of the Superintendent.

1.14.3 Clean-up

The Contractor shall be responsible for the removal and lawful disposal of all surplus spoil and rubbish, and for the final cleaning up of all areas affected by the Works which shall be left clean and tidy upon completion of the Contract.

2 Quality assurance and documentation requirements

2.1 Introduction

The Contractor shall produce the following site-specific documentation for Superintendent's review and approval within fifteen (15) working days of mobilising to site:

- Work Health and Safety Management Plan.
- Quality Management Plan.
- Traffic Management Plan, including:
  - Vessel Management Plan if applicable.
- Construction Environmental Management Plan.
- Construction Method Statement.
- Pre-construction dilapidation survey.

The Contractor shall ensure these documents meet the requirements set out in the:

- Contract.
- Contract Drawings.
- Technical Specification.
- Binding statutory approvals and permit conditions.
- Work Health and Safety Management Plan.

2.2 HOLD POINT

2.2.1 Definition of a HOLD POINT

A HOLD POINT is defined as a position in the progress of the Works under the Contract beyond which further work shall not proceed without mandatory verification by the Superintendent. Mandatory Hold Points shall include those identified in this Specification to ensure compliance with the intent of the designs and with other specified requirements, and to ensure that critical and/or irreversible activities are constructed correctly. The Contractor shall notify the Superintendent ten (10) days prior to achieving a Hold Point.

Mandatory Hold Points shall apply prior to commencement of designated work lots or work items

To obtain authorisation to proceed, the Contractor shall ensure that all work items affected by the Hold Point are conforming.

2.2.2 Summary table of all HOLD POINTS

The minimum required Hold Points for the design shall include (if applicable) but not be limited to:

Section	Hold Point	Applicable (Y/N)
General		
1.10	Dilapidation survey.	Y
1.11	Before structure removal works.	Y
1.14	At practical completion after clean-up	Y
2	In times the Contract Drawings cannot be achieved (founding level, piling refusal depth etc.).	Y
2	Upon issue of an Non-Conformance Report (NCR) or a Notice of Non-Conformance (NNC).	Y
-	Upon submission of Marine Execution Plan (MEP)	N
2.8	Upon submission of the Construction Methodology Statement and before possession of the Site.	Y
Earthwork		
6.9	Foundation preparation	Y
Rock armour work		
7.3	Quality control of rock armour	Y
7.4.5	Completion of rock armour work	Y

Additional Hold Points are at the discretion of the Superintendent.

2.3 WITNESS POINT

2.3.1 Definition of a WITNESS POINT

A WITNESS POINT is a point in the progress of the Works under the Contract where the Contractor must notify the Superintendent prior to proceeding. The Contractor shall notify the Superintendent five (5) days prior to achieving a Witness Point. If the Superintendent chooses not to attend, work may nevertheless proceed, unless otherwise instructed.

Witness Points shall apply to verify compliance of the constructed works with the approved Design Drawings.

2.3.2 Summary table of all WITNESS POINTS

Witness Points shall include (if applicable), but are not limited to:

Section	Witness Point	Applicable (Y/N)
General		
1.11	Demolition and removal works	Y
3.5	Setout	Y

Earthwork		
6.7.1	Inspection of surfaces after removal of unsuitable material.	If applicable
6.7.2	Assessment of material suitability	Y
6.8.2	Testing of foundation soil	If applicable
6.11.2	Placement of geosynthetics	If applicable
Rock armour work		
7.4.4	Construction of rock armour test section	Y

Additional Witness Points are at the discretion of the Superintendent.

2.4 Work Health and Safety Management Plan

The Contractor shall develop, implement, and administer a work health and safety program that will ensure that all construction activities are performed to the relevant work health and safety requirements, and any other relevant statutory requirements. The Work Health and Safety (WHS) Management Plan shall outline project specific risks that may arise during the Works and measures to eliminate or control such risks. The Contractor shall provide the plan for Superintendent's review and approval, fifteen (15) working days prior to mobilisation to site.

The WHS Management Plan must document at least:

- The names, positions and health and safety responsibilities of all persons at the workplace.
- The arrangements in place for managing any work health and safety incidents that occur.
- Site-specific and work-specific health and safety rules such as working near deep excavation, in confined space, in water, and at height etc.
- The arrangements for ensuring that all persons at the workplace are informed of work health and safety rules.
- A site-specific risk register including control measures.
- The arrangements for the collection, assessment, monitoring, and review of Safe Work Method Statements at the workplace.
- Coordination with adjoining property owners and all relevant parties as necessary to ensure a safe construction environment at all times.

2.5 Quality Management Plan

The Contractor shall provide the project specific Quality Management Plan (QMP) for Superintendent’s review and approval, fifteen (15) working days prior to mobilisation to site.

The QMP must document:

- All proposed HOLD POINTS, WITNESS POINTS and Milestones.

- Inspection & Test Plans (ITPs), identifying the tests, frequencies, rejection criteria and responsibilities of each ITP.

The minimum requirements for HOLD POINTS and WITNESS POINTS are provided in Section 2.2.1 and 2.3.2 respectively.

The reporting system must record all results obtained during, but not limited to inspection, testing, transporting, production, supplying and installation. Standard forms of ITPs must be used as a basis for the development of the ITPs and quality control records supplemented by the requirements of this Specification.

The Superintendent is permitted to make inspections at any time at the source of supply of materials, at the place of preparation, and during installation at the Site.

2.6 Traffic Management Plan

The Contractor shall provide the project specific Traffic Management Plan (TMP) for Superintendent's review and approval, fifteen (15) working days prior to mobilisation to site.

The TMP must be compliant with the relevant authority:

- The current version of the Queensland Manual of Uniform Traffic Control Devices, Part 3 and be prepared by a Qualified Traffic Management Designer.

The approved access point to the Site and laydown area are to be clearly nominated in the TMP. Other access points may be considered, which will require approval from the Superintendent prior to mobilisation to site.

The Contractor shall be responsible for the remediation of any access points back to pre-construction standard following the completion of works to the satisfaction of the Superintendent.

Materials must be transported to the Site along a route approved by the Superintendent. Within the TMP, the Contractor must provide and represent the proposed haulage route(s) and alternative route(s) through detailed description and an A3 plan drawing.

The Contractor shall use vehicles which are of a type specifically constructed for hauling material and shall travel with caution in high pedestrian use areas.

2.7 Environmental Management Plan

The Contractor's Environmental Management Plan (EMP(C)) shall document all environmental-specific roles and responsibilities of key personnel.

2.7.1 Permits and approvals

Conditions outlined in the planning report shall form part of the EMP(C).

Additional approval conditions following award of the Construction Contract, pertaining to the Contract may be placed onto the Contractor to meet approval conditions. Any new

conditions should be met at short notice. The Principal will indicate whether any such condition constitutes a variation from the Tender Contract.

The Contractor shall be responsible for identifying statutory requirements and obtaining all other approvals that are required for construction activities to occur. The EMP(C) shall include a list of all approvals relevant to the Contract. Details shall include:

- Name, type, and reference number of approvals.
- Administering authority.
- Commencement and expiry date.
- Conditions of approval.

Where environmental approvals contain or are likely to contain conditions that will extend beyond the period of the Contract, the Contractor shall seek advice from the Superintendent regarding the acceptance of the environmental approval condition prior to formalising the approval.

A suitably qualified ecological consultant shall be engaged to complete a self-assessment in line with the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) to understand whether there will be significant impact to protected matters or matters of national environmental significance requiring an EPBC Act referral.

2.7.2 Site induction

Prior to commencing ground disturbing activities, the Contractor shall ensure that all staff involved in or supervising these activities have attended an environmental site induction. This includes, as a minimum, all site management staff, employees, and subcontractors working on activities which disturb the natural ground surface. The Contractor shall prepare and deliver a contract specific site induction for all persons prior to entering the Site. The Contractor shall maintain a register signed by those inducted. The register shall contain but not be limited to the name of inductees, dates inducted and the name of the induction facilitator. A copy of the Contractor's environmental site induction shall be included in the EMP(C).

