APPENDIX 11

CONCEPT DESIGN AND CONSTRUCTION REPORT

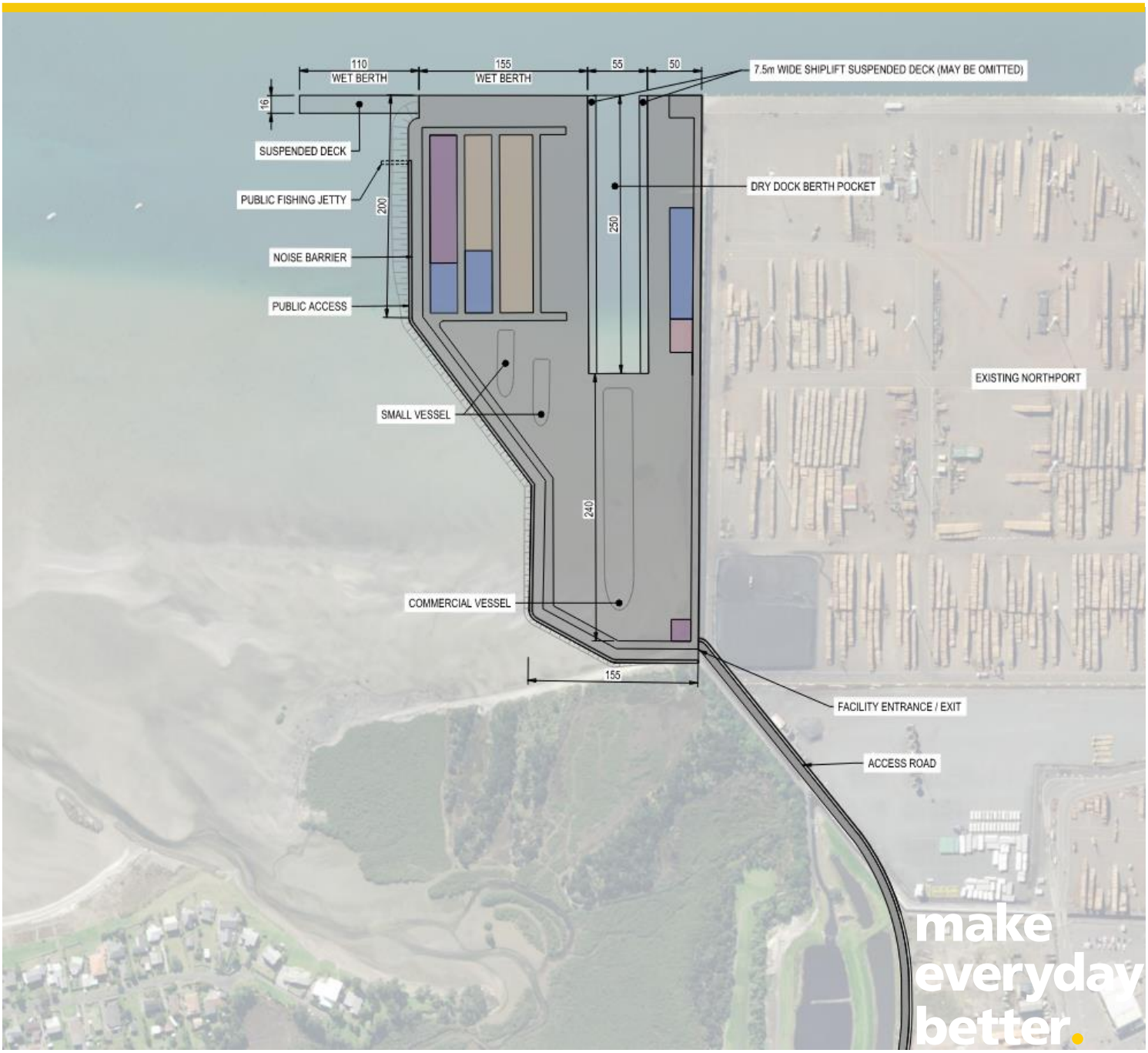
REDACTED VERSION

Concept Design and Construction Report

Northland Shipyard and Drydock

Prepared for Ministry of Business, Innovation & Employment
Prepared by Beca Limited

18 August 2026



PUBLIC VERSION

Certain information has been redacted from this version under section 93(3) of the Fast-track Approvals Act 2024, by reference to the applicable grounds in the Official Information Act 1982. The unredacted report has been provided to the EPA and expert panel.

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Revision History

Revision N°	Prepared By	Description	Date
A	Robbie Howe	DRAFT for Client Review	15 May 2026
B	Robbie Howe Finn Palmer	DRAFT for Client Review	08 June 2026
C	Robbie Howe	Final DRAFT for review	31 July 2026
D	Robbie Howe	Final for Review	12 August 2026
E	Robbie Howe	Issued for Lodgement	18 August 2026

Document Acceptance

Action	Name	Signed	Date
Prepared by	Robbie Howe		18 August 2026
Reviewed by	John Tucker	pp. 	18 August 2026
Approved by	Andy Harvey		18 August 2026
on behalf of	Beca Limited		

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1 Introduction

1.1 Purpose

This Concept Design Report has been prepared to support the Ministry of Business, Innovation and Employment (MBIE) application under the Fast-track Approvals Act 2024 (FTAA) for the development of a Marine Operations Maintenance Facility at Northport, located at Marsden Point, Northland, hereinafter referred to as the Northland Shipyard and Drydock (NDD).

The purpose of this report is to present the concept design and proposed construction methodology for the NDD.

1.2 Statement of Qualifications and Experience

1.2.1 Andrew Harvey

Andrew has over 25 years' experience in the planning, design and delivery of major port and maritime infrastructure projects across New Zealand, Australia, Asia, Europe and the Caribbean. He has gained extensive international experience in the planning, design and execution of port and maritime projects, including large-scale reclamation, breakwater and port development schemes. Andrew has also managed multidisciplinary design teams for Ro-Ro facilities, container terminals and liquid and bulk handling facilities, and undertaken the masterplanning of a number of international ports and terminals.

At Beca, Andrew has led the Northport Shipyard Business Case and Masterplanning project for the Ministry of Transport and shipyard feasibility studies in Tonga and New Caledonia, including the assessment of vessel lifting technologies, facility planning, dredging and reclamation requirements, and concept design development. Andy has additional dry dock experience through his role as Senior Technical Authority for the Devonport Naval Base dry dock caisson gate replacement project.

Andrew's experience in shipyard feasibility, dry dock planning, dredging and reclamation, marine structures, port development and marine maintenance facilities provides him with practical knowledge and understanding of the planning, design, construction and operation of shipyards, dry docks and marine maintenance facilities.

Andrew confirms he has read the Environment Court Practice Note 2023 – Code of Conduct for Expert Witnesses and agrees to comply with it in the preparation of this report and participation in any subsequent expert or hearing processes. He confirms that the opinions expressed are within his area of expertise and are his own, except where he has expressly relied on the work of others.

1.2.2 John Tucker

John Tucker holds a Bachelor of Engineering (Mechanical) and is a Charter Engineer and Chartered Marine Engineer. He has 36 years’ experience in the Naval and Offshore Marine sectors, working across the Asia Pacific region.

Through his NZ Defence Force roles as Fleet Marine Engineering Officer, Assistant Chief of Navy (Capability) and Logistics Commander, John developed in-depth knowledge of Naval vessel build, commissioning, maintenance and operations, including logistics and planning for vessel docking.

He consolidated his systems engineering and vessel maintenance and operations project management experience within the marine sector as Managing Director of a Singapore-based company that owned, chartered, and operated a fleet of specialised offshore support vessels. He subsequently operated his own offshore marine consultancy based in Singapore.

At Beca, John has continued his focus on Maritime developments including on the i-ReX replacement Inter-Islander Ferry programme, various NZ Defence Force systems engineering projects, and business cases for the NZ Naval Base location and the Marsden Point Dry Dock.

John's experience across the Asia Pacific region provides him with real world knowledge and understanding of how to design for the layout and operation of dry docks and marine maintenance facilities.

John confirms he has read the Environment Court Practice Note 2023 – Code of Conduct for Expert Witnesses and agrees to comply with it in the preparation of this report and participation in any subsequent expert or hearing processes. He confirms that the opinions expressed are within his respective areas of expertise and are their own, except where they have expressly relied on the work of others.

1.2.3 Robbie Howe

Robbie Howe holds a Master of Civil Engineering with International Studies (first-class honours). He is a Senior Ports and Coastal Engineer at Beca with experience delivering port, shipyard and dry dock projects across New Zealand and internationally.

Robbie has experience in port masterplanning, maritime engineering and marine infrastructure development. He has acted as Project Manager, and maritime engineer on a range of port and marine infrastructure projects, working directly with government agencies, port authorities and private sector clients.

At Beca, Robbie has undertaken project management and engineering roles on projects involving marine maintenance facilities, shipyards and dry dock infrastructure. This includes serving as Project Manager and Marine Engineer for the Northland Dry Dock Concept Refinement project and contributing to the Northland Shipyard Business Case and shipyard studies in New Caledonia and Tonga.

Robbie's experience in shipyard planning, dry dock development, marine maintenance facilities, port masterplanning and maritime infrastructure design provides him with practical knowledge and understanding of the planning and design of shipyards, dry docks and marine maintenance facilities.

Robbie confirms he has read the Environment Court Practice Note 2023 – Code of Conduct for Expert Witnesses and agrees to comply with it in the preparation of this report and participation in any subsequent expert or hearing processes. He confirms that the opinions expressed are within his area of expertise and are his own, except where he has expressly relied on the work of others.

2 Scope of Engineering Workstream

The NDD concept development has numerous workstreams being undertaken by various parties. The workstreams undertaken by others have not been repeated here.

The workstream undertaken by Beca and highlighted in this report is:

- Concept design of the civil and marine infrastructure, including the reclamation, required to support the operation of either a floating dry dock or alternative shiplift technology. The selection and procurement of the dry dock is excluded from this scope.
- Development of a concept-level construction methodology, including an indicative works programme.

The purpose of this phase of design work is to produce a concept design for the NDD together with an associated construction methodology suitable to inform the scope of planning approvals sought under the FTAA and to provide the basis for technical assessment to determine the environmental effects arising from concept design and construction.

3 User Requirements

The functional requirements of the facility are linked to the operating model. The recommendation of the business case is that a fully integrated services model is adopted as the operating model, where the value proposition is a fully integrated repair facility. The user requirements have been derived through collaboration with Northport and a potential operator.

The key requirements to be incorporated in design are as follows:

- Dredged pocket for a 250m floating dock or an alternative lifting device (shiplift).
- A lifting device suitable to lift a vessel up to 230m in length with a displacement of 28,000 tonnes
- A minimum distance of 50m between Northport's existing berths and the entrance to the dry dock for safe navigation.
- A system designed to transfer a vessel up to 200m in length to the hardstand allowing multiple vessels to be worked on simultaneously.
- Vessel handling systems (mules) to guide vessels into the dry dock pocket.
- A suitable system to handle and store small vessels (e.g. white boats) up to 100m in length on the hardstand.
- An end wall to cater for mobile plant access to the dock floor.
- A sufficient maintenance wet berth alongside for a mix of client vessels.
- Services to all berths including shore power, water (fresh and sea) and air supply.
- Containment and treatment facilities for oily water, oil waste, wastewater and wash water.
- Stormwater collection and discharge network
- Quick connect couplings on the pocket wall attached with seismic bolts.
- Salt-water firefighting pumps and potable water ring main.
- Full utilities connections (power, water, telecoms, etc.).
- Workshops and Warehousing / Covered storage areas.
- Administration facilities.
- Visiting ship Project office(s).
- Canteen(s).
- Ablutions and sickbay(s).
- Emergency services.
- Access road.
- Perimeter fencing and security systems.

Other design requirements are as follows:

- Public access way and fishing jetty.
- Noise barrier.

4 Operational Environment

4.1 Setting Out

The NDD is proposed to be located adjacent to Northport, within One Tree Point Chart Datum (Land Information New Zealand – LINZ), and all elevations within this document are referenced as such. Marsden Point is 4.186m below the RNZN benchmark (LINZ code DJM9).

4.2 Tide Levels

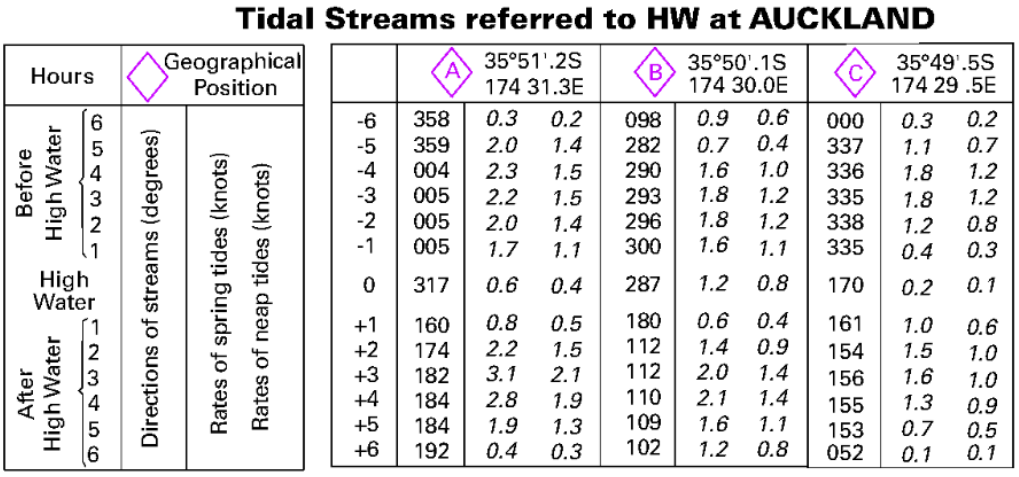
The following tidal levels as published by LINZ for the period of 1 July 2024 to 30 June 2025 shall be used for design purposes. All values are specified in metres with reference to chart datum.