The induction shall include, but not be limited to:

- Basic roles and responsibilities for environmental management including general environmental duty and duty to notify under relevant Act:
  - QLD works: Environmental Protection Act 1994.
- Specific locations within the Site of environmental and/or cultural heritage significance or risks, including exclusions zones and details of prohibited and restricted biosecurity matters on site.
- The scope and conditions of approvals applicable to the Contract.
- Locations of ancillary activities deemed suitable by the Superintendent (including but not limited to stockpile sites, turnaround points, construction water and material sources).

- The limit of clearing and the boundary of any protected sites identified in the Cultural Heritage Management Agreement or Cultural Heritage Management Plan (where applicable).
- Environmental management measures stipulated in the EMP(C).
- Procedures for notifying of potential environmental and cultural heritage incidents.
- Contingency plans for unplanned incidents.

2.7.3 Specific element requirements

The EMP(C) shall include the environmental management of the Works under the Contract including temporary works and ancillary activities, including sourcing water, gravel, side-tracks, stockpile sites, Contractor's site facilities and camps, and turnaround points. The Contractor shall select management measures which are reasonable and practicable for the environmental impacts they are managing.

Environmental elements incorporated in the EMP(C) shall include, but may not be limited to those detailed in the following sections:

- Clause 2.7.4– Water quality.
- Clause 2.7.5- Cultural heritage.
- Clause 2.7.6– Noise and vibration.
- Clause 2.7.7 – Air quality.
- Clause 2.7.8 – Acid sulfate soils.
- Clause 2.7.9 – Contaminated sites.
- Clause 2.7.10 – Native fauna.
- Clause 2.7.11 – Vegetation.
- Clause 2.7.12– Biosecurity and pest management.
- Clause 2.7.13– Waste.
- Clause 2.7.14– Chemicals and fuels.

2.7.4 Water quality

The Contractor shall be responsible for the management of water quality to meet contractual and legislative requirements, and not cause environmental harm or environmental nuisance to waterways or the ocean, within or adjacent to the Site or adjacent waterways, wetlands or marine environments into which the Site discharges. The management of water quality shall comply with the provisions of the relevant Act.

The Contractor shall develop and implement an appropriate erosion and sediment control plan in accordance with the principles contained in the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Guidelines 2008 for the duration of the Contract. The plan shall be rigorous in controlling turbidity and resin debris as required by relevant guidelines and the relevant Act.

The Contractor shall develop and undertake a water quality monitoring plan to verify the effectiveness of management of water quality risks from the Site. Monitoring of discharges

and waterways shall consist of visual monitoring for this Contract and will be documented in the form of a spreadsheet and photographs of the monitoring locations. Photographs must include a time and date stamp. Rainfall data from the Bureau of Meteorology may be used for any comparison with monitoring where required.

Where monitoring observes discharges or waterways to be visually contaminated, to show a visible accumulation of sediment or other contaminant within a waterway at the point of discharge, or when a complaint is received, the Contractor shall undertake investigations, assess whether reasonable and practicable measures are implemented, and whether corrective actions are required. The outcome of the investigation shall be recorded and reported to the Superintendent. The Superintendent may at their discretion instruct the Contractor to undertake further investigations and/or undertake additional water quality monitoring.

2.7.5 Cultural heritage

The Contractor shall be responsible for the management (including protection) of cultural heritage within and adjacent to the Site, in compliance with the Aboriginal Cultural Heritage Act 2003 (QLD), Torres Strait Islander Cultural Heritage Act 2003 (QLD), Heritage Act 1992 (QLD) and the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth), Where a Cultural Heritage Management Plan or Cultural Heritage Management Agreement is in place, the Contactor shall operate in accordance with its conditions.

A Stop Works Procedure for historic and aboriginal cultural heritage protection shall be included in the EMP(C).

2.7.6 Noise and vibration

The Contractor will need to prepare for and advise on the monitoring and management of noise and vibration based on professional advice from a suitably qualified person(s). The Contractor shall take reasonable and practicable management measures to avoid and mitigate environmental harm or environmental nuisance from noise and vibration associated with the Works under the Contract. Refer to the Superintendent for guidance and ensure all adjoining property requirements relating to noise and vibration are met. If it is established that there are no site-specific requirements, then the Contractor shall refer to minimum requirements for abatement of noise and vibration nominated by relevant statutory requirements.

2.7.7 Air quality

The Contractor shall be responsible for managing work under the Contract to avoid and minimise environmental harm and nuisance associated with air quality, including that from dust, smoke and offensive odours and other air pollutants. Burning of material is not permitted on site.

2.7.8 Acid sulfate soils

The Contractor shall be responsible for the management of actual or potential acid sulfate soils (ASS) within the Site. The EMP(C) shall address requirements concerning the identification and management of actual and potential ASS that may be encountered. Refer to Section 6.7.4 for further information on the management of ASS.

2.7.9 Contaminated sites

The Contractor shall take reasonable and practicable management measures to mitigate contamination and to manage known contaminated sites in order to avoid and prevent the spread of contaminants either within the Site or beyond the boundary of the Site. Management shall be in accordance with statutory requirements under the relevant Act.

2.7.10 Native fauna

The Contractor shall take reasonable and practicable management measures to avoid environmental harm to native fauna, and to known fauna habitats and breeding places. Where environmental harm cannot be avoided, the Contractor shall comply with the provisions of both State and Commonwealth legislation pertaining to native fauna.

2.7.11 Vegetation

The Contractor shall take reasonable and practicable management measures to avoid disturbance to vegetation and the ground surface outside of the limits of clearing and to minimise disturbance areas within the limits of clearing where practicable.

2.7.12 Biosecurity and pest management

The Contractor shall comply with the relevant Biosecurity Act. The Contractor shall fulfil their general biosecurity obligations to mitigate biosecurity risk from prohibited and restricted biosecurity matters (including but not limited to invasive animals and plants) within the Site by preventing their spread into the Site, within the Site and out of the Site.

2.7.13 Waste

The Contractor to demonstrate waste management plan.

2.7.14 Chemicals and fuels

Management of hazardous substances or dangerous goods (flammable and combustible liquid storage) shall comply with AS 1940 and AS 3833, as well as satisfying the requirements of the Environmental Protection (Water) Policy 2009 (QLD). No fuel shall be stored on site.

The Contractor shall ensure spill response equipment is available on the Site for use in an emergency. Spill response equipment shall be commensurate with the site location, topographical features, type and quantity of chemicals and fuels being used, and the time of year the Contract is undertaken. All site personnel shall be trained in the use of spill response equipment.

The Contractor shall promptly remediate any contamination resulting from spills, leaks and discharges to a condition similar to that before the contamination and to the Superintendent's satisfaction.

Refuelling of machinery shall conform to the following requirements:

- Occur away from the ocean unless for tracked machinery and with contingency plan management measures available in the immediate area.
- Fuelling activity to be supervised at all times.
- Hoses to be fitted with a stop valve at the nozzle end. Machinery shall be maintained to minimise the leakage of oil, fuel, hydraulic and other fluids.

2.8 Construction Method Statement

A Construction Method Statement shall be submitted to the Superintendent for approval within fifteen (15) days of mobilising to site. This will describe and address each requirement of this Specification. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Construction Method Statement.
Submission Details:	Within fifteen (15) days of mobilising to site, submit to the Superintendent the following: (a) Provide a written Construction Method Statement which conforms with Section 2.8 of this Specification.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising the release of the HOLD POINT.

The Construction Method Statement must detail the following for all activities:

- Conformance with the requirements of this Specification.
- Working methods and selection of plant, equipment, techniques.
- Temporary works, including details of any shoring.
- Lifting schedules (if applicable).
- Site delivery.
- Stockpile schedules and locations.
- Construction program.
- Safety measures and procedures.
- Dilapidation survey.
- Site access including locations.
- Methods to protect permanent works.
- General site planning including layout of compounds.
- Any works that affect private properties including measures to provide security.
- Methods for protection of permanent survey marks or other features.
- Methods when buried services are identified, known and unknown.

The Construction Method Statement must include details on the following where applicable:

- Proposed plant and equipment contingency plans for:
  - Unsuitable existing subbase material.
  - Adverse weather response and protection of works.
  - Reasonable differences in ground profile resulting in inability to construct Works to the lines and levels shown in the Contract Drawings.
  - Piling activity (depth and refusal).
- Proposed methods for estimating, tracking and determining actual volumes of unsuitable, foreign body or other waste material to be removed from site.