Table 1: Astronomical Tide Levels (source: LINZ, 2025)

Tidal Plane	Abbreviation	Level relative to CD
Highest Astronomical Tide	HAT	3.05
Mean High Water Spring	MHWS	2.75
Mean High Water Neap	MHWN	2.30
Mean Sea Level	MSL	1.63
Mean Low Water Neap	MLWN	0.97
Mean Low Water Spring	MLWS	0.50
Lowest Astronomical Tide	LAT	0.18

4.3 Currents

The tidal currents shown below have been extracted from the Marsden Point Marine Chart 5214:



Tidal Streams referred to HW at AUCKLAND

Hours	Geographical Position	A 35°51'.2S 174 31.3E			B 35°50'.1S 174 30.0E			C 35°49'.5S 174 29 .5E		
		Directions of streams (degrees)	Rates of spring tides (knots)	Rates of neap tides (knots)	Directions of streams (degrees)	Rates of spring tides (knots)	Rates of neap tides (knots)	Directions of streams (degrees)	Rates of spring tides (knots)	Rates of neap tides (knots)
Before High Water 6	-6	358	0.3	0.2	098	0.9	0.6	000	0.3	0.2
Before High Water 5	-5	359	2.0	1.4	282	0.7	0.4	337	1.1	0.7
Before High Water 4	-4	004	2.3	1.5	290	1.6	1.0	336	1.8	1.2
Before High Water 3	-3	005	2.2	1.5	293	1.8	1.2	335	1.8	1.2
Before High Water 2	-2	005	2.0	1.4	296	1.8	1.2	338	1.2	0.8
Before High Water 1	-1	005	1.7	1.1	300	1.6	1.1	335	0.4	0.3
High Water	0	317	0.6	0.4	287	1.2	0.8	170	0.2	0.1
After High Water 1	+1	160	0.8	0.5	180	0.6	0.4	161	1.0	0.6
After High Water 2	+2	174	2.2	1.5	112	1.4	0.9	154	1.5	1.0
After High Water 3	+3	182	3.1	2.1	112	2.0	1.4	156	1.6	1.0
After High Water 4	+4	184	2.8	1.9	110	2.1	1.4	155	1.3	0.9
After High Water 5	+5	184	1.9	1.3	109	1.6	1.1	153	0.7	0.5
After High Water 6	+6	192	0.4	0.3	102	1.2	0.8	052	0.1	0.1

Figure 1: Tidal currents (source: LINZ, 2025)

From discussions with Northport representatives, we understand that the Marsden Point and Northport fairway is subject to spring tidal streams of up to 3 knots.

4.4 Long-Term Sea-level Rise

An assumed rise of 0.46m in the next 50 years when considering the SSP3–7.0 scenario.

4.5 Wave Data

The calculated resultant design significant wave height (Hs) and peak wave period (Tp) are:

Table 2: Wave Data for Project Area

Direction (from)	Hs (m)	Tp (s)
N	0.9	3.2
NE	0.4	1.9
E	0.9	3.1
NW	1.1	3.6

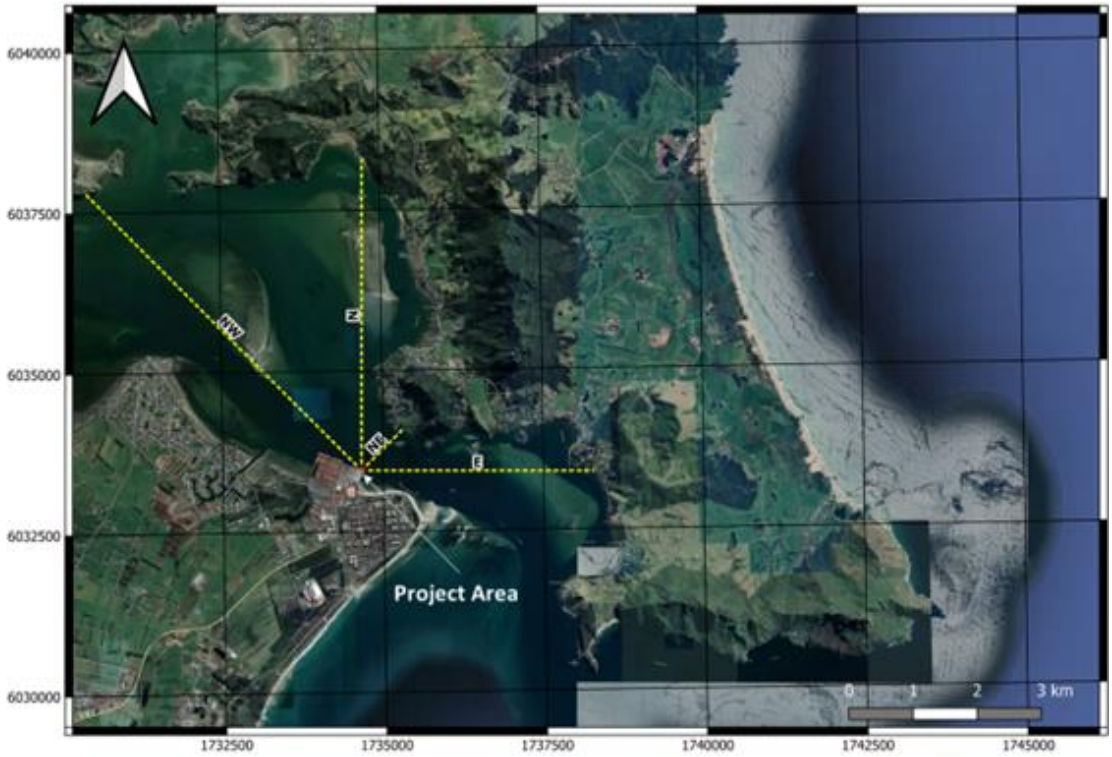


Figure 2: Fetch Lengths

5 Design Criteria

5.1 Primary Design Codes

Maritime:

- BS 6349-Part -1-1: Maritime works. General. Code of practice for planning and design for operations
- BS 6349-Part -1-4: General – Code of practice for materials
- BS6349-Part 2: Maritime structures. Design of quay walls, jetties and dolphins
- BS 6349-Part 4: Maritime structures. Design of fendering and mooring systems
- BS 6349-Part 5: Code of practice for dredging and land reclamation
- AS 4997-2005: Guidelines for the design of maritime structures
- Coastal Engineering Manual (CEM) EM 1100-2-1100
- The Rock Manual (CIRIA, 2007): revised guide on the use of rock in hydraulic engineering
- EurOtop (2018): Manual on wave overtopping of sea defences and related structures

Loading:

- BS 6349-Part -1-2: Maritime works. General. Code of practice for assessment of actions
- AS/NZS 1170 Structural Design Actions Set

Reinforced Concrete/Steel Structures:

- NZS 3101 Parts 1 and 2 Concrete Structures Standard
- NZS 3404 Parts 1 and 2 Steel Structures Standard
- SNZ TS 3404 Durability requirements for steel structures and components
- AS/NZS 5100.6 Steel and Composite Construction

Geotechnical:

- Ministry of Business Innovation and Employment. (2021). Earthquake Geotechnical Engineering Practice Module 1: Overview of the guidelines. Wellington: Ministry of Business Innovation and Employment.
- Ministry of Business Innovation and Employment. (2021). Earthquake Geotechnical Engineering Practice Module 3: Identification, assessment and mitigation of liquefaction hazards. Wellington: Ministry of Business Innovation and Employment.

Operation & Maintenance:

- PIANC MarComs WG 44: Accelerated Low Water Corrosion
- UFC 3-570-06-2019: Operation and Maintenance: Cathodic Protection systems
- ISO 12473-2017: General Principles of Cathodic Protection in seawater

Other references:

- New Zealand Building Code Handbook 2014
- AS 2159:1995 Piling – Design and Construction

- AS 1657-2018: Fixed platforms, walkways, stairways and ladders - Design, construction and installation
- New Zealand Ministry for the Environment

5.2 Dredging

A capital dredging campaign is required to develop the facility and provide it with safe and suitable navigational approach, turning basin and berth pocket. Dredged material is likely to be utilised as fill for reclamation.

The existing berth depths at the existing Northport wharf frontage are as follows:

- Berth 1 and 2 (chainage 0 – 390m) is currently -13m CD but can be cut to -14.5m CD.
- Berth 3 (chainage 390 – 570m) is -14.5m CD but can be cut to -16m CD

The proposed dredge depths for the facility have been developed in conjunction with Northport and MBIE and can be seen in the Drawing Package B.02.

Preliminary dredge side slopes of 1V:10H to 1V:15H shall be adopted for the concept design and quantity estimation. These slopes are indicative only and shall be confirmed during subsequent design phases based on detailed geotechnical investigations, dredging methodology, and dredge slope stability assessments.

5.3 Reclamation, Paving and Dry Berths

The proposed reclamation forming the facility will need to achieve the following design parameters:

- Appropriate grading to achieve surface drainage, with nominal slopes of approximately 1:100.
- A nominal crest level (of approximately RL +5.7m CD) to align with the adjacent Northport hardstand area.

The proposed operational loading assumptions for the facility are summarised as follows:

- Heavy duty paving across the full extent of the reclaimed platform to support port and shipyard operations.
- A uniform design load of 25 kPa for all reclaimed areas, consistent with existing berth loading criteria, allowing for operational flexibility.
- Large vessels are able to be transferred to the hardstand (likely via a railed system, supported by piles and connected by waler beam.
- The lateral transfer of small vessels to the hardstand.
- Lifting operations will be undertaken using mobile plant or, the case of the floating dock, wing wall mounted cranes.

An access roadway consisting of a 7m wide carriageway plus footpaths connecting the facility to the existing road network is allowed for.

5.3.1 Dry Berths

The facility shall have the capacity to allow for the following vessels to be transferred from the lifting device to the reclamation:

1. Maximum design vessel for longitudinal transfer to the hardstand:
    - The maximum LOA for the longitudinal dry berth is 200m.
    - The maximum design lightship displacement for the facility is 28,000 tonnes.

2. Design vessel for lateral transfer to the hardstand:
    - The maximum design lightship displacement for this area of hardstand is 5,000 tonnes.

5.4 Wet Berth

A wet berth is required to meet the operational requirements, enabling maintenance activities and vessel preparation prior to lifting. The berth shall be designed to accommodate vessels with a maximum length overall (LOA) of 230 m. To secure a vessel of this size alongside and allow for manageable berthing line fleet angles a wet berth of 265m will be provided. The western-most 110m section of this wet berth is to be formed of an open piled suspended deck structure.

The fendering and bollards are to be designed for the design vessels identified.

5.5 Site Security

5.5.1 Security and Noise Control

The Port's existing noise wall will remain in its current location.

A noise wall and security fence approximately 4 metres high will be required around the southwestern boundary of the reclamation.

The facility requires a single entry and exit point with a gatehouse for security and traffic control.

The security for the facility will need to be designed in accordance with The International Ship and Port Facility Security (ISPS) Code.

5.6 Stormwater and Wastewater Management

The treatment of stormwater and wastewater will need to comply with Regional Plan requirements and any relevant resource consents authorising the discharges.

5.6.1 Stormwater Runoff

The concept design shall account for the stormwater management systems design by Hawthorn Geddes.

5.6.2 Foul and Wastewater

The concept design shall account for the foul and wastewater management systems design by Hawthorn Geddes.

5.6.3 Biosecurity

Dry dock and landside facilities will be designed to have the capability to capture, contain and treat biofouling from vessel hulls and ballast tanks.

5.7 Revetment

5.7.1 Revetment Form

The revetment design must cover:

- Stable foundation
- Rock or cementitious core bund
- Geotextile (provisional)
- Two layers of rock armour

The concept design shall be based on a double-layer revetment. The revetment slopes are to have a 1V:1.5H profile and be armoured to protect the core material from wave/current action.

Table 3: Revetment concept design

Parameter	Value
Slope – Seaward Edge	1V:1.5H
Slope – Landward Edge	1V:1.25H
Armour Layer Dn50 – Type A	0.40 m
Armour Layer Dn50 – Type B	0.20 m
Core Material	Silt Clay (cemented) or Rock
Density of Rock Armour	2600 kg/m3

Further optimisation of the revetment design is expected at subsequent design stages once further geotechnical and wave modelling information is available.

5.7.2 Revetment Core

The design will include a revetment core formed of rock material or silt/clay material dredged from the site and stabilised with cement to form a structural bound material. This core will serve as the perimeter bund containing the reclamation.

5.7.3 Geotextile

The design will provisionally include a geotextile that is placed on the inner slope of the bund to protect the fill material from washing out through the core and armour layers.

5.7.4 Rock Armour

Durability for armour rock will be 100 years.

Armour rock shall be hard, durable, crushed, quarried or natural stone (igneous/metamorphic, complying with abrasion, density, crushing, water absorption requirements etc.).

5.8 Quaywall Structures

5.8.1 Material Densities

The following material densities shall be considered in all calculations:

- Reinforced Concrete: 25 kN/m^3
- Structural Steel: 77 kN/m^3
- Sea water: 10.25 kN/m^3

5.8.2 Reinforced Concrete

Design and detailing of reinforced concrete elements shall be in accordance with NZS 3101:2006, Concrete Structures Standard.

The properties of concrete used for exposed elements of marine structures is as follows:

- NZS 3101 Exposure Classification C (tidal/splash/spray)
- Characteristic Compressive Strength: 50 MPa
- Reinforcing cover determined from NZS 3101 to achieve a 100-year durability for concrete elements.

Reinforcement shall have a minimum yield strength of 500 MPa. All reinforcing steel must comply with the requirements of Grade 500E in accordance with AS/NZS 4671.

5.8.3 Corrosion Protection

The combi-wall will likely require a cathodic protection (CP) system.

The cathodic protection shall be designed at the detailed design stage in line with AS 2832.3.

The system is to be designed to work in combination with the existing CP system currently functioning on the existing Northport wharf and any proposed CP system for the dry dock.

Corrosion allowances and durability design shall be undertaken in accordance with Standards New Zealand Technical Specification SNZ TS 3404:2018.

5.8.4 Steel Tubular Piles

Steel tubular piles shall be designed in accordance with NZS 3404. For durability considerations, steel piles shall be designed based on a reduced (corroded) section, with appropriate allowances made for loss of thickness due to corrosion.