- Proposed methods for verifying grading of earth materials.
- Proposed methods for the protection of plants/turf/trees during revegetation and ensuring plants will survive an initial 60 days post planting.

The Construction Method Statement must demonstrate the ability to comply with the following:

- Site survey; refer to Section 3.
- Demolition of existing structures; refer to Section 1.11.
- Earthworks; refer to Section 6.
- Procurement, supply, and installation of pre-manufactured items.
- A construction program (Gantt chart in Microsoft project or similar). The program must highlight all tidal windows available to undertake the specific element of work if applicable.

The Contractor shall submit for review by the Superintendent any design modification necessary to allow for the Contractor's proposed method of construction of the Works, including temporary access necessary for the construction.

Approval by the Superintendent of the Contractor's Construction Method Statement for all activities does not relieve the Contractor of its responsibility for the safe design and implementation of any work.

2.8.1 Compound and stockpiles

The Construction Method Statement must include an A3 sketch plan showing the proposed compound area and laydown area for construction materials.

Any material stockpiles must be formed so that they do not constitute a hazard. The locations, side slopes and heights must be shown and/or stated on the sketch plan. Direction given by the Superintendent on all factors affecting safety must be followed.

Stockpiles must not obstruct the natural flow of any surface water, nor contribute to any sediment runoff. The Contractor's method for protection of stockpiled material shall prevent the loss of any material by tide, flooding, or current actions.

All materials, stockpiles and containments must be located within the site compound area.

The Contractor shall be responsible for the removal of excess material and remediation of stockpile locations to ensure that the Site is in a clean and presentable condition (as before construction commenced).

2.8.2 Temporary fencing

The Contractor's working area shall be restricted to those areas directly affected by the Works. The Contractor's working area shall be agreed with the Superintendent before work commences on the Site.

The Contractor shall maintain all fencing and ensure that a practicable continuous barrier is provided around the perimeter of the Site.

2.8.3 Temporary works

The Contractor shall include and prove sufficiency of all temporary works designs in the Construction Method Statement. Care shall be taken not to damage any portion of the permanent works. Damage to the permanent works during installation or removal of temporary works shall be repaired by the Contractor at their own cost to the satisfaction of the Superintendent.

2.8.4 Disposal requirements

All debris (including hazardous material) resulting from clearing operations must be removed from the Site and disposed of at a place approved for the receipt of such material. The Contractor to confirm the disposal facility.

3 Survey

The Contractor is to conduct a pre-construction survey of the worksite at the beginning of the Works. Any significant discrepancy requiring change of design shall be submitted to the Superintendent. The Contractor shall be responsible for obtaining detailed information of changing and/or submerged, buried environment including the possible presence of objects on or below the existing ground, channel/river/sea bed levels not necessarily shown on the Contract Drawings.

3.1 Survey audit

All survey work shall be carried out by a Registered Surveyor.

The Contractor shall be responsible for the collection and processing of the survey data and the provision of all survey equipment required to complete this activity to the satisfaction of the Superintendent.

The Contractor shall provide all labour, materials, and other assistance that the Superintendent may require at any time to check the setting out of the Works or to make progress measurements.

The Contractor is requested to check and confirm acceptance of the pre-construction survey information provided by the Principal prior to commencement of the Works.

Should the Contractor identify any discrepancies from the contract quantities to quantities calculated from this survey this shall be brought to the immediate attention of the Superintendent.

The Datum for all levels, soundings and contours referred to in this specification and the contract drawings is the Australian Height Datum (AHD). The horizontal coordinate system referred to in this specification and the contract drawings is GDA94 MGA Zone 56.

The Contractor shall be responsible for establishing and maintaining any additional survey marks required to complete the Work as specified. The Contractor shall preserve all survey marks and benchmarks. In the event of accidental destruction of a mark(s) by the Contractor, the cost of restoration shall be borne by the Contractor.

The Contractor shall be responsible for all line and level surveys necessary to check that the Works are constructed in accordance with the Contract Drawings.

3.2 Permanent survey marks

Permanent survey marks (PSMs) are established at various locations near the Site.

PSMs shall be undisturbed, safeguarded and preserved unless in a position of direct conflict with the permanent works. Any PSM disturbed by an action associated with the Works under this Contract shall be reinstated including those in direct conflict with the permanent Works.

PSMs located to conflict with the permanent works shall be relocated outside the scope of the permanent works.

All PSMs shall be established to the following accuracy limits by a Registered Surveyor:

- Position accuracy ±0.002 m
- Level accuracy ±0.005 m.

All PSMs shall consist of a metallic cap set in a stable concrete plinth, at least 0.3 m³ in volume, with its identification mark, co-ordinates and elevation permanently marked on it. The benchmark plates shall not be centre popped until checked and approved by the Principal, with scribe marks to be used in the meantime.

All PSMs shall be clearly identified, such that they are visible from a distance of 20 metres.

3.3 Tolerances

Tolerances for positions and levels of the various items of the works shall be as detailed in the relevant sections of this Technical Specification.

3.4 Survey staff

A licensed and competent Surveyor shall be employed to ensure that all works are executed true to the lines and levels shown on the Contract Drawings and that adequate dimensional and level control of the Works is maintained.

3.5 Setting out the works

Subject to specified tolerances, all work is to be set out in accordance with the Contract Drawings and constructed to the lines, levels and other details shown on the Contract Drawings.

The Contractor shall engage a Registered Surveyor to set out the Works and shall make good any error in setting out the Works at their own cost and to the satisfaction of the Superintendent.

Prior to commencement of the Works, the Contractor shall establish the project datum by using a system of temporary benchmarks. All set out dimensions shown on the Drawings shall be verified by the Contractor on site before work commences. This is a **WITNESS POINT.**

WITNESS POINT	
Process Witnessed:	Setting out.
Submission Details	At least two (2) working days prior, provide notice of set out work. Thereafter, give the Superintendent the opportunity to inspect and witness the set out works.

Where necessary, the Contractor shall carry out surveys to locate and/or reinstate any boundary pegs required for setting out. On completion of construction, the Contractor shall reinstate any PSMs and boundary pegs which may have been disturbed by the Works. The cost of all necessary surveys shall be included in the lump sum price.

3.6 Survey equipment

All survey shall be undertaken using modern survey instruments suitably calibrated and recorded. Minimum requirements are:

- Theodolites capable of reading to an accuracy of within 5 mm.
- Electronic distance measurement equipment capable of reading to an accuracy of within ±5 mm.

Total station equipment is preferred.

3.7 Processing of survey data

All survey information shall be presented clearly and concisely at appropriate scales to A3/A1 paper format. In addition, information shall be provided in digital form to DXF format such that it can be utilised in AutoCAD as well as in a format that can be utilised in Civil 3D, 12d Model or similar.

3.8 Data availability

At the request of the Superintendent, the Contractor shall supply, free of charge, any digital depth, height, coordinate and other survey information and associated documentation held by the Contractor for the purpose of verification or computation by the Superintendent. Information shall be supplied within five (5) working days of the request and shall be in a digital format as requested by the Superintendent.

3.9 Survey by Principal

For purposes of verification, Principal may from time to time undertake compliance check surveys at any location or any cross-section. Any non-compliance detected by such surveys shall be remedied by the Contractor at no cost to Principal.

3.10 Compliance survey

Compliance surveys shall be undertaken by the Contractor.

The Contractor will prepare additional compliance surveys at their own costs to justify progress payment, if required. Compliance surveys shall be included in quality records.

In the event that the surveyed work does not meet the requirements of the Specification, the Superintendent may instruct the Contractor to reconstruct that component of the Works and resubmit the survey for approval. The time for Practical Completion shall not be affected by such rectification activities, and the cost of all works associated with the rectification including re-survey shall be borne by the Contractor.

3.11 Existing works - joining up

Where the Works connect to, are continuous with, or adjacent to existing works, the Contractor shall confirm that the existing works conform in level and location with those shown on the Contract Drawings before commencing work on the Site.

Where the method of joining old and new work is not otherwise specified, the cutting away and joining up shall be carried out in a manner approved by the Superintendent and will match existing adjacent work.