Structural steel pile casings manufactured and supplied in accordance with API Specification 5L shall demonstrate material compliance through a conformity assessment, verifying equivalence with the requirements of AS/NZS 1163 and NZS 3404.

5.8.5 Tie Rods

The combination piled wall structure is connected to a sheet pile anchor wall with tie rods. The tie-rods shall be designed to EN 1993-5 "Design of steel structures: Part 5 Piling"

The steel grade of the tie rod is to be determined as part of the detailed design. The tie rods will be provided with ducting suitable for settlement.

5.9 Marine Infrastructure and Reference Vessels

5.9.1 Design Vessel

The maximum design vessel for the lifting device and wet berth has the following characteristics:

- The maximum design LOA for the facility is 230m:
- The maximum design lightship displacement for the facility is 28,000 tonnes.
- The maximum vessel draft is 9m.

5.9.2 Fendering

The fendering and bollards are to be designed for the design vessels.

Shipyard berths are to have suitable fendering running along the entire length of each berth.

5.9.3 Bollards

The following bollards are required to cater for the range of design vessels and their potential deadship condition:

- Normal bollards are assumed to be spaced as per existing Northport spacings of 12 metres
- Flush storm bollards are assumed to be spaced at 45 metres

5.9.4 Safety Ladders

Safety ladders to be installed at regular intervals along the wharf edge. Ladders to be provided at max 50 metre intervals.

Ladders shall extend from 0m CD to top of deck level.

5.9.5 Dry Dock Mooring

The dry dock will be moored to the Shipyard Berth 1 by means of three spud connections (no fendering will be required along that berth).

5.10 Utilities

5.10.1 Lighting

The existing port lighting grid will be extended across the proposed NDD reclamation, with lighting masts provided at regular intervals.

Lighting masts are assumed to be approximately 35m in height.

LED Lumineers appropriately designed to minimise light spill and glare.

In the case of the floating dock itself, it is assumed this will be self-contained for lighting

5.10.2 Power and Vessel Shore Power

A 1000 kVA power supply of variable frequency (50-60Hz) is required for each vessel alongside or within the facility.

This will require the construction of a number of new substations which would be located in the vicinity of the ship berths. The number of substations and their locations will be defined in the later stages of the design process.

5.10.3 Fibre Connection

The facility will require fibre connectivity around the site and to the existing external network.

5.10.4 Compressed Air

It is anticipated that a compressed air supply system is to be provided throughout the site, with a large compressor and distribution system.

5.10.5 Potable Water and Firefighting

Potable water and firefighting infrastructure are to be provided in the facility.

5.11 Vessel Lifting Options

This section introduces two options considered for lifting vessels clear of the water at the NDD facility.

5.11.1 Floating Dry Dock

5.11.1.1 General Dimensions

- Length: 250 metres
- External beam of dry dock: 55 metres
    - Beam (between wing walls): approx. 44 metres

    - Width of wing walls: 5-6 metres to accommodate wing wall cranes and residual buoyancy
- Assumed maximum vessel draft: 9m
- The expected maximum depth of the dry dock pontoon: 6 metres
- Assumed keel block height: 2 metres

5.11.1.2 Lifting Capacity

- Maximum lifting capacity must be capable of lifting a vessel in the order of 28,000 tonnes

5.11.1.3 Structural Material and Corrosion Protection

- Dock will be constructed using Class Society certified marine-grade steel (such as grade D36) to ensure strength and longevity.
- The dock deck must be designed with considerable corrosion margin to withstand heavy loads and frequent vessel docking cycles.
- Corrosion protection systems including impressed current protection will be required to extend service life.

5.11.1.4 Ship Handling System

- High-strength bollards along the length of the wing walls are required for securing and aligning vessels.
- A muling system (towing vehicles on the wing walls) will be installed to assist in vessel with berthing and alignment.
- A high-capacity winch at the centre-line of the dock for hauling vessels into precise docking positions.
- Docking alignment system with visual or electronic positioning aids for efficient and safe vessel docking.

5.11.1.5 Buoyancy & Stability

- Dock must maintain stability under full operational conditions and will include auto-ballasting system for adjusting ballast tanks to maintain stability and trim during docking and lifting operations.
- Ballast system must be equipped with sensors and remote monitoring capabilities for safe operation.

5.11.1.6 Cranes & Lifting Equipment

- One rail mounted electrical, or hybrid powered crane on each wing wall, capable of lifting up to 20 tonnes from the centre line on the floating dock.
- Cranes should have a sufficient boom reach and hook height to service vessels docked in the well and to assist in ship transfer operations.

5.11.1.7 Biosecurity and Pollution Prevention

- Spill Containment: Fully contained deck drainage system to prevent pollutants entering the sea.
- Onboard Treatment: Sedimentation and filtration to remove debris from collected water.
- Shore-Based Processing: Residual fluids pumped ashore for treatment.
- No Sea Discharge: All liquid waste managed within the dock system to capture discharges.
- Spill Response: Equipped with containment booms, absorbents, and response kits for leaks.

- Floating dock hull cleaning: A full capture underwater hull cleaning system will be required to clean the underwater section.

5.11.1.8 Land side transfer

- A floating dock may be designed to facilitate ship to shore transfers of vessels. The residual buoyancy of a dry dock capable of lifting large vessels will be exploited to lift lighter vessels (circa 5000) so that the vessel may be transferred ashore using a bogey and rail system.

5.11.2 Shiplift

5.11.2.1 General Dimensions

- Length: 230 metres
- Width (Between Suspended Deck): 35 - 40 metres

5.11.2.2 Lifting Capacity

- Maximum lifting capacity in the order of 28,000 tonnes

5.11.2.3 Biosecurity and Pollution Prevention:

- Wash water containment: Fully contained dock deck with drainage system and catchment tanks to prevent wash water and pollutants entering the sea.
- Treatment system. All captured run off is transferred ashore for separation and treatment in a purpose-built treatment facility and potentially recycled.
- Spill Response: Any spills from vessels berthed alongside the facility will need to be managed by the facility operator in accordance with any regulatory requirements. Containment booms, absorbents, and response kits will be available around the facility.

5.12 Design Life

The design life is defined as the period for which the structural elements and components are used with acceptable maintenance without any major replacement/repair being necessary.

The period to first maintenance is based on typical product performance and routine maintenance is based on an asset management process adopted by the owner.

The reclamation will be designed for a minimum design life of 50 years, consistent with the design life of the lifting device. Provision will be made for future durability interventions to enable the reclamation to achieve an extended design life of up to 100 years.

Table 4: Summary of design life of structural elements and components

Component	Design Life (yrs)	Period to Major Maintenance (yrs)	Routine Maintenance by Owner	Repair/Remediation action
Reinforced Concrete Elements	100	100	None	Cutting out/replacement of defective/cracked/spalled concrete and corroded reinforcement
Steel Elements: Tubular Pile/Sheet piles/Structural steel	50	20	Recoating of protective coating systems every 15 years	Cutting out/replacement of defective/corroded steel or its fixings; welding of steel plates onto existing steel structures/elements

Component	Design Life (yrs)	Period to Major Maintenance (yrs)	Routine Maintenance by Owner	Repair/Remediation action
Fenders	15 (rubber) 20 (steel) 10 (restraint chains)	15 20	None Re-coating of exposed protective surface coating systems every 20 years	Cutting out/replacement of defective/corroded steel or its fixings; welding of steel plates onto existing steel structures/elements
Revetments	100	50	None	Removal of material from the main dredged areas, that has collapsed/slipped and fallen in from the adjacent side slopes
Pavement	25	25	Periodic maintenance and resurfacing of pavement when needed	Periodic and routine maintenance and not repairing defects
Dry Dock	50	25	Periodic (in-house) surveys every year and more detailed thickness testing survey every 5 years by independent surveyor	Periodic and routine maintenance
Shiplift	50	15	Periodic (in-house) surveys every year and Class surveyor inspections on 5 yearly basis.	Periodic and routine maintenance, e.g. winch wire changes each 5-10 years or, in the case of hydraulic chain jacks, chain changes every 15 years.

5.13 Spatial Layouts and area requirements

The reclamation (defined as the area above MHWS, excluding suspended deck structures) has a total area of 9.7Ha.

The concept design footprint can accommodate the following areas:

Table 5: Spatial allocation by facility type

Area Ref #	Facility Type	Required Area (m^2)
1	Administration spaces	3,250
2	Warehouse and storage spaces	4,650
3	Workshops	7,500
4	Utilities	600
5	Roads	13,500

Area Ref #	Facility Type	Required Area (m^2)
6	Crane corridors	19,250
7	Transfer bogie storage	3,150
8	Dock block and cradle storage	1,800
9	End slip vessel working and laydown hardstand	14,600
10	Side slip vessel working and laydown hardstand	3,800
11	Small vessel working and laydown areas	9,450
12	Wastewater and environmental controls	7,950
13	Wet berth working and laydown areas*	5,600
14	Public access	1,700
15	Revetment above MHWS	2,050
	Total	98,850

*Note: Area 13 is inclusive of the wet berth suspended deck structure with an area of 1,760m^2.

5.14 Importance Level and Seismic Issues

5.14.1 Importance Level

Seismic design parameters derived from NZS 1170.5 (Standard New Zealand, 2004), and New Zealand Geotechnical Society (NZGS) / MBIE Module 1 are summarised in Table 6. Key inputs for deriving the seismic loading in NZS 1170.5 (Standard New Zealand, 2004) is the Site Class and Importance Level. At the NDD site, the site class has been assessed as Class D, deep soil site, as rock is very deep.

The proposed structures are considered “Normal Structures” and are therefore categorised as Importance Level 2. (i.e. it is not proposed to contain people in crowds, fulfil a post disaster function, contain hazard materials that will cause hazardous conditions outside the property boundaries or is a public utility).

It is recognised that if the facility is intended to support defence operations or other critical resilience functions, certain structures and operationally critical components may warrant classification as Importance Level 3 or Importance Level 4. This will need to be confirmed during subsequent design phases once the operational and resilience requirements of the facility have been established.

Table 6: Seismic Design Parameters

Basis	Importance Level 2		
	Earthquake Return Period/ Basis	Magnitude	Peak Ground Acceleration [1]
NZGS/ MBIE Module 1 [2]	1/500	5.8 (6.5)	0.136 (0.19g)
NZGS / MBIE Module 1 minimum requirements consistent with Site Class D. [3, 4]	1/500	6.5	0.16g
AS/NZ 1170.5 (Structure design), Site Class D [5]	1/500	7.5	0.11g

[1] Based on a 50-year design life.

[2] For geotechnical liquefaction assessment and slope stability analysis (Minimum requirements as specified in Module 1 Guideline based on Site Subsoil Class C: Shallow Soil site, shown in brackets as per Table A1, Appendix A).

[3] For geotechnical liquefaction assessment and slope stability analysis (Minimum requirements as specified in Module 1 Guideline (M6.5 at 20km), for Class D site adopted from NZTA Bridge Manual 2022).

[4] Basis of liquefaction assessment

[5] For assessment of loads on structures. All loads are normalised to a M7.5 earthquake. Considers site class D.

5.14.2 Seismic Issues

Seismic issues associated with this development include:

- Potential for liquefaction of the existing soils (typically the upper sand deposits) beneath the seabed and sandy reclamation fill that has not been densified; and
- Settlement of the ground surface and any structures founded on that surface.

In general, the potentially liquefiable sand layers are located above proposed dredge levels so the loose sands will be dredged and placed within the reclamation. The concept of the proposed retaining structure accounts for the seismic loading, and assumes that reclamation fill placed immediately to the rear of the retaining structure and any loose upper sand deposits in that area immediately to the rear of the retaining structure will be non-liquefiable (i.e. ground improved if dredged sands or loose upper sand deposit, or a gravel fill).

6 Proposed Concept Design

The design process for the facility layout and structural form is described in the Issues and Options Report, demonstrating development in collaboration with MBIE, Northport, and a potential operator. The concept design reflects the layout agreed with these parties.

As outlined in the Issues and Options Report, a range of structural forms were considered. Based on site-specific constraints, relevant project experience, and early contractor engagement, a combined tubular pile (combi-wall) system has been selected as the preferred option for further development. Alternative structural solutions remain viable and can be considered in subsequent design phases.

The current design is at concept level and has been developed to a level sufficient to inform assessment of environmental effects and support planning approval. Further refinement and optimisation of all design elements will be undertaken during subsequent design stages and the supply of additional ground investigation.

6.1 General Layout

The layout adopted for the concept design is shown in Drawing 3237966-SK-0001.