No claim will be entertained consequent upon the Contractor failing to ensure that these conditions are met.

4 Additional site information

4.1 General

Additional site information can be found in the Tender Documentation. Weather, tide, natural hazards such as flood and fire information of site shall be obtained by Contractor.

4.2 Geotechnical information

Geotechnical investigations reports are included in the Tender Documentation. The Contractor shall familiarise with the site and follow recommendations proposed by geotechnical engineers.

5 Protection of the Works

5.1 General

The Contractor shall be responsible for protecting the Works from tidal action, flooding, and runoff. Protection of the Works shall be provided for the duration of the Contract.

The Contractor shall construct the Works in a manner which limits the extent of works exposed to the action of water levels and runoff, and which limits stockpiles of excavated material potentially exposed to accelerated erosion due to currents and runoff.

5.2 Wave action and erosion

The Contractor shall inform themselves of the wave conditions likely to be encountered, including the effects of wave action on water levels, and adopt work methods and implement temporary works accordingly.

The method of protecting the Works from wave actions shall be as stated in the Contractor's approved Method Statement.

In planning and implementing any system of temporary protection of the Works from wave action, the Contractor shall ensure that the system does not create adverse effects such as increased erosion at areas adjacent to the Works.

The Contractor shall be deemed to have made their own assessment of wave action to be encountered during construction of the Works and to have made adequate allowance for these conditions in the Tender.

5.3 Tidal action and flooding

The Contractor shall inform themselves of the likely tide conditions, flood levels and currents to be encountered during the Works.

The Contractor shall be deemed to have made their own assessment of tidal action and flooding to be encountered during construction of the Works and to have made adequate allowance for these conditions in the Tender.

5.4 Overland flows

The Contractor shall be responsible for the temporary diversion of any overland flows and runoff from the existing stormwater system(s) and the management of overland flows due to any surcharging of stormwater pits where applicable.

The Contractor shall be deemed to have made their own assessment of the need for temporary diversion of stormwater and of the overland flows likely to be encountered during construction and to have made allowance for these conditions in the Tender.

5.5 Dewatering

The Contractor shall be responsible for dewatering areas of the Site as required during construction such as in excavations, and for preparation of foundations, placement of concrete and backfilling.

The Contractor shall adequately control and remove all surface water, including tidal water and groundwater, necessary for completion of the Works as required.

The Contractor shall be deemed to have made its own assessment of dewatering requirements during construction of the Works and to have made adequate allowance for these requirements in the Tender.

5.6 Temporary works

Temporary works such as shoring of excavations, working platforms, barriers and any temporary works deemed necessary for the construction shall be the responsibility of the Contractor. This includes construction, installation and certification of temporary works and the design of such temporary works. The Contractor shall satisfy themselves that any temporary works will not negatively impact the performance or stability of the permanent works.

6 Earthworks

6.1 Scope

The Contractor shall supply all plant, materials and labour required for the minor surface preparation, local profiling, and supply, transport, placement, finishing, and testing of earthworks to permit construction of the Works as shown on the Contract Drawings and specified herein.

6.2 Reference documents

6.2.1 Standards Association of Australia

AS 1141	Methods for sampling and testing aggregates
AS 1726	Geotechnical site investigations
AS 1289	Methods of testing soils for engineering purposes
AS 3798	Guidelines on earthworks for commercial and residential developments
AS 4678	Earth-retaining structures
AS 4997	Guidelines for the design of maritime structures

6.2.2 Queensland Department of Transport and Main Roads (DTMR)

MRTS04	General earthworks
MRTS06	Reinforced soil structures
MRTS16	Landscape and Vegetation Works
MRTS27	Geotextiles (separation and filtration)
MRTS50	Specific quality system requirements

6.2.3 Other

ASTM D5034	Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D5035	Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)

6.3 General

For this project, a no-dig construction approach applies. Earthworks are limited to minor surface preparation, local regrading, and placement of materials as shown on the Contract Drawings. Clauses referring to excavation, battering, trenching, trial pits, foundation

improvement, or bulk earthworks apply only where explicitly shown on the Contract Drawings or where otherwise approved by the Superintendent.

Works supervisors shall have a basic understanding of Aboriginal site identification and have access to the corresponding registered Culture Heritage Body or Native Title body corporate contact details should suspected archaeological materials be located. All workers undertaking ground disturbing works shall complete Superintendent's cultural heritage training and follow Superintendent's finds procedure if required by the Superintendent.

Contactor is responsible for the stability of excavation and stockpile materials. Contractor shall be satisfied to their temporary works. Contractor is responsible for safety of all on site personnel.

6.4 Tolerances

Where no tolerances are given in this Technical Specification, then tolerances required by the relevant Australian Standards and reference Specifications shall apply.

6.5 Testing and control

The following information shall be supplied for all fill material:

- Location and source of material for imported material.
- A summary of test results indicating that the material complies with all the requirements specified herein, endorsed by a National Association of Testing Authorities (NATA) accredited laboratory for the performance of such tests.

Trial pits shall not be undertaken unless expressly approved by the Superintendent. Verification of subsurface conditions shall rely on the Geotechnical Investigation and surface inspection.

6.6 Site preparation

The plant and equipment used in the Works shall be appropriate for the execution of the tasks and shall always be maintained in satisfactory working condition while operating.

The Contractor is to be and shall remain solely responsible for the excavation methods, procedures, and practices.

The Contractor shall submit a Construction Method Statement to the Superintendent for approval as per Section 2.8 of this Specification. Approval by the Superintendent does not relieve the Contractor of its responsibility for the safe design and implementation of excavation work.

The Contractor shall provide all temporary works necessary to retain the sides of all excavations in a manner which ensures safe working and protection of surrounding works.

This may include battering back of excavation slopes, use of shields, and installation of temporary supports and provision of covers and/or fencing.

The Contractor shall be responsible for the safety and stability of all excavations, the effect of excavations on adjacent works and the design and construction of all temporary supports. The Superintendent may direct the installation of additional support it considers necessary; however, this shall not absolve the Contractor of its sole responsibility for the support of the excavation.

The Contractor shall be responsible for any damage to existing services, structures, walls, fences, batter slopes, trees and other property on the Site and adjoining properties that result from excavation and construction works.

The Contractor shall ensure excavations are adequately fenced, secure, well-lit, and signed to ensure personnel safety.

All machinery shall be cleaned prior to arrival and departure from site to prevent the spread of noxious materials.

6.6.1 Demolition of existing infrastructure

Obsolete materials or structures shall be removed fully, including vegetation within the permanent works zone.

Weather and tidal forecasts shall be reviewed as part of the planning of the Works. Any works that may be impacted due to weather or tidal conditions shall be postponed until the risk is sufficiently reduced.

Suitable materials bored from excavation and deconstruction activities can be used within the proposed works should they comply with material specifications. Unsuitable material that does not meet the specification (including rocks, trees, and other materials) shall be removed from the Site and disposed of to a waste facility approved by the Principal.

Areas for stockpiling should be cleared, levelled and free of services, debris and other obstructions.

6.6.2 Clearing, grubbing, and stripping

Clearing, grubbing, and stripping shall be undertaken only where required within the permanent works footprint or where expressly shown on the Contract Drawings, and shall otherwise be avoided. The extent of clearing and stripping shall be limited to the minimum necessary to facilitate placement of the Works and associated surface preparation.

Where vegetation removal is required, clearing and stripping shall be restricted to the removal of vegetation, organic matter, roots, and surface debris that would interfere with the stability or performance of the permanent works. Stripping depths shall be kept to a minimum and shall not exceed that required to achieve a suitable bearing surface for the Works.

No clearing, grubbing, or stripping shall be undertaken outside the approved limits of work without prior approval from the Superintendent. Areas not subject to works shall be protected to prevent disturbance. Where no vegetation clearance is required, no grubbing or stripping shall be undertaken.

Any additional clearing required for temporary access, stockpiling, or construction activities shall be subject to Superintendent approval and shall be completed in accordance with environmental and cultural heritage requirements All tree stumps, logs, undergrowth, noxious weeds, grass, roots, obstructions and rubbish of every description shall be cleared from the area within the limits of the permanent works or as instructed by the Superintendent. Vegetation to be kept unless state otherwise. Prior to removal of large vegetation, the Superintendent must be notified.

The Contractor shall be responsible for additional clearing necessary for their own storage, access and work areas in locations only as approved by the Principal.

6.7 Excavated materials

6.7.1 Unsuitable materials

An unsuitable material, as defined for all purposes for this Contract, is a material that is not suitable to be left in its current position. Unsuitable materials may include mud, slurry, or other semi-liquid solids incapable of supporting construction equipment, topsoil, clay, any rubbish (resin), etc. Unsuitable and surplus materials shall become the property of the Contractor. Superintendent shall be given notice to inspect the surfaces after removal of unsuitable material. This is a **WITNESS POINT.**

WITNESS POINT	
Process Witnessed:	Surfaces post unsuitable material removal.
Submission Details	At least two (2) working days prior, provide notice to Superintendent. Thereafter, give the Superintendent the opportunity to inspect and witness the surfaces.

6.7.2 Suitable materials

Any excess material generated due to decommissioning of existing structures may be re-used as shown in Contract Drawings, if approved by the Superintendent. This is generally limited to rock armours, and soils as fill or landscaping materials. The re-use of geotextile, metal fixings such as bolts, nuts, recovered concrete elements or other arisings is not permitted.

All materials recovered from excavations and decommissioning of existing structures shall be assessed for processing and re-use if deemed suitable. The Contractor shall advise the Superintendent of their assessment prior to re-using any excavated materials in the Works. The Superintendent may order the Contractor to re-assess the materials until an acceptable classification is obtained for all materials which are to be re-used in the Works. Suitable

material is to be assessed for compliance with this Specification by the Superintendent. This is a **WITNESS POINT.**

WITNESS POINT	
Process Witnessed:	Assessment of material suitability.
Submission Details	At least two (2) working days prior, provide notice of the proposed use of any suitable materials. Thereafter, give the Superintendent the opportunity to inspect and witness the placement of suitable materials.

All materials recovered from excavations and decommissioning of existing structures shall be assessed for processing and re-use where deemed suitable. The Contractor shall advise the Superintendent of their assessment prior to re-using any excavated materials in the Works. The Superintendent may order the Contractor to re-assess the materials until an acceptable classification is obtained for all materials which are to be re-used in the Works.

Excavated materials that are unsuitable for any reason cannot be used in the Works and shall be disposed of in accordance with the requirements of this Specification. This may include Acid Sulfate Soils.

If the stripped or excavated materials which have been approved for re-use in the Works cannot be incorporated into the Works at the time of stripping or excavation, then the materials shall be stockpiled for later use.

6.7.3 Hazardous waste

The Contractor shall provide notice immediately to the Superintendent if hazardous materials or conditions are encountered during excavation.

6.7.4 Acid sulfate soil management

The Contractor will be responsible for the appropriate management of acid sulfate soils (ASS) should they be identified. If applicable, an ASS Management Plan shall be submitted to the Superintendent for approval prior to the start of the Works.

If suspect soils are excavated, the Superintendent is to be contacted for advice. Material which may indicate the presence of ASS includes black, mangrove-type soil, orange or yellow staining within the soil, pyrite crystals or an eggy odour.

6.8 Fill material

All materials used as fill shall be free from deleterious matter and shall be sampled and tested to confirm they comply with the requirements of this Technical Specification.

No material containing the following may be used:

- Vegetable matter.
- Contaminated material.

- Organic or dispersive clays or silts.
- Ashes, or similar materials.
- Any material which, in the opinion of the Superintendent, will scour significantly.

Only hand-operated compaction equipment shall be allowed within 1.5 m of the front of existing structures and newly installed structures.

6.8.1 Backfill to soil retaining structures

Backfill to soil retaining structures shall be as shown on the on the Contract Drawings. Granular backfill behind the wall should use the mechanical interlock method of construction and be placed such that hydraulic continuity between the material is maintained. Compaction induced horizontal pressures can induce significant loads on retaining walls and only light compaction equipment, such as hand-held, vibratory plate compactors should be used within 1.5m of the wall facing.

6.8.2 Foundation improvement through stabilised sand

Foundation improvement works, including stabilised sand placement, Dynamic Cone Penetrometer (DCP) testing, over-excavation, or replacement of foundation materials, are not anticipated for this project due to the adopted no-dig construction approach and the reliance on existing ground conditions and previously installed emergency works.

Earthworks are limited to minor surface preparation, profiling, or reworking required to facilitate placement of the permanent works. No excavation below existing ground levels or disturbance of underlying formation shall be undertaken unless explicitly shown on the Contract Drawings or approved in writing by the Superintendent following advice from an RPEQ.

Consistent with the Geotechnical Investigation, foundation conditions shall be assessed by a suitably qualified geotechnical RPEQ during construction to confirm that the founding materials are suitable to receive the permanent works and that no foundation improvement is required.

Where such assessment confirms acceptable conditions, no further action is required. Where localised instability or unsuitable conditions are identified, remedial measures shall be limited to non-invasive treatments where practicable. Any verification testing undertaken following remedial works shall constitute a **WITNESS POINT**.

WITNESS POINT	
Process Witnessed:	Testing of foundation soil.
Submission Details	At least two (2) working days' notice in writing of the first DCP testing. Thereafter, give the Superintendent the opportunity to witness future tests. Following testing, submit documentation, including test results, verifying that foundation conforms to the specified

	requirements. The Superintendent will consider the submitted documents and may carry out surveillance and audit.

6.8.3 Controlled Soil Fill

All soil fill should be compacted at moisture contents within the range of ±2% of OMC for Standard Compaction. Fill particles greater than 100 mm must be excluded. Fill should be placed in maximum 250 mm thick (loose thickness) layers and be compacted by repeated rolling to achieve a dry density ratio of at least 98% of the maximum Dry Density Ratio (Standard Compaction method), or 75% of the Dry Density Index for cohesionless fills (e.g. sands).

Should importation of soil fill be required, it is recommended that such fill should comply with the following:

- Minimum CBR value of 10%.
- Maximum 'fines' content (percent passing 0.075 mm sieve) of 10%.
- Plasticity index not exceeding 15%.

Confirmatory compaction testing must be carried out at regular intervals. A minimum of two tests per vertical lift is recommended where structural fill heights are to exceed 300mm. Further details for inspection and testing of fill are given in AS 3798.

6.8.4 Free draining material

Free draining material shall be per MRTS04.

6.8.5 Clay fill

Compaction per Section 6.8.3.

Should importation or recycling of insitu soil be required, such fill shall comply with the following:

- Minimum CBR value of 10%.
- 'Fines' content (percent passing 0.075 mm sieve) of 30% to 60% of weight.
- Sand content (percent passing 2.36 mm sieve) of 10% to 40% of weight.
- Gravel content (percent passing 63mm sieve) of 0% to 15% of weight.
- Plasticity index not exceeding 15%.
- Liquid limit not exceeding 50%.
- Permeability not exceeding 1.4E-07 m/s after compaction.

Confirmatory compaction testing must be carried out at regular intervals. A minimum of two tests per vertical lift required where structural fill heights are to exceed 300mm. Further details for inspection and testing of fill are given in AS 3798.

6.8.6 Rock fill

Prior to the commencement of rock filling, a suitable geosynthetic material per drawing should be laid out over the subgrade areas.

The select rock fill shall be sound igneous or metamorphic material that will not disintegrate when exposed to weather and saline conditions, or easily erode. Rocks should be fresh or slightly weathered, being of very high strength (or stronger) as defined by AS 1726.

Rock fill shall be placed in such a manner that all relatively large stones shall be essentially in contact with each other, and all voids filled with finer rock to achieve a well graded, compact mass. Rock fill shall be washed on adjacent areas, or prior to being transported to site, to remove fine material prior to handling and placement. The rock fill must be 'benched' into any sloping ground. Rock fill placement and compaction should achieve a strong mechanical interlock, following the method specified in MRTS04.

6.8.7 Placement of fill material

Fill material shall be placed in layers of uniform thickness such that any particles larger than the maximum size which have not been removed in the excavation shall be either broken down into particles of the required size or removed from the fill completely.