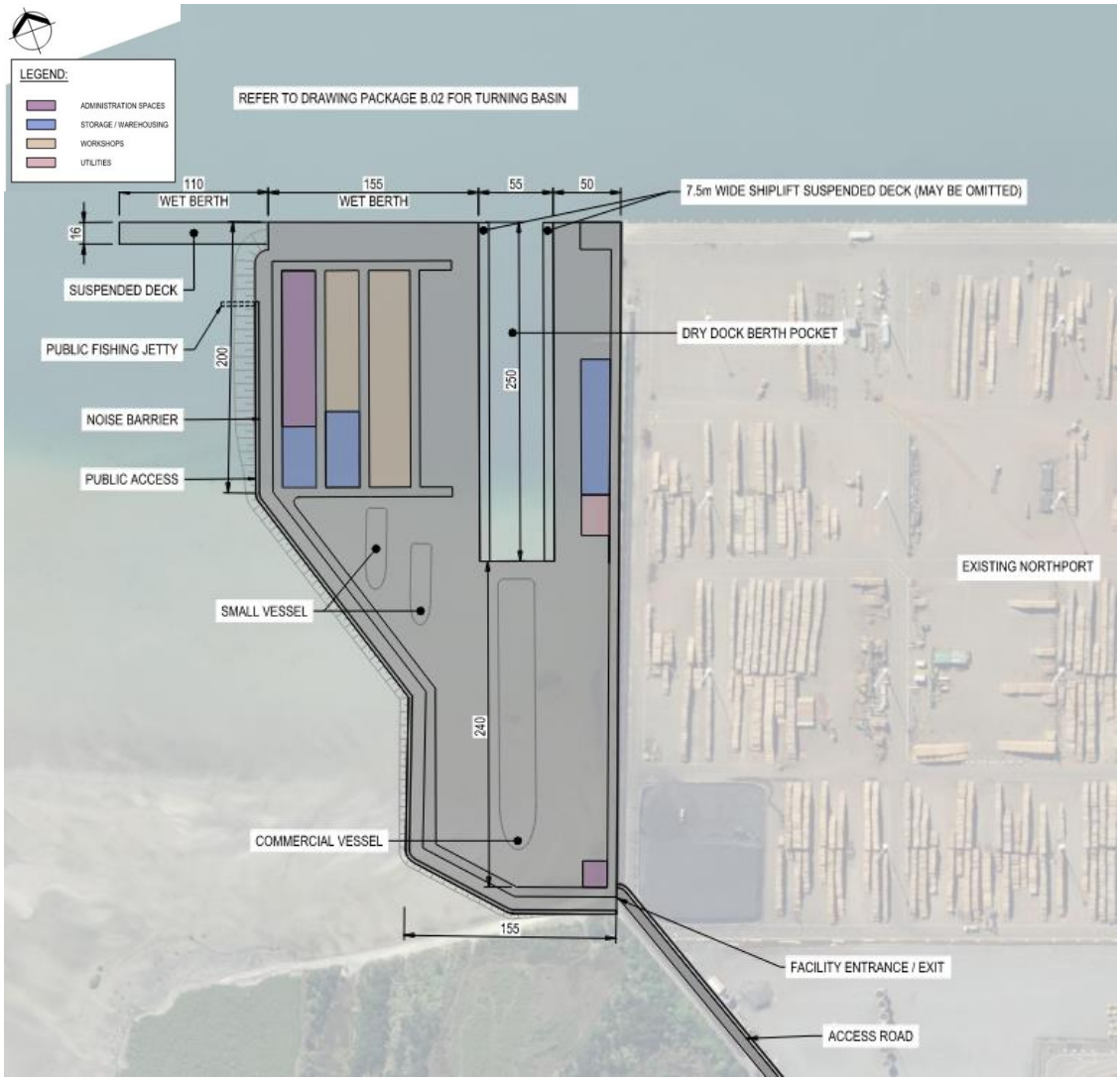


Figure 3: Excerpt from Drawing 3237966-CA-K0001

6.1.1 Dry Dock Core Services

The core dry dock services are:

- Reticulated services (fresh and cooling water supplies, shore power and waste and wash-water collection and treatment).
- Ship handling systems (winches and mules) for the floating dock and Berth 2.
- Admin, project offices for docking staff.
- Stores and hardstand areas for dry dock equipment, including the cranes, dock block marshalling and access ramps, brows.

The final selection of the lifting device has not yet been confirmed (i.e. shiplift or floating dry dock). The facility layout and spatial allocations have been developed to accommodate either of these proprietary items.

6.1.2 Marine Maintenance Core Facilities

The marine maintenance facilities are:

- Admin, project office and welfare facilities for NDD staff and clients oversight teams. Potential inclusion for training, education and/or cultural learning facilities within this administration space.
- Materials receipt and warehouse for equipment used by the NDD and clients/customers.
- Combined and segregated workshops with appropriate plant and lifting equipment for long term and specialist contractors.
- Space allocated for the transportation and storage (on hardstand areas) of white boats and client containers, and safe movement of cranes and equipment.
- Carparking established as close as reasonably practical to the production yard area on land owned by Northport.

6.1.3 Spatial Layouts and Area Requirements

A spatial plan illustrating the locations within the site is provided in Drawing 3237966-CA-K0002.

The conceptual layout has been developed to provide appropriate separation of operational working areas, with provision for vehicle and pedestrian access that supports safe site operations and efficient functionality of the facility.

The building infrastructure and overall layout are indicative and will be subject to further refinement and optimisation during detailed design, in consultation with a potential operator.

6.2 Overview of Reclamation and Dredging

The dredge and reclamation areas have been modelled in Civil 3D by Northport to determine cut and fill volumes. Refer to Northport Drawing Package B.02 for further details.

The concept design for the facility will require refinement as further data, including ground investigation, is procured.

6.2.1 Dredge (Cut)

Where possible dredge areas have been refined to reduce the extent of dredging whilst also meeting the operational requirements of the facility.

The following material types are believed to be present and will be dredged from the turning basin and berth pockets:

- Sand
- Shell Sand

- Silt Clay

Refer to Northport Package B.02 for further details.

A silt screen at the entrance to the dry dock basin would potentially be required to reduce ongoing maintenance dredging in the berth pocket.

6.2.2 Reclamation (Fill)

The reclamation will be constructed using dredged material, which will be placed in layers. Aggregate fill may be used should there be inadequate fill or where required for the retaining structure.

For the purpose of this study, we have assumed that materials below the water level in the vicinity of the retaining structure are intended to be densified by ground improvement, while those above sea level will be compacted through a combination of hydro compaction and roller compaction techniques.

Sandy materials are preferred for the reclamation and will be fully utilised.

Further analysis of the silt clay material will be required to assess its suitability as fill material for the reclamation.

6.3 Revetment

The southern and western sides of the reclamation will be protected by a revetment slope which is armoured with conventional rock armour to protect a core bund. We have assumed the core can in part can be constructed from the poorer quality silt and clay materials dredged from the basin area. These materials will need to be mixed with cement to form a treated bonded cementitious material.

We have assumed that the treated silt clay dredged material will be placed with a 1V:1.5H slope on the seaward side with rock revetment protection and with a 1V:1.25H slope on the landward side. The bund width is 6m and the bund height is +4.2m CD; assumed for the purpose of access during construction.

It should be noted that if there is not sufficient dredge material to form a cementitious bund this can be formed by imported rock consistent with the adjacent reclamation.

The rock revetment will consist of a Type A and Type B structure to optimise the use of materials and minimise costs.

6.3.1 Revetment Type A

Revetment Type A consists of the following elements:

- Two layers of Armour Rock (Dn50 = 0.4m)
- Crest Width approx. 3Dn50 (1.2m)
- Crest Height at +5.0m CD

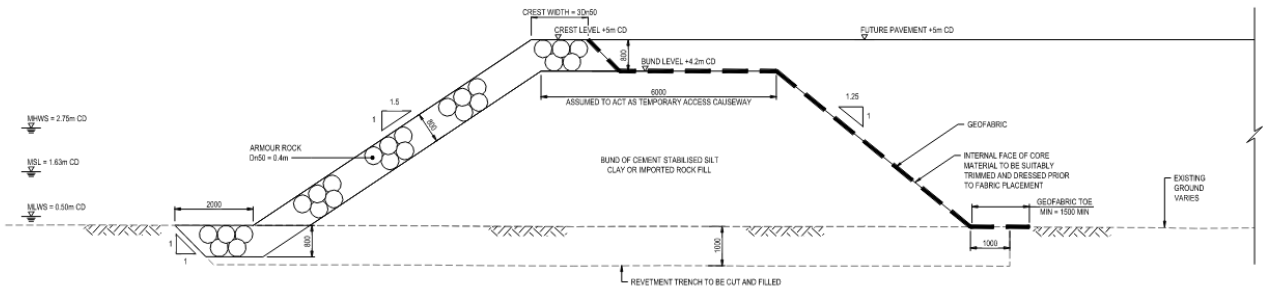


Figure 4: Type A Rock Revetment Typical Section (Drawing 3237966-CA-K3000)

6.3.2 Revetment Type B

Revetment Type B (Figure 23) consists of the following elements:

- Two layers of Armour Rock (Dn50 = 0.2m)
- Crest Width approx. 3Dn50 (0.6m)
- Crest Height at +5.0m CD

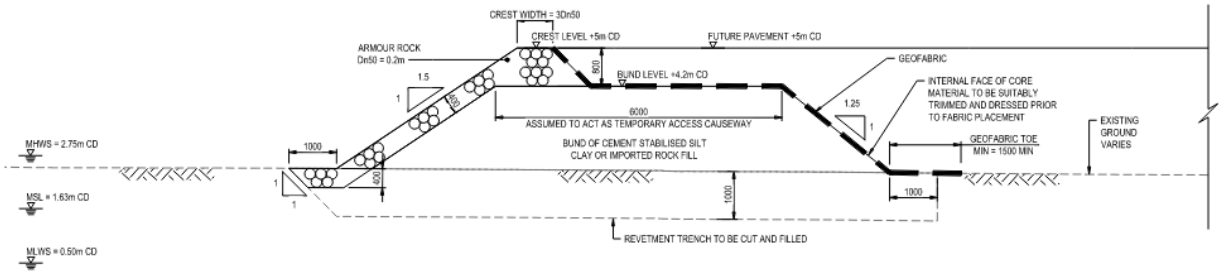


Figure 5: Type B Rock Revetment Typical Section (Drawing 3237966-CA-K3000)

6.4 Paving and Hardstand Support System

A heavy-duty paving has been assumed to be appropriate for the extent of the reclamation. The reclamation will be connected to the existing road network and staff parking areas via a 7m-wide access road. The heavy duty, access road and car park pavement designs and the design of the hardstand support system are indicative only, and are subject to changes in detailed design.

6.4.1 Heavy Duty Paving (Facility Hard Stand)

Heavy duty pavement will cover the extent of the reclamation. This pavement design is based on the existing Northport facility paving as follows:

- 70mm thick asphaltic concrete.
- 400mm thick stabilised basecourse.
- 1500mm (minimum) thick compacted and prepared subgrade.

6.4.2 Longitudinal Transfer Hardstand Support System

A hardstand support system will allow for the longitudinal transfer of vessels from the lifting device to the reclaimed area directly to the south of the lift system. A rail system is to be installed with the following supporting structure:

- Two sets of transfer beams each with a total length of 200m. the transfer beams are to have a width of 3.3m and depth of approximately 1m.
- Ø1000 CFA piles at 6m c/c spacing along the length of the transfer beams. These piles will be bored through the reclamation to a depth to be determined following further ground investigation.
- The number and composition of the rail system is to be determined at the detailed design stage noting that this is a function of the selected lifting device.

The rail transfer system and hardstand are likely to be highly sensitive to horizonal tolerances and therefore further design development will be required following analysis of additional site investigation information.

6.4.1 Lateral Transfer Hardstand Support System

The lateral transfer hardstand area is to be developed in a similar manner to the longitudinal with lower loadings consideration will need to be given to the reduction in pile and beam size. However as with the lateral transfer hardstand horizontal tolerances will be the key issue and dependent on the underlying soil conditions, following analysis of additional site investigation information. The structural form of this area will be a function of the selected lifting device.

6.4.2 Access Road and Car Park Pavement

The car park and access road pavement is assumed to be as follows:

- 50mm thick asphaltic concrete.
- 150mm thick basecourse.
- 250mm (minimum) thick compacted and prepared subgrade.

6.5 Overview of Suspended Deck

6.5.1 Wet berth

As stated in Section 5.4 the facility is to include a 265m wet berth. As shown in Drawing 3237966-CA-K0001 the easternmost 155m section of the wet berth is formed by the reclamation. The remaining 110m to the west is formed by a suspended deck structure.

This suspended deck structure is to be 110m long and 16m – 18m wide. A pile grid of 6m c/c has been assumed with 19 bents with 3 piles per bent.

The suspended deck structure concept design allows for the following:

- Mobile harbour crane movements and lifting operations.
- Mooring and berthing forces

The following berth furniture has been allowed for in the concept design:

- Trelleborg MV1450 Fenders at 12m centres along the berthing face
- 100 tonne tee bollards are assumed to be spaced as per existing Northport spacings of 12 metres
- Flush storm bollards are assumed to be spaced at 45 metres

The fender and bollard systems are to be refined at the next stage of the design.

A concept-level assessment was undertaken to identify a suitable pile diameter for the suspended deck. The assessment focused on the governing lateral loading from marine mooring actions.

Key assumptions and inputs were as follows:

- Governing load case:
    - Lateral loading from marine mooring actions
    - Conservatively based on four adjacent 100-tonne bollards acting simultaneously (1,000 kN per bollard)
- Ground conditions:
    - Assumed to comprise sand with standard penetration test (SPT) N-values of approximately 10–30

- Conservative lower-bound soil stiffness and capacity parameters adopted due to limited geotechnical information

- Analysis approach:
  - Three-dimensional structural modelling of the wharf and pile system
  - Use of simplified lateral soil springs and passive resistance models appropriate for concept design

The key assessment outcomes are as follows:

- 900mm diameter piles are inadequate, with bending demands exceeding flexural capacity
- 1200mm diameter piles provide sufficient flexural capacity and acceptable overall performance at concept stage

Based on this assessment, 1200mm diameter tubular steel piles (nominally 1219mm CHS) are considered suitable, noting that final pile sizing, detailing, and performance verification will be confirmed during detailed design, following further geotechnical investigation and refined loading assessment.