Mixing and placing procedures and associated equipment shall be adjusted as necessary to obtain the finished surface levels within the allowable tolerances, to prevent segregation and degradation, and to reduce or accelerate loss or gain of water.

Prior to placing adjoining sections, segregated or contaminated material at the end of the preceding section or at the edge of an abutting area shall be rejected and removed and disposed of in accordance with the requirements of this Specification.

Any areas that are damaged by environmental conditions shall be reinstated to conform to the requirements of this Specification.

The Contractor is responsible for the method of construction and selection of plant used when filling near and under water.

Where fill is to be placed against an existing slope steeper than one vertical to three horizontal, whether natural or man-made, the existing slope shall be first stripped of topsoil, then benched as the fill proceeds at vertical intervals of not less than 300 mm or more than 500 mm.

Equipment shall be routed over the whole of each area being filled at any one time so that single over-compacted tracks are not formed.

6.8.8 Compaction standard

Granular backfill should use the mechanical interlock method of construction and be placed such that hydraulic continuity between the material is maintained. Compaction induced horizontal pressures can induce significant loads and only light compaction equipment, such as hand-held, vibratory plate compactors should be used within 1.5 m of structures.

Any section of the Works that does not meet specified compaction standards when tested shall be reworked or replaced as necessary until it has met the compaction standards specified. Unless specified otherwise, general fill shall be standard compacted as in MRTS04 and placed as follows:

- Finished layer thickness: nominal 300mm unless stated otherwise, no less than 100mm
- For granular fill: Density Index: Minimum 0.95
- For cohesive fill: 98% of MDD
- Three tests shall be undertaken during the works, at 20%, 60% and 100% completion. The testing procedure shall follow the method detailed in AS 1289.

The surface shall not be raised to the required level by the addition of thin layers of material. Areas below the specified level shall be corrected prior to the subsequent layer being placed by removing material from the surface where necessary and placing new material in layers having a compacted thickness of at least 100 mm. When additional material is added it shall be placed, spread, compacted, and finished in accordance with the requirements of this Specification.

6.9 Foundation

During construction, foundation subgrades must be assessed by a geotechnical engineer to ensure the bearing capacity aligns with Contract Drawing throughout the alignment. If unspecified, foundation shall have a bearing capacity greater than 100kPa or shear vane testing must record readings > 50kPa (after correction).

For foundation of trafficable surfaces, refer to Section **Error! Reference source not found.**.

After any approved foundation preparation or surface reworking, the Contractor is to provide evidence of bearing capacity to the Superintendent for approval. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	After foundation preparation.
Submission Details:	Within two (2) working days after foundation preparation, submit to the Superintendent the following: a. Bearing capacity of foundation at multiple locations, minimum one test per 10m along alignment.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising

the release of the HOLD POINT.

6.10 Protection of earthworks

Refer to MRTS04 for general guidelines on the protection of earthworks.

6.10.1 Batter slope and shape

The Contractor shall carry out all excavation, stockpiling, filling, and associated earthworks in a manner that avoids creating unstable slopes or degradation of materials forming part of the permanent works.

Any area that becomes damaged as a result of instability or degradation shall be removed to the extent affected and replaced by the Contractor at no cost to the Principal.

Cutting a batter is not a guarantee of permanent stability. Without support works, the batter may not be stable at all times. During construction there shall be continuous monitoring of excavation edges, with particular emphasis on the presence of tension cracks and indications of subsidence. Permanent batter slopes shall be as shown on the Contract Drawings. The batter face shall be finished by trimming to produce a uniform shape.

6.10.2 Protection of finished earthworks

The Contractor shall protect finished earthworks from traffic, weather and erosion and keep it free of rubbish and debris.

Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, the Contractor shall scarify, reshape, and compact the surface to the required density in accordance with this Specification prior to further construction.

6.10.3 Maintaining excavation sides

Any solid material which could damage the geotextile shall be remediated to prevent geotextile puncture.

Any slips or falls of banks shall be rectified and any materials, equipment, etc, damaged by such slips or falls shall be repaired or replaced by the Contractor at their own expense.

Batters shall not be exposed to the public, particularly when the Contractor is not on site. The construction site must be fenced, and excavations not left open when the Contractor is not on site.

6.11 Geosynthetics

Geosynthetics selection per Contract Drawings.

Geosynthetic material is to be installed in accordance with manufacturer's guidelines and as detailed on the Contract Drawings. The geosynthetics shall not be punched through unless otherwise shown on the Contract Drawings and shall not be placed end to end. A 1 m

overlap between adjacent widths shall be maintained at all joints. No dropping of heavy and sharp objects such as rock armour onto geosynthetics is allowed.

All geosynthetics shall be placed just ahead of the associated advancing construction works and be overlaid by the relevant construction material within 48 hours. Material shall be placed from top to bottom down excavated slopes, with geosynthetics restrained by appropriate weights at the top and toe of the slope, unless noted otherwise.

6.11.1 Geotextile for backfill protection

A non-woven, needle punched stable geotextile consisting of filaments of polypropylene, polyester polyamide, polyseinychloride or a combination of the above and with the properties specified in Table 6-1 shall be used for backfill protection.

Table 6-1: Minimum requirements of geotextiles for backfill protection

Properties	Units	Requirements
Mass	Gms/m^2	270
Grab tensile strength (based on 200 by 200 mm samples)	(ASTM D1682) N	1200
Elongation (based on 100 by 150 mm samples)	(ASTM D1682) %	50-80
Tear strength (based on 120 by 50 mm samples)	DIN (53363) kN	360
Percolation rate (no less than) (0.1m head)	L/m^2/sec	100
Filament type polypropylene, polyester polyamide, polyseinychloride, or a combination of these materials.		
Resistant to bacteria, fungi and ultra-violet (UV) light		
Unaffected within the pH range of 4 to 10		

6.11.2 Storage and use

Geosynthetic suppliers shall be made aware of the use of their products. The Contractor shall provide evidence to the Superintendent that the material is suitable for its application. Geosynthetics shall not be ordered if different to those specified by the Designer. Similar products satisfying the requirements in this Specification shall be approved by the Superintendent before use.

Material shall be stored within an opaque, protective, waterproof and UV resistant cover, and shall not be stored directly on the ground or where they could be affected by heat. Geosynthetics shall be placed in accordance with the layout and lapping plan. This is a **WITNESS POINT.**

WITNESS POINT	
Process Witnessed:	Placement of geosynthetics
Submission Details	At least two (2) working days' notice in writing of the proposed placement of geosynthetic. Thereafter, give the Superintendent the opportunity to inspect the placed geosynthetic before it is overlaid by construction

material.

Prior to the use of geosynthetic materials, the following deliverables shall be submitted to the Superintendent for approval:

- Samples of the materials.
- The geotextile layout and lapping plan.

6.12 Landscaping

Landscaping works including seeding, turfing and planting, as applicable, shall be in accordance with the Contract Drawings and MRTS16 Landscape and Vegetation Works. Turfing areas shall finish flush with adjacent areas.

7 Rock armour

7.1 Scope

The Contractor shall supply all plant, materials and labour required for the testing, handling, and placement of rock armour to permit construction of the Works as shown on the Contract Drawings and specified herein.

7.2 Reference documents

The following documents, which are referenced in this Section, form part of this Technical Specification and are used as Standard Specifications:

7.2.1 Standards Association of Australia

AS 1141	Methods for sampling and testing aggregates
AS 2758.6	Aggregates and rock for engineering purposes, Part 6: Guidelines for the specification of armourstone
AS 4997	Guidelines for the design of maritime structures
AS 4133	Methods of testing rocks for engineering purposes

7.2.2 Queensland Department of Transport and Main Roads (DTMR)

MRTS05	Unbound Pavements

7.2.3 Others

EN 13383	Armourstone
ASTM C295	Standard Guide for Petrographic Examination of Aggregates for Concrete
CIRIA C683	The Rock Manual

7.3 General requirements

Rock armour that does not satisfy the following descriptions shall not be used.

Rock armour shall be naturally occurring, dense, sound material and shall be of such character that it will resist disintegration and erosion by the action of air, water, wetting and drying, freezing and thawing and any other natural or climatic factors.

Rock armour shall be free from soil, peat, or any other organic matter.

Rock armour shall be capable of being handled and placed without fracture or damage.

Rock armour shall be free from visually observable cracks, veins, fissures, shale layers, stylolite seams, laminations, foliation planes, cleavage planes, unit contacts or such flaws that could lead to breakage during loading, unloading, or placing.

Rock armour shall not include any impurities in a quantity such that damage will occur to the structure or environment in which it is to be used.

Rock armour shall consist of individual stones which are either igneous or metamorphic in origin and which are dense, sound, resistant to abrasion and free of cracks.

Any stone which is susceptible to physical change causing spalling, weathering, or fracturing in the environment of the site of the works shall not be acceptable.

Prior to delivery of rock, the Contractor is to provide a review of the any recyclable insitu rock armour and suitable quarry sources to the Superintendent for approval. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Quality review of rock armour.
Submission Details:	At least 15 working days prior to the proposed date of rock import, submit to the Superintendent the following: b. A quarry certificate or written statement from a suitable experienced petrologist or geotechnical engineer stating conformance to Section 7.3.2 (Inclusive of 7.3.2.1 to 7.3.2.10) of this Specification. c. Review of in situ rock armour in suitability for recycling.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising the release of the HOLD POINT.

7.3.1 Recycling rock armour

Recycled rock armour shall be free of defects and proven to be satisfactory in quality and size. Evidence shall be provided to the Superintendent to support the decision of recycling or disposal of rock armour on site.

7.3.2 Testing and requirements

All testing of material for quality control purposes shall be in accordance with an approved Contractor's Quality Plan.

The Contractor shall supply testing by a suitable experienced petrologist or geotechnical engineer at a NATA accredited laboratory. The test results shall be submitted as a report to the Superintendent prior to the placement of rocks.

Rocks must comply with the following laboratory testing criteria.

7.3.2.1 Los Angeles abrasion test

For specimens complying with the “F” grading of AS 1141.23 the loss when tested in accordance with the requirements of that standard shall not exceed 20%.

7.3.2.2 Sodium sulfate soundness test

For the 37.5 mm to 63 mm fraction of a crushed sample when tested in accordance with the requirements of AS 1141.24 for five cycles, the loss shall not exceed 2.5%.

7.3.2.3 Particle density

The particle density of all primary armour rock material to be incorporated in the Works shall not be less than 2,650 kg/m³ when determined by the relevant methods described in AS 1141.6.

7.3.2.4 Colour

The natural variation of the rock colour coming from a quarry (or from different parts of a pit) is not a sufficient reason for rejection of the material.

7.3.2.5 Impurity

The rock fill should not contain any substance whose quantity could damage the structures or the environment in which the rocks are used.

7.3.2.6 Petrographic analysis

A petrographic analysis per ASTM C295 shall be undertaken to determine the rock type, detect the presence of voids and water-soluble content, and discuss adequacy for primary armouring purposes (environment and mechanical characteristics). The laboratory in charge of this petrographic analysis should have a comprehensive track record in the analysis of rock armour material.

If water-soluble constituents are detected and testing is required, the test shall be prepared in accordance with AS 1141.6.

7.3.2.7 Weathering

If necessary, the presence of signs of “sunburn” of the primary armour rock (except fragments) for volcanic rocks such as basalts should be determined according to Article 10 of EN 13383-2.

7.3.2.8 Water absorption

The water absorption of the rocks (except fragments) should be determined according to AS 1141.6. The average rock water absorption should not be greater than 0.5% (mass percentage). The rock may be considered as resistant to the crystallisation of salt. The test should be carried out on 10 pieces of each different rock type.

7.3.2.9 Shape

The aspect ratio of the maximum dimension of any rock to the minimum dimension, measured at right angles to the maximum dimension, shall not exceed three. No greater

than 25% of all primary and filter armour rock of a particular class supplied for any area of approximately 90 square metres shall have an aspect ratio exceeding two. The blockiness of rocks shall be greater than 50% (classified as irregular rocks), as defined in CIRIA C683 Section 3.4.1.2.

7.3.2.10 Gradation

Table 7-1 has been provided as the specification for the minimum size/ grading of rock required. Prior to delivery of rock the Contractor is to provide a review of the rock already on site and comparable suitable quarry sources to the Superintendent for approval. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Use of each rock type or source.
Submission Details:	At least fifteen (15) working days prior to the proposed date for use of the rock, submit to the Superintendent the following: (a) A quarry certificate or written statement from a suitable experienced petrologist or geotechnical engineer stating conformance to this Specification.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising the release of the HOLD POINT.

Table 7-1 Gradation for armour rock

Percentage passing	Primary armour		Filter armour	
-	Mass (kg)	D (m)	Mass (kg)	D (m)
5	20	0.23	NA	
15	60	0.34	NA	
50	170	0.48	NA	
85	280	0.56	NA	
97	370	0.62	NA	
Rock sizes are based on a mass density of 2,650 kg/m^3. D_{100}, D_{50}, D_{15} refer to the sieve or screen opening sizes through which 100%, 50% and 15% of the material by weight can pass, respectively. D_{50} represents the median rock size - note this is different from D_{n50} denoted in the Contract Drawings and Design Report. 'M' nominal unit mass. 'D' equivalent spherical diameter, quarry use. 'D_n' nominal diameter or equivalent cubic diameter, Designer use.				

7.4 Construction of rock armour

7.4.1 General

Rock armour shall be placed to form armour layers generally to the lines and levels shown on the Contract Drawings. The various classes of rock armour, number of layers and nominal overall thickness shall be as shown on the Contract Drawings. Rock shall not be dropped in loading, transit, or placement on the structure. Do not proceed with placing of rock armour in any areas where the construction tolerance of the underlying layer has not been achieved unless otherwise approved in writing by the Superintendent.

No construction equipment or vehicle is allowed on the rock armour at any time. Traffic loads may damage rock, geotextile or underlayers and destabilise slopes.

7.4.2 Founding layer

The founding layer for the rock armour works shall comprise the existing ground surface and, where present, previously installed emergency works that are retained and incorporated into the permanent works. Construction shall follow a no-dig approach, with founding surface preparation limited to minor cleaning, profiling, and localised reworking only.

Assessment of foundation conditions, requirements for any remedial measures, and verification following remediation shall be undertaken in accordance with Clause 6.8.2.

The rock armour toe shall incorporate a sacrificial and self-healing arrangement to accommodate expected settlement or localised erosion of intertidal materials without undermining the seawall, allowing future re-formation through maintenance as required.

Geotextile shall not be installed beneath existing emergency works and shall be installed only where shown on the Contract Drawings, including beneath the new toe where it extends beyond the footprint of the emergency works.

7.4.3 Form of rock armour

Each rock armour layer shall comprise rocks lying over the preceding layer. There shall be no free rock on the surface of a completed layer and all rock shall be keyed and fitted, maximising contact on all sides such that they are not free to move without disturbing adjacent rocks. Standard placement method, meaning three points of contact (minimum) are required between a rock and other rocks in the same layer, should be complied with.

In general, the longitudinal axis of each rock should be normal to the structure, and slope downward towards the centre of the structure. The centre of gravity of the placed rock shall be closer to the geotextile than the face of the structure. Rocks less than the nominal size of the material class specified for a particular zone shall not be placed in adjacent locations. Materials shall be placed so that the distribution of rocks within any 10 m by 10 m area conforms to the rock armour grading.

Interstices between adjacent armour rocks within the rock armour layers shall remain free of small rock particles.

No rock is to protrude more than one fifth of its dimension (perpendicular to the structure face) above the nominal level, to prevent excessive hydraulic action on individual rocks. Pushing rocks into the structure to achieve the finished level will cause damage to the internal grading and is not permitted. Such obstructive stones shall be removed, and the integrity of the rock layer re-established at the Contractor's expense.

Where rock armour transitions from one size to another, an equal blend (by mass) of rock armour of each type at each end of the transition shall be made and placed.

Armour layer porosity shall be less than 32% when rocks have a density of 2.65 t/m^3 and a target packing density of 1.8 t/m^3 shall be achieved.

7.4.4 Rock armour profile

Reference profiles of the rock armour shall be established at no more than 10 m intervals and more frequently where the profile is changing rapidly.