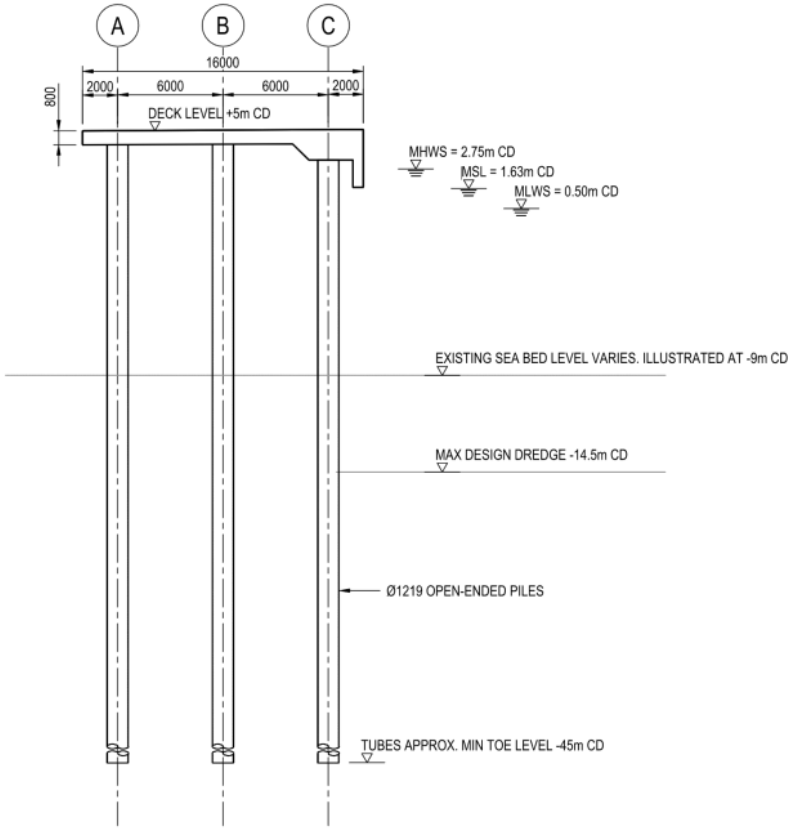


Figure 6: Suspended Deck Cross Section (Drawing 3237966-CA-K2002)

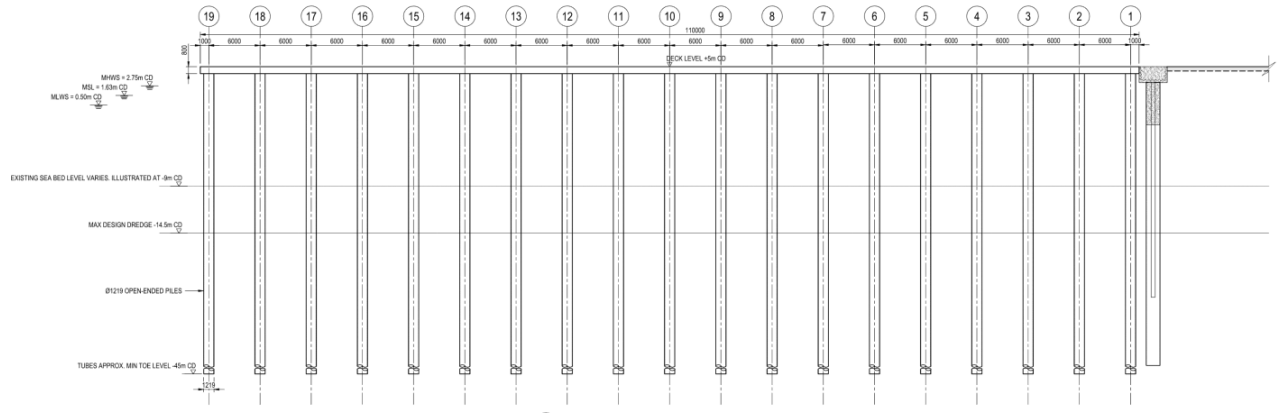


Figure 7: Suspended Deck Elevation (Drawing 3237966-CA-K2002)

6.5.2 Shiplift Suspended Deck

The proposed concept design for the shiplift suspended deck is as follows:

- 7.5m wide suspended deck with two rows of 1.4m diameter tubular piles at 3m spacing, extending to -30 m CD.
- A 4m wide x 3.3m long x 2m deep pile cap per pile (based on a jack spacing of 6.6m)

For further details refer to Drawings 3237966-CA-K2000 and 3237966-CA-K4002.

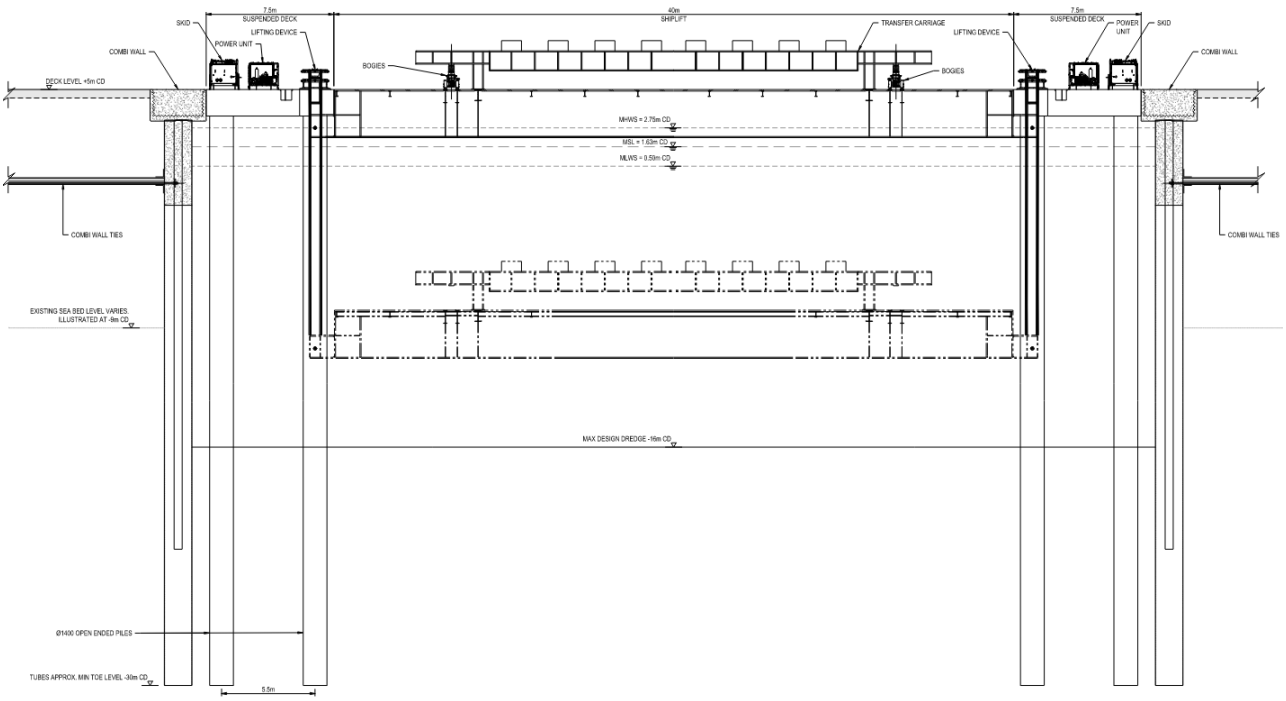


Figure 8 Lifting Device Cross Section (Drawing 3237966-CA-K4002)

6.6 Berth and Surrounds Requirements

As discussed in the Issues and Options Report a number of concept structural forms could be used for the creation of a vertical edge for the dry dock pocket and wet berth. Based on recent Northport designs at the eastern end of the site and early contractor involvement, a combi-wall system (combined tubular piles and sheet piles) has been identified as the preferred wharf construction solution at the concept design stage. The combi-wall option is illustrated on Drawings 3237966-CA-K2000 and 3237966-CA-K2001.

The proposed concept design for the combi wall is as follows:

- Retaining wall 1.62m diameter tubular piles at 3.29m spacing, extending to -30m CD with intermediate AZ25-800 sheet piles extending to -22m CD. The open-ended driven tubular piles are filled with sand or gravels up to a reinforced concrete pile plug in the upper extends to provide a moment resisting connection to a capping beam.
- 3m wide by 1.5m deep capping beam.
- Single bar tie rods extending to a sheet pile deadman at 35m back from rear wall (one tie rod per pile).
- Sheet pile anchor wall comprising AZ25-800 sheet piles, 12m long located between +3m CD and -9m CD.

Along the wet berth the following berth furniture has been allowed for in the concept design:

- Trelleborg MV1450 Fenders at 12m centres along the berthing face.
- 100 tonne tee bollards are assumed to be spaced as per existing spacings of 12 metres.
- Flush storm bollards are assumed to be spaced at 45 metres.

The fender and bollard systems are to be refined at the next stage of the design.

6.7 Site Servicing and Facilities

6.7.1 External Parking Area

An area external to the reclaimed NDD is required to accommodate off-site car parking for all staff working at the facility. The proposed access, parking, and connectivity arrangements associated with the NDD are summarised as follows:

- Off-site car parking will be established as close as reasonably practicable to the production (yard) area, on land owned by Northport/MMH.
- The extent of the parking area is indicative at this stage and will be refined during the next phase of design.
- Vehicle access to the parking area will be provided via a 7m wide access road, connecting to Marsden Bay Drive.
- Pedestrian access between the car park and the NDD will be provided via a 2.5m wide footpath running parallel to the access road.
- The access road and footpath will cross the Northport drainage canal at two locations. Appropriate bridging structures will be installed at each crossing to maintain connectivity.

The location and indicative size of the parking area and access road is shown on Drawing 3237966-CA-K7000.

6.7.2 Security and Noise Barriers

The concept design has included a 4m high noise barrier around the southern and western perimeter of the facility. This barrier will also act as a security fence to separate pedestrians accessing the new fishing jetty on the western side of the reclamation from operational areas of the facility.

6.7.3 Stormwater and Wastewater

Stormwater runoff and wastewater treatment systems have been developed by Hawthorn Geddes. The concept design plans have allowed space and fall to accommodate the conveyance and treatment concepts identified.

6.7.4 Water

The proposed firefighting water supply and hydrant network for the NDD are summarised as follows:

- Fire hydrants will be provided along the berthing faces at approximately 50m spacing.
- Hydrants will be installed within dedicated penetrations in the reclamation structure.
- Water supply to the hydrant network will be provided via 150mm diameter pipelines connected to the external water supply system.
- Isolation valves will be incorporated within the watermain to enable sections of the network to be shut down for maintenance.
- Isolation valves will generally be located centrally along berth faces.

6.7.5 Lighting

The proposed lighting layout and design provisions for the NDD are summarised as follows:

- The existing port lighting grid will be extended across the proposed NDD reclamation, with lighting masts provided at regular intervals.
- Lighting masts are assumed to be approximately 35m in height, comprising a galvanised steel lighting platform mounted on a 32m steel mast supported by a 3m octagonal concrete base and foundation plinth.
- Artificial lighting required for health and safety purposes will not exceed the following standards:
    - 15 Lux at the boundary of a road reserve; and
    - 10 Lux at the boundary of any other allotment not within the ownership of the consent holder.
- All new floodlighting luminaires will utilise LED (Light Emitting Diode), LEP (Light Emitting Plasma), or equivalent advanced lighting technologies to meet consenting requirements.
- Lighting poles will be finished in recessive colours to minimise visual prominence.
- Where practicable, lighting will be directed below the horizontal plane to reduce light spill.
- The colour temperature of all new floodlighting will not exceed 4000 K.
- Floodlighting will be designed to ensure that, as far as practicable, the principal light output is directed within the port operational area (including the container terminal, adjoining wharves, and Port Zone land).

6.7.6 Power Supply

The proposed power supply and additional considerations are summarised as follows:

- At least 2 feeds of 11 kV 3-phase mains supply from the Bream Bay substation and an 11 kV 'ring' at the NDD are required for increased network resilience and operational flexibility.
- Bream Bay substation has seen a reduction of approximately 30 MW in power demand since the closure of the Marsden Point Oil Refinery. It is estimated that the power requirements of the NDD will be less than 30 MW.
- A compressed (working) air supply system will be provided throughout the site, supplied via an appropriately sized compressor and air filtration system.
- Provisions shall be made for back-up generators to provide 'emergency' power for dry dock operations. The quantity, location, and power output of these generators will be defined in the later stages of the design process.
- Other technologies, such as wind, solar, or hydrogen, could be considered – based on the demand for emergency power.

6.8 Design assumptions

The following assumptions have been adopted to inform the concept design and consenting assessment. These assumptions define the basis on which the proposed development has been assessed and will be subject to further refinement during subsequent design stages.

- The proposed development is based on a concept-level design, and therefore the configuration, layout, and engineering details are indicative only and will be refined at later design stages. This may result in changes to the design, layout, and operational performance of the facility.
- The design has been informed by inputs from MBIE, Northport, a potential operator, and supporting technical studies.
- The position of buildings, storage areas, and supporting infrastructure, is indicative and has been developed for assessment purposes. The landside layout of the facility will be refined and optimised during detailed design, including consideration of the chosen lifting device and associated operational requirements.
- The design vessel parameters inform the extent of dredging, berth design, and associated infrastructure.
- The navigation and manoeuvring arrangements, including the turning basin and approach, are based on existing simulation studies and published guidance. Additional simulation work is expected to be undertaken to confirm suitability for the full range of vessels.
- The marine structures and infrastructure, including quay walls, piles, and berthing facilities, are based on preliminary assessments and indicative sizing. These elements will be subject to detailed engineering design to confirm structural performance and operational requirements.
- The dredging and reclamation concept assumes that dredged materials can be reused within the reclamation to achieve a broadly balanced cut and fill. The suitability of materials, particularly fine-grained sediments, will require confirmation through further investigations and assessment.
- The environmental management systems, including stormwater, wastewater, and operational runoff treatment, are presented at a concept level and will be further developed to ensure they meet regulatory requirements through the detailed design.

- The design incorporates climate change allowances, including an assumed sea level rise of approximately 0.46m over a 50-year period, which informs platform levels and coastal interface design.

7 Inputs from other Sources

This concept design has been developed in collaboration with MBIE, Northport and a potential operator, whose inputs have helped inform and shape the design.

The concept design has been informed by the following sources:

- The 3D modelling of the facility and estimation of cut/fill volumes has been completed by Northport.
- The size and location of the parking areas and the route of the access road is an input from the potential operator and MBIE/Northport and is discussed and analysed by Flow Transportation.
- Shipyard user requirements including building sizes have been derived in collaboration with a potential operator.
- MBIE/Northport have supplied historic geotechnical data which has informed the design. Further geotechnical investigations are recommended.
- Additional navigation simulations may further optimise the turning basin.
- Hydrodynamic studies have been undertaken by MetOcean Solutions Ltd.
- Stormwater and Wastewater design by Hawthorn Geddes.

The current concept design will be subject to further review and refinement as the project progresses through subsequent design stages.