A test panel of 10 m should be used to form an agreed method of placing and an achievable packing density. Upon agreement, the test panel will form part of the permanent works. Additional test panels shall be undertaken at the discretion of the Superintendent for likely reasons including but not limited to; change of rock source or density, or concern that the profile does not match the original panel.

For each approved test panel or test section, the Contractor shall record accurately for agreement:

- The grading of each type of rock armour used.
- The quantity (tonnes) and volume (m^3) of material used of each rock armour type.
- For a cover layer, the slope area covered and the number of pieces of rock armour placed.

Permanent works shall not be commenced until the Superintendent has approved the working method and the quality of the test panel section is satisfactory. On completion of placement of the rock armour, the upper surface of every rock within a 3 m bandwidth along the reference profiles shall be measured. These measurements shall be plotted on the reference profiles to determine the thickness of rock armour. This is a **WITNESS POINT**.

WITNESS POINT	
Process Witnessed:	Construction of rock armour test section.
Submission Details	At least two (2) working days' notice in writing of the proposed placement of rock for the rock armour test section. Thereafter, give the Superintendent the opportunity to inspect and witness the constructed test section.

Rocks smaller than D_5 of the particular gradation shall not be used to fill interstices or to prop larger stones in order to achieve the required profile.

7.4.5 Tolerances

The vertical placing tolerance of rock armour is ± 0.3D_{n50} m of deviations based on individual measurements.

The minimum thickness of a rock armour layer shall not be less than 80% of the nominal thickness when calculated using mean actual profiles. The average crest shall not be less than the nominal crest level.

The packing density will be measured on site during construction of the test panel and will be deemed acceptable if reordered within ± 0.036 t/m^3 of the design target (1.8 t/m^3).

The tolerances on two consecutive mean actual profiles shall not be negative. Compliance with tolerance shall be measured and verified immediately following construction.

Upon completion of the construction of rock armour, the Contractor must provide a statement from a suitably qualified person verifying that the rock particles meet grading, profile and packing density requirements based on evidence such as survey record or other means. This is a **HOLD POINT**.

HOLD POINT	
Process Held:	Completion of rock armour work.
Submission Details:	Provide written statement from a suitably qualified person that rock armour work satisfies grading, packing, and profile requirements herein.
Release of Hold Point:	The Superintendent will consider the submitted documents, and may carry out surveillance and audit, prior to authorising the release of the HOLD POINT.

7.4.6 Settlement

The Contractor shall make good any part of the Works that has been subject to any settlement within the structure that is beyond the specified allowable limits and that may occur up to one month after completion of the Works. Making good of settlement shall be with materials and in a manner approved by the Superintendent.

7.5 Transportation and stockpiling

The Contractor shall design a route for transportation of armour rocks, including obtaining approvals from appropriate authorities before using the highway. The Contractor is responsible for repairing any damage caused by transportation at their own expense and ensuring armour rocks are properly loaded and unloaded and free from any damage.

Separate stockpiles shall be made for rock armour with different gradation and all stockpiles shall be managed to minimise the risk of falling and collapsing. The location and size restrictions on stockpiling any material on site shall follow MRTS05.

7.6 Testing schedule

7.6.1 General

All testing of material for quality control purposes shall be in accordance with an approved Contractor's Quality Management Plan. Materials which do not comply with the requirements of this Specification shall not be incorporated in the Works.

7.6.2 Sampling

Sampling methods should be operated as described in AS 1141.3.2.

7.6.3 Testing of individual pieces

The shape of individual pieces of armour rock should be tested according to the methods described in EN 13383 for mass size and mass distribution.

7.6.4 Frequency of testing

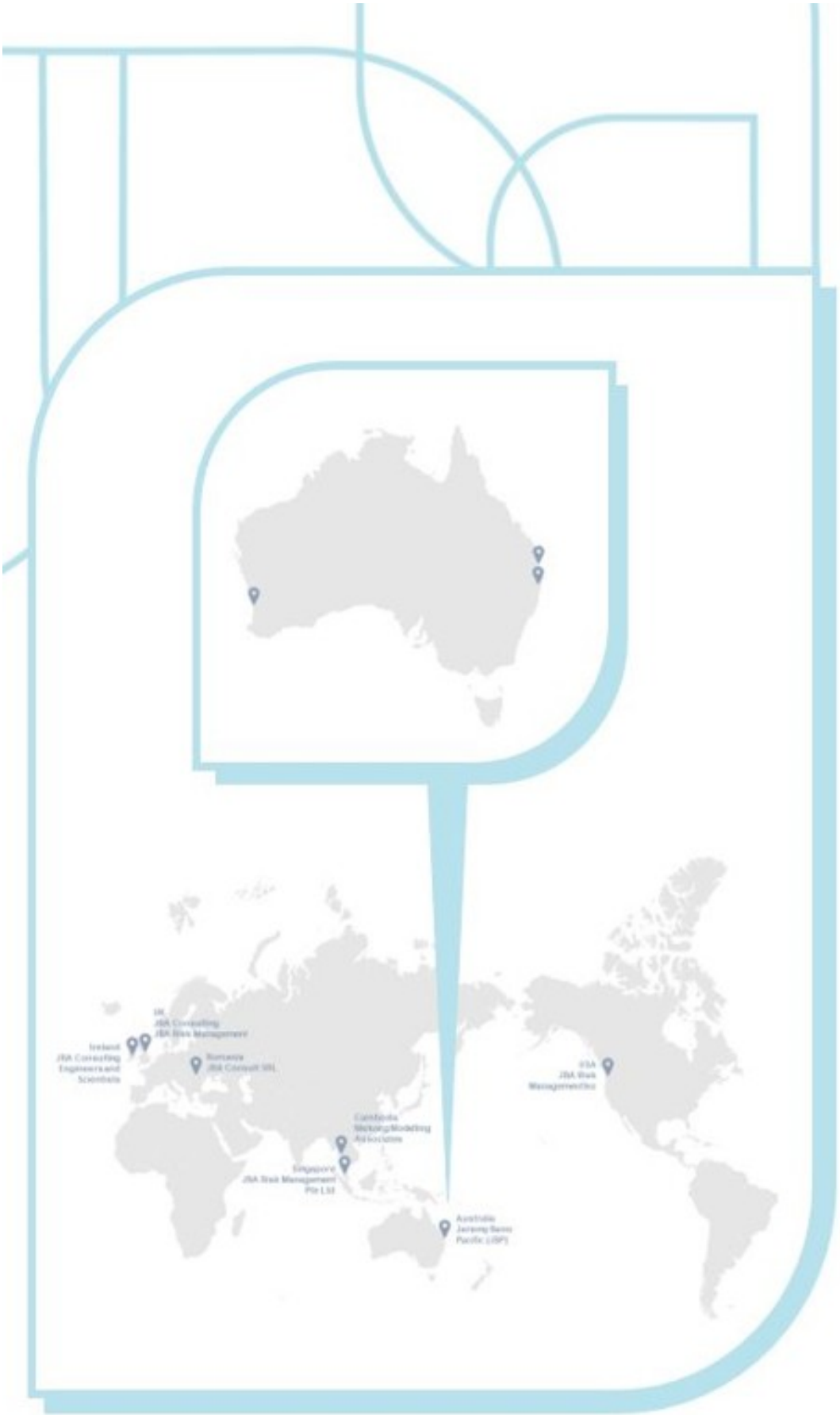
A complete set of tests for rock armour shall be undertaken at the commencement of quarrying. Further testing for the nominated properties during production shall be routinely conducted in accordance with the approved Quality Management Plan and Table 7-2.

The Superintendent may challenge the Contractor outside of the specified frequency to demonstrate a rock source's compliance with the testing criteria.

Table 7-2 Testing frequency

Properties/Test	Maximum interval between tests
Los Angeles Abrasion	Refer to Notes[1]
Sodium Sulfate Soundness	Refer to Notes[1]
Size and grading	500 tonnes[2]
Aspect ratio / shape	500 tonnes[2]
Bulk density	500 tonnes[2]

Notes:
[1] Further tests shall generally not be required unless rock density tests become variable.
[2] Testing minimum once per rock type per interval.



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