8 Preliminary Geotechnical Assessment

8.1 Geology

The 1:250,000 published Geological Map of Whangarei (Heron, 2020) describes the underlying geology directly south of the site as:

- Weakly cemented dune forming sands
- Weakly cemented sand, mud and peat in lake and swamp deposits belonging to the Karioitahi Group

8.2 Geotechnical Investigations and Ground Model

8.2.1 Geotechnical Investigations

Historic geotechnical investigations have been undertaken prior to the development of Northport, and for each stage of Northport's existing wharf extensions. In 2019, Northport undertook a geotechnical investigation to support concept design of a then proposed western reclamation. The outcome of those geotechnical investigations is consistent with the published geology.

Boreholes from these reports that are located within and immediately surrounding the project area have been selected for this concept geotechnical assessment and borehole locations are shown in Figure 9 below.

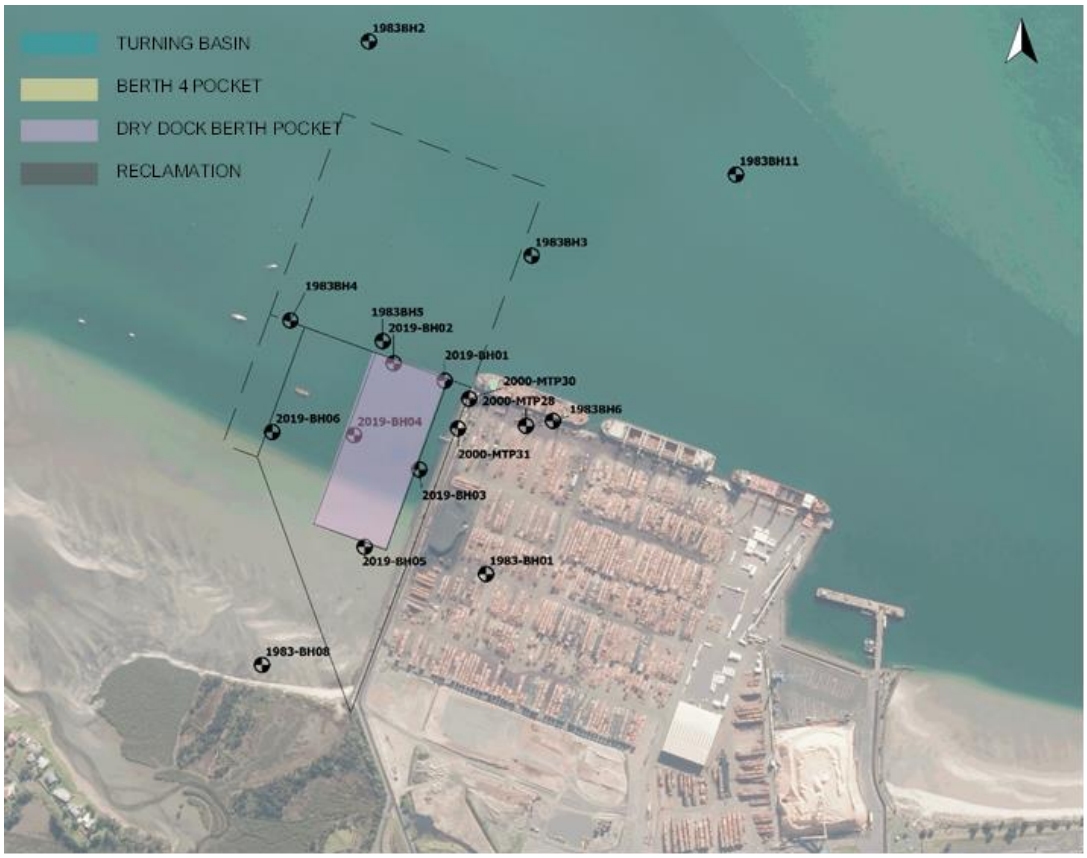


Figure 9: Locations of boreholes used for geotechnical assessment

8.3 Ground Model

The existing ground information data from the boreholes was reviewed, and a simplified layering system was developed within the nearshore deposits based on material strength and type. The ground profile generally comprises the following units:

a) Shelly Sand – Fine to medium shelly sand, varies loose to very dense, typically medium dense to dense. This unit is generally located immediately below seabed.

b) Silt–Clay: Upper – Fine grained layer, varies silty clay, sandy clay, sandy silt. Typically, stiff to very stiff, and encountered immediately below the shelly sand layer.

c) Sand – Loose to medium dense sand encountered below the silt-clay layer. This layer is not consistent across the site.

d) Dense Sand – Typically a very dense sand. This unit underlies the silt – clay and sand layers and extends across the proposed dry dock area.

e) Silt-Clay: Lower – Fine grained layer, varies silty clay, sandy clay, sandy silt. This unit has been encountered underlying the Northport area and is typically very stiff to hard.

Bedrock has not been encountered in the port area from borehole investigations drilled to -50m CD.

East of the proposed dry dock area, the site has been reclaimed for the port and comprises some 12-13m of dredged shelly sand material that was undertaken around ~2000.

8.4 Geotechnical Assessment

A preliminary geotechnical assessment was undertaken to support the proposed concept design of the NDD. Specific geotechnical issues requiring assessment include:

- Liquefaction – Loose sands are present within the port area that may be subject to liquefaction. This may affect the seismic and post seismic performance of wharf structures and buildings within the reclamation.
- Settlement – Construction of the reclamation fill will result in a load on the seabed that may cause consolidation of underlying soils resulting in settlement of the reclamation surface.
- Wharf Structure – Both piled quay and sheet pile structures have been used at Northport for wharf structures.
- Revetment and Slopes – The reclamation at Northport has been formed from perimeter bunds comprising locally quarried rock, and dredged sand. Specific consideration of available dredge materials, and performance requirements of the reclamation is required.
- Reclamation and Dredging – Suitable material from dredgings can be utilised for the reclamation fill. Some ground improvements techniques may be required in the reclamation fill adjacent to new structures where the risk of liquefaction is not acceptable.
- Buildings Structures – There are several buildings and structures that will need to be built on the reclamation to support the NDD. Consideration of performance and foundation requirements will be required.

8.4.1 Liquefaction Assessment

The assessment of the materials encountered on site indicates that there are loose granular soils present that may be susceptible to liquefaction. However, the silt deposits present are generally stiff, and are therefore not likely to cyclically soften in the design earthquake.

This assessment indicates localised liquefaction may occur under the design earthquake with a return period of 1/500 years in the sands present beneath the existing seabed within the Shelly Sand unit. In addition, reclamation fill (hydraulic filling of dredged material) without any ground improvement is also likely to be susceptible to liquefaction based on previous assessments of the existing reclamation fill at Northport.

Specific areas of the reclamation fill (such as immediately behind the retaining structure) would likely be ground improved to reduce the risk of liquefaction.

It is noted however the depth of the liquefiable layers and the planned dredging, most of these layers will be dredged as part of the proposed works. For the area beneath the reclamation fill, assessment shows that the overburden pressure due to the reclamation fill will reduce the extent of the liquefaction.

8.4.2 Settlement

Construction of the NDD will induce consolidation of the underlying soils resulting in settlement of the ground surface. The magnitude of settlement depends on the load from the reclamation fill and overlying structures and the compressibility of the underlying soils. The settlement will primarily be due to consolidation of the Upper Silt-Clay unit and will occur over time due to its relatively low permeability. The lower silty clay layer is unlikely to contribute significantly to settlement as it is very stiff to hard and located well below the existing seabed.

The total estimated settlements could be in the order of 200mm to 400mm based on previous assessments at the port area. Considering around 1.5 years for construction, “post-construction settlements” could be of the order 100mm and 200mm. Historically post construction settlement at Northport has been relatively low. Note however any seismic liquefaction induced settlement would be additional to these post construction settlements.

A ‘preload and surcharge’ may be constructed to reduce the post construction settlement. Details of post construction settlement and the requirement for ‘preload and surcharge’ will be undertaken in the next phase of the design.

8.4.3 Wharf Structures

The proposed wharf structure retaining the reclamation comprises tubular steel piles with intermediate sheet piles connected with steel tiebacks to a sheet pile dead man. A reinforced concrete capping beam connects the piles along the main wall. The proposed structure provides support to the reclamation while enabling dredging to be disposed of as reclamation fill. Details of the proposed structure are provided on the Drawing 3237966-CA-K2001.

Preliminary analysis was undertaken based on modelling for the proposed Northport Berth Extension to determine likely performance (Deflection and embedment to meet stability requirements), and structure sizes (Bending moment and shear force) based on the soil conditions present at site, proposed retained heights (top of wharf to dredge level) and loadings.

The open piled finger jetty will be supported on piles driven to depths to provide the required lateral and vertical load capacities.

8.4.4 Revetment and Slopes

The existing revetment slopes on the western side Northport generally comprise locally quarried rockfill with armour rock protection. Over an initial length adjacent to land a low height sand core with armour protection was used at the reclamation edge. The revetment slope is 1V:1.5H. Similar is recommended for the proposed revetment for this project

Specific slope stability analysis is required to confirm geometry and perimeter bund requirements to meet required factors of safety. Displacement based design for seismic load cases with respect to the revetment may be required to avoid requirements for ground improvement, particularly where there is a risk of liquefaction and the overall performance is not specifically critical.

8.4.5 Reclamation and Dredgings

Material proposed to be dredged will vary from shelly sand within the harbour to silt-clay and sand within the Dry Dock.

Dredged Shelly Sand

The shelly sands and sand dredgings have been successfully used within the Northport reclamation. Stormwater, utilities and pavement construction can occur relatively quickly due to the granular free draining nature of the sand. The main issue with the sand is when placed below water, the sand is not compacted so it is relatively loose and therefore potentially at risk of liquefaction, which would cause settlement of the ground surface and additional loading on wharf structures. Where required for wharf structures and buildings, the sand may need to be ground improved to reduce the risk of liquefaction.

Dredged Silt Clay

Dredged silt clay placed within a reclamation generally performs poorly as the material remains very weak and cannot be easily compacted or strengthened below water due to their very fine-grained impermeable nature. The reclamation would be prone to ongoing settlement over a very long period of time, so typically these materials are dredged to waste or placed within reclamations where they are not required for a long period of time.

In Auckland, fine grained silt clay dredgings have been used to form reclamations by stabilising with cement to negate the requirement to dispose offshore or use imported quarried material. This has a beneficial outcome of reusing a waste product and forming a sound reclamation available for immediate use. The silt clay materials generally need to be firm to soft, plastic and dredged with methods that limits the significant addition of water to be successfully cement stabilised. At this site, further assessment would be required as the upper silt clay materials may be too stiff and form cohesive lumps therefore unable to be adequately mixed with cement. If however, found to be suitable, the stabilised dredgings could be used within the perimeter bund and reclamation.

8.4.6 Buildings and Other Structures

A number of buildings will be constructed to support services of the NDD. These buildings will vary from larger warehouse structures to smaller single level buildings. Foundation requirements will vary for these structures and consideration will need to be given to the following:

- Settlement of the reclamation: Settlement may occur either due to construction of the reclamation or seismic liquefaction induced settlement. For structures sensitive to settlement, piled foundations may be required (i.e. driven steel tubes or H piles). For structures not sensitive to settlement, shallow foundations or raft type foundations may be appropriate.
- Uplift of structures: Where structures are subject to high uplift loads, piled foundations may be required.

9 Proposed Construction Methodology

9.1 Overview and Capability

The proposed NDD concept design adopts construction techniques that have been successfully implemented at Northport and similar ports, including rock revetment, combi-wall construction, dredging and reclamation, pavement construction, utilities and services. These proven methods provide confidence in constructability, environmental management, programme certainty and durability of the works.

It is noted that the construction methodology will be further evaluated and may be refined during subsequent design stages.

9.2 General Approach to Construction

The works comprise a maritime dredging and reclamation development forming a new hardstand and berthing facility, together with supporting land-based infrastructure, utilities, and buildings. The main construction components include:

- Dredged turning circle including berthing area
- Dredged lift device pocket
- Reclamation of seabed for hardstand and facilities, contained by:
    - Piled quay walls
    - Sloped rock revetments
- Open piled finger pier jetty for berthing on the northern face
- Road access including the provision of services and utilities to the site
- Paving, Drainage, Lighting and utility provision across the site
- Associated buildings and facilities

The overall construction period is approximately 3 years from mobilisation to completion of the civil infrastructure work. It is expected that there would be a further or overlapping period of approximately 12 to 18 months to complete the development of the buildings for the initial NDD establishment.

Following the civil infrastructure completion, allowance of a period of approximately 6 months for the installation and commissioning of the shiplift device.

9.3 Construction Sequence

The potential construction sequence has been illustrated in Appendix B.

The development would essentially proceed in the following manner:

9.3.1 Site Investigations

- Marine and landside boreholes and testing

9.3.2 Site Establishment and Clearance

- An area close to the site on either Northport or MMH land would be required for the contractor’s site and offices
- The Perimeter Road access along the SW boundary of Northport land would be created and the movement of the ISPS fencing and services and utility changes undertaken

- A small area of unformed legal road will be occupied by the reclamation edge and public accessway

9.3.3 Reclamation Containment Structures

The reclamation will be formed within engineered containment structures comprising both rock revetments and piled quay walls.

9.3.3.1 Rock revetment

This structure will typically be constructed from landside and be formed by either placing cement stabilised silt-clay dredgings or end tipping of locally quarried rock core material with an outer perimeter rock armour protection. As this structure reaches the deeper water an element of the structure may be constructed using marine split hopper barges to place larger quantities of material on the base and avoid road haulage.

The inner face of this structure would typically be lined with a geofabric to contain the fill placed during the dredge and reclaim phase.

There is a potential that the beach and bed profile that will form the substructure for this structure may require some grading and preparation, and this would likely be undertaken by excavator/backhoe and materials moved to disposal of containment areas.

Where possible, material from the existing western bund would be removed and re-used, subject to assessment of the risk of exposing the edge of the existing reclamation to erosion prior to the extension of the reclamation adjacent to it.

9.3.3.2 Piled structures

Two alternatives are presented for the piled wall perimeter wall

a. Conventional Construction Methodology

The remainder of the reclamation containment will likely be formed by the installation of an ‘Anchored Combi-Wall’ type structure which would essentially be constructed of a steel tube and sheet piled front wall with steel tie rods running back through the reclamation to a rear sheet piled anchor wall.

It is anticipated that piling work will be undertaken from marine plant. However, some contractors may elect to build a temporary work platform to allow the construction to proceed without floating plant. This work platform would be moved along the wharf face as it is constructed.

As the foundation materials are generally soils (i.e. not rock) piles would be installed using Vibratory hammer driving techniques. Some piles will need to also be driven with an impact hammer to confirm their load capacity and/or reach final embedment depth where pile is “hung up” on a very dense sand layer.

With the front wall in place the dredge and reclaim activity can commence and the two activities will overlap so that the rear anchor wall can be placed using landside plant on the first phase of the reclamation. With the anchor wall installed the remainder of the dredging will be undertaken and the fill level brought up to final formation level.

b. Co-ordinated Construction Methodology for Drydock Berth Slot

An alternative construction methodology can be considered, provided there is well planned coordination between the piling and dredging activities. This option requires the development of working platforms for the piling activity with dredged fill, some of which will have to be removed after the combi-wall is complete. This is particularly applicable to the drydock berth slot. The existing water depth in this area is generally between 5m and 10m below Chart Datum. This area would be filled to say 1m above MHWS in an area inside the area contained by the combi wall for a work area for the crane. The fill would be placed at its natural angle of repose resulting in some being deposited in the drydock slot area.

As the combi-wall proceeds, the rear anchor wall can follow behind using landside plant. Once a sufficient length of the wall is completed, the berth slot can be dredged to design depth and the material used to bring the area behind the wall to final level.

9.3.4 Dredging and Reclamation

Based on the information available the dredge materials are likely to be suitable for the formation of the reclamation, and the aim is to achieve a cut and fill balance that leaves little to no offsite disposal.

The dredging work will potentially be phased but based on the project being completed in one phase the work is likely to be undertaken using the combination of a cutter suction dredger and a backhoe dredger. All materials would be pumped into the containment area or cut and placed in barges for controlled bottom dumping using split hopper barges.

As noted in the section above on the formation of containment structures that the dredging will need to be a carefully sequenced activity. The construction sequence for the reclamation can be found in Appendix B.

It is likely that in order for the site (reclamation area) to be functional in the time periods required that there would need to be a ground improvement activity in order to reduce post construction settlement and also to meet liquefaction risk requirements. This activity is likely to involve one or other of the following:

- Vibrocore/vibro replacement compaction
- Wick drain installation
- Rolling overburden (short term excess loading)
- Roller Compaction

9.3.5 Jetty Structure

The jetty structure will be an open piled structure formed of driven steel pile reinforced concrete piles supporting a reinforced concrete deck structure. The piles will be driven using vibratory hammer driving techniques with final driving undertaken with an impact hammer technique. These piles will be installed either from working out from land or by marine plant with the deck structure formed with either precast and insitu slab or insitu only concrete slab.

9.3.6 Lift Device

9.3.6.1 Floating Dry Dock

It is expected that the floating drydock would be fabricated in an overseas shipyard, followed by systems tests at the dockyard. The drydock would then be towed to site, installed and final commissioning testing undertaken.

9.3.6.2 Shiplift

It is expected that the lift platform would be fabricated offsite then barged or shipped to site, assembled and installed before final commissioning tests would be undertaken.

9.3.7 Paving, Utilities and Services

- On completion of the placement and improvement of the reclamation service and utility trenches and corridors will be established prior the placement of paving and the development of and lighting and other such above grade services.

9.3.8 Buildings

- Building will likely require piled or slab foundations designed and constructed to meet any settlement requirements.
- The buildings will likely include offices and industrial steel framed sheds all of which will likely have all materials delivered by road.

10 Proposed Construction Programme

The overall construction period is anticipated to be approximately 3 years from mobilisation to completion of the civil infrastructure work. It is expected that there would be a further or overlapping period of approximately 12 to 18 months to complete the development of the buildings for the initial NDD establishment.

Following the civil infrastructure completion, allowance of a period of around 6 months for the installation and commissioning of a shiplift device; this would depend partly on the option choice of Floating Dry Dock or Ship Lift.

An indicative programme is provided with an accompanying Gantt chart.

Note that this programme is subject to change, noting the following:

- Ilt is possible that barges will need to be brought in from overseas which may impact the programme.
- Steel procurement may be a critical path item and will need to be considered at an early stage in the process and possibly procured during the preceding detailed design process.
- The detailed construction methodology and construction contract may influence programme timing.

Table 7 Indicative Construction Programme

Activity	Start (month)	Duration (months)	End (month)
Preliminaries & procurement	0	12	12
Site establishment & enabling works	2	3	5
Rock revetments	5	6	11
Dredging	5	22	27
Quay walls (piles + anchoring)	10	14	24
Reclamation (including GI)	6	24	30
Finger pier jetty (piled wet berth)	30	4	34
Services & utilities	32	2	34
Roads, pavements, drainage & lighting	33	3	36
Lifting device installation & commissioning*	36	6	42
Buildings & facilities	40	18	58
Completion	58	2	60

*Note: The programme duration may alter depending on the lift device selection and procurement options.

Table 8 Indicative Construction Programme Gantt Chart



A

Appendix A – Concept Drawings

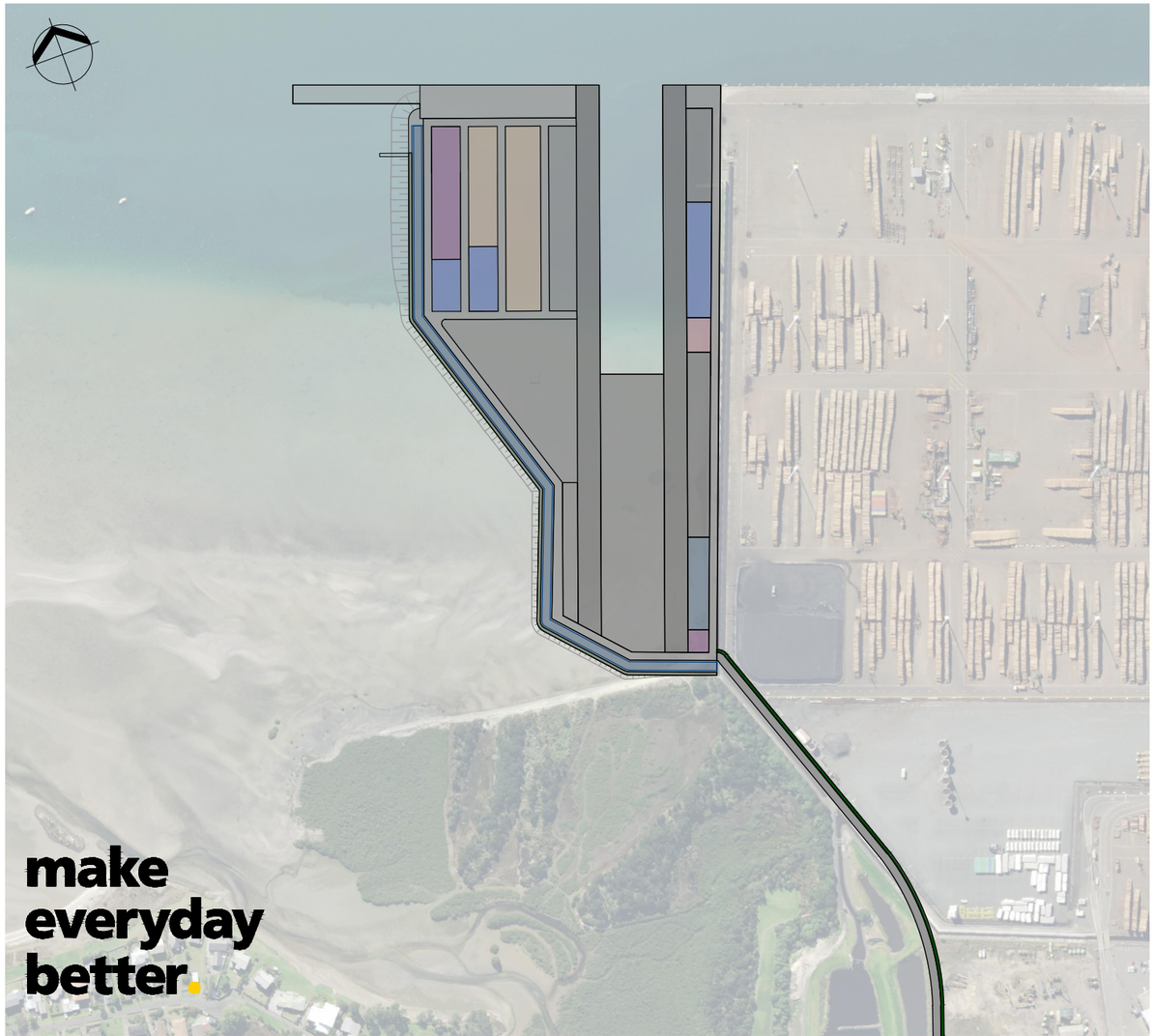
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MARINE OPERATIONS MAINTENANCE FACILITY

CIVIL ENGINEERING

Prepared for Ministry of Business, Innovation & Employment
Prepared by Beca Limited (Beca)

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06 AUGUST 2026
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DRAWING No.	DRAWING TITLE
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3237966-CA-K0002	GENERAL ARRANGEMENT SPATIAL PLAN
3237966-CA-K0004	HYDROGRAPHIC AND TOPOGRAPHIC SURVEY
3237966-CA-K2000	QUAYWALL GENERAL ARRANGEMENT
3237966-CA-K2001	QUAYWALL TYPICAL SECTIONS WALL TYPE 1
3237966-CA-K2002	QUAYWALL TYPICAL SECTIONS SUSPENDED DECK
3237966-CA-K3000	REVETMENT TYPICAL SECTIONS
3237966-CA-K4000	EXAMPLE DRY DOCK ARRANGEMENT
3237966-CA-K4002	EXAMPLE SHIPLIFT ARRANGEMENT
3237966-CA-K7000	EXTERNAL ROAD LAYOUT
3237966-CA-K8001	CONSTRUCTION STAGING PLANSTAGES 1 AND 2
3237966-CA-K8002	CONSTRUCTION STAGING PLANSTAGES 3 AND 4
3237966-CA-K8003	CONSTRUCTION STAGING PLANSTAGES 5 AND 6
3237966-CA-K8004	CONSTRUCTION STAGING PLANSTAGES 7 AND 8
3237966-CA-K8005	CONSTRUCTION STAGING PLANSTAGE 9

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E	FOR RESOURCE CONSENT	WP	RH	BM	06.08.26
D	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
C	FOR INFORMATION	FP	RH	BM	08.06.26
B	FOR INFORMATION	FP	RH	AH	22.05.26

Original Scale (A1) 1:2500
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Design	RH/WP	30.04.26	Approved For Construction*
Drawn	WP/FP	30.04.26	
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Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

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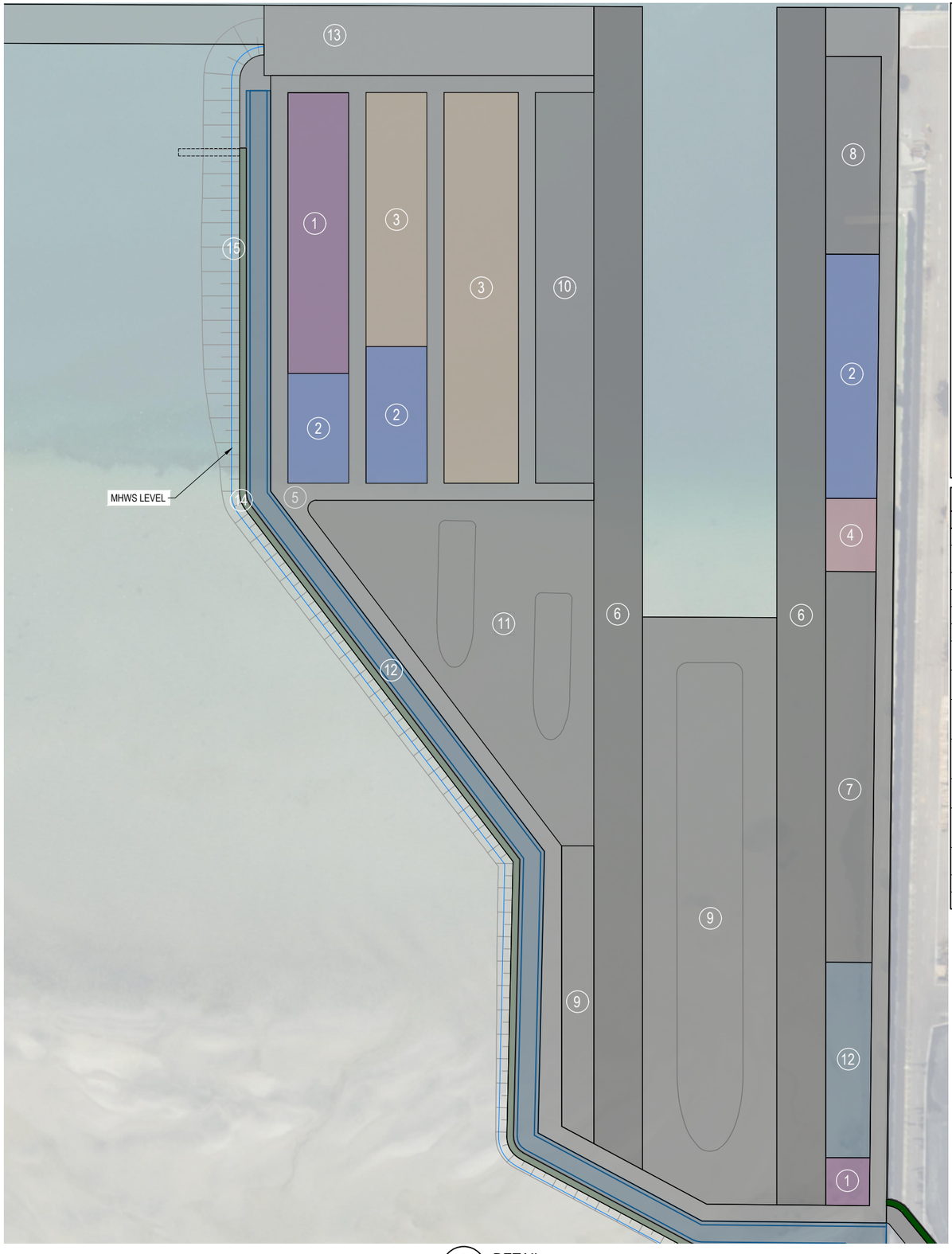
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LEGEND:

- 1. ADMINISTRATION SPACES
- 2. WAREHOUSE AND STORAGE SPACES
- 3. WORKSHOPS
- 4. UTILITIES
- 5. ROADS
- 6. CRANE CORRIDORS
- 7. TRANSFER BOGIE STORAGE
- 8. DOCK BLOCK AND CRADLE STORAGE
- 9. END SLIP VESSEL WORKING AND LAYDOWN HARDSTAND
- 10. SIDE SLIP VESSEL TRANSFER AREA AND LAYDOWN HARDSTAND
- 11. SMALL VESSEL WORKING AND LAYDOWN HARDSTAND
- 12. WASTEWATER AND ENVIRONMENTAL CONTROLS
- 13. WET BERTH WORKING AND LAYDOWN AREAS
- 14. PUBLIC ACCESS

SPATIAL ALLOCATIONS LIST

REF.	DESCRIPTION	AREA (m^2)
1	ADMINISTRATION SPACES	3,250
2	WAREHOUSE AND STORAGE SPACES	4,650
3	WORKSHOPS	7,500
4	UTILITIES	600
5	ROADS	13,500
6	CRANE CORRIDORS	19,250
7	TRANSFER BOGIE STORAGE	3,150
8	DOCK BLOCK AND CRADLE STORAGE	1,800
9	END SLIP VESSEL WORKING AND LAYOWN HARDSTAND	14,600
10	SIDE SLIP VESSEL TRANSFER AREA AND LAYDOWN HARDSTAND	3,800
11	SMALL VESSEL WORKING AND LAYOWN HARDSTAND	9,450
12	WASTEWATER AND ENVIRONMENTAL CONTROLS	7,950
13	WET BERTH WORKING AND LAYDOWN AREAS	5,600
14	PUBLIC ACCESS	1,700
15	REVETMENT ABOVE MHWS	2,050

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GENERAL ARRANGEMENT
SCALE 1:2500

A DETAIL
SCALE 1:1000

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Design	RH/WP	30.04.26	Approved For Construction*
Drawn	WP/FP	30.04.26	
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Project: MARINE OPERATIONS MAINTENANCE FACILITY

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Discipline: CIVIL - GENERAL

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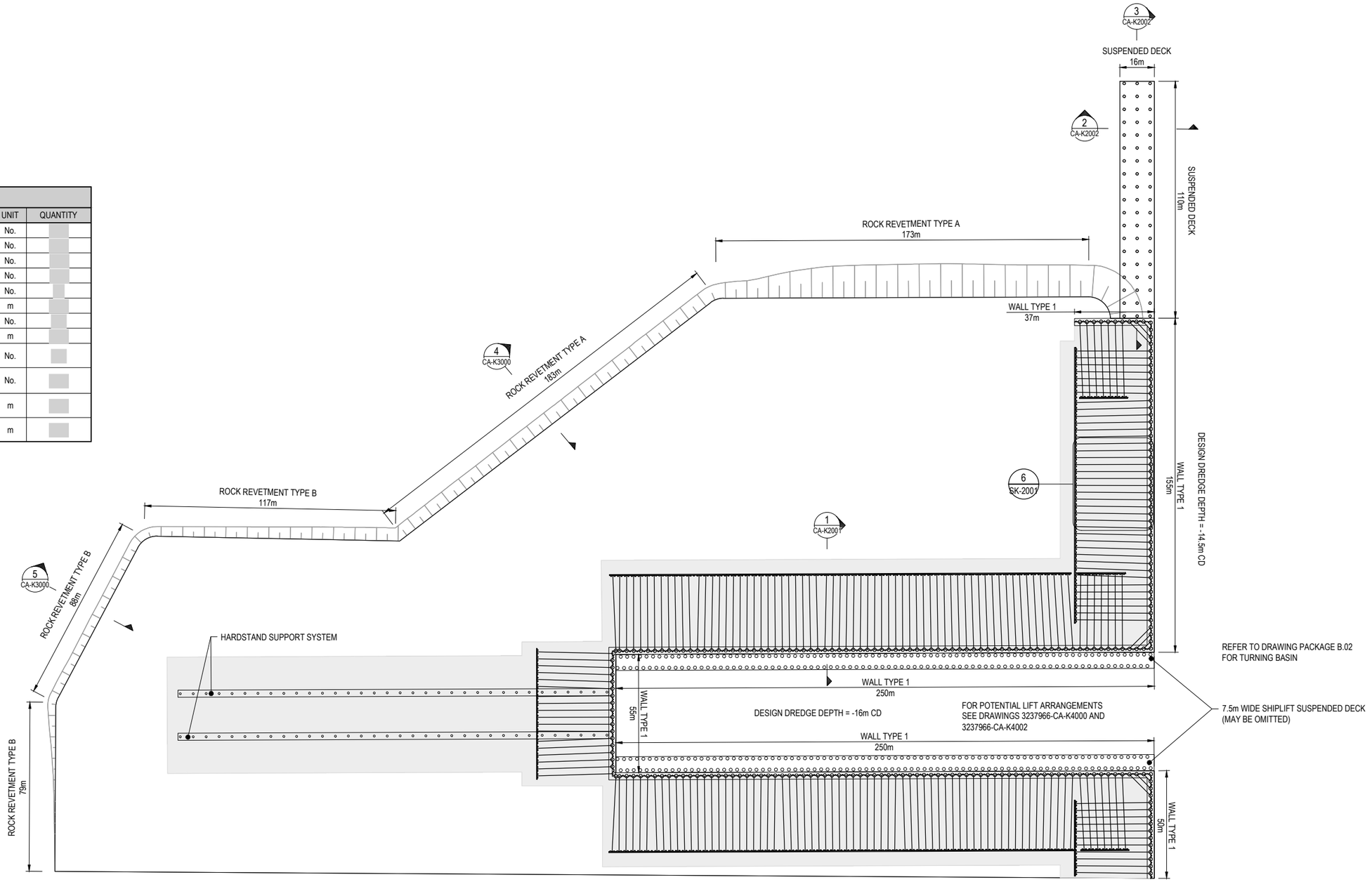
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2. SHIPLIFT SUSPENDED DECK MAY BE OMITTED
3. PILE NUMBERS ARE INDICATIVE AND SUBJECT TO CHANGE

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EXTENT OF GROUND IMPROVEMENT

MATERIAL TAKEOFF

ITEM	MATERIAL	UNIT	QUANTITY
WALL TYPE 1	Ø1626 CHS PILES	No.	
	AZ 25-800 SHEET PILES	No.	
	AZ 25-800 SHEET PILE ANCHORS	No.	
	M130 TIE ROD	No.	
	CORNER TIE ROD	No.	
	WALER BEAM	m	
HARDSTAND SUPPORT SYSTEM	Ø1000 CFA PILES	No.	
	WALER BEAM	m	
SUSPENDED DECK	Ø1219 OPEN-ENDED PILES	No.	
SHIPLIFT SUSPENDED DECK (MAY BE OMITTED)	Ø1400 OPEN-ENDED PILES	No.	
REVETMENT	TYPE A	m	
	TYPE B	m	



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Original Scale (A1)	1:750	Approved For Construction*	Date
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Design	RH/WP	30.04.26
Drawn	WP/FP	30.04.26
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Title: QUAYWALL GENERAL ARRANGEMENT

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K2000

Rev.: C

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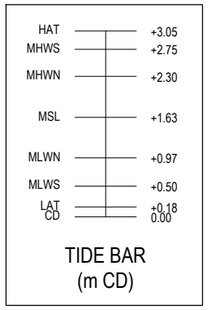
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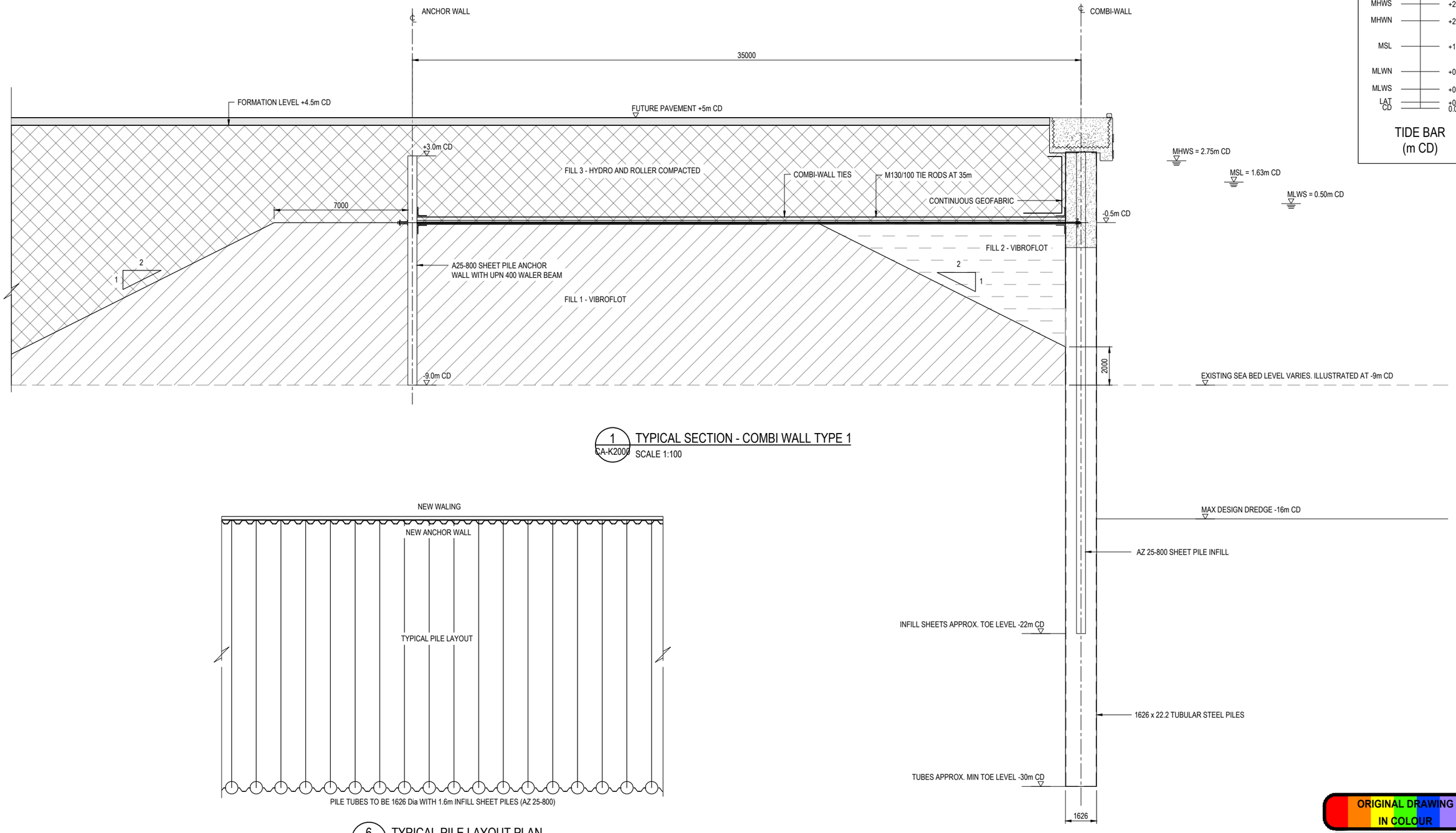
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3. ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.
4. FILLS 1 AND 2 MAY ALSO COMPRISE ROCK FILL.
5. FENDERS AND BOLLARDS ARE NOT SHOWN.





1 CA-K2000 TYPICAL SECTION - COMBI WALL TYPE 1
SCALE 1:100

6 CA-K2000 TYPICAL PILE LAYOUT PLAN
SCALE 1:250

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C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
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Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: QUAYWALL TYPICAL SECTIONS WALL TYPE 1

Discipline: CIVIL - GENERAL

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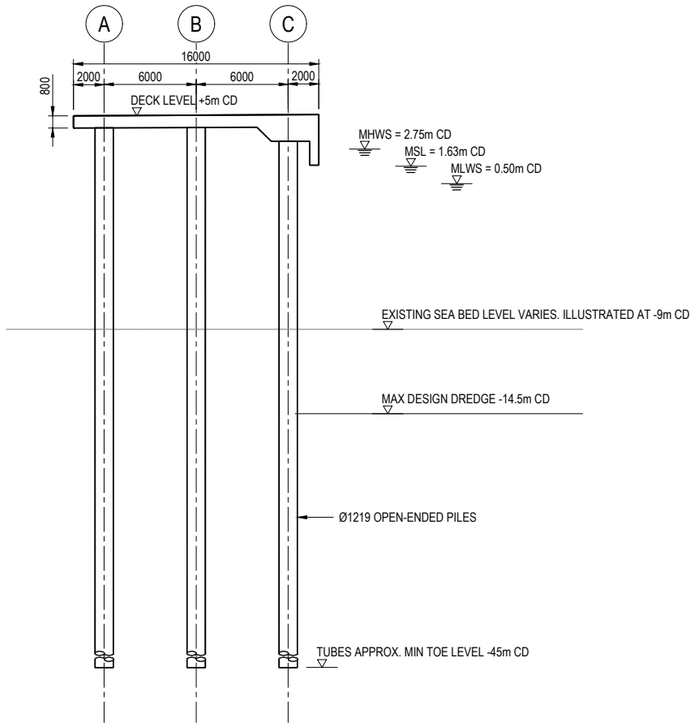
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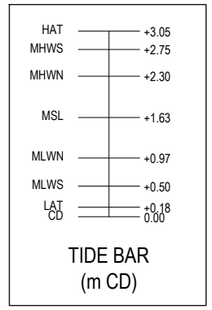
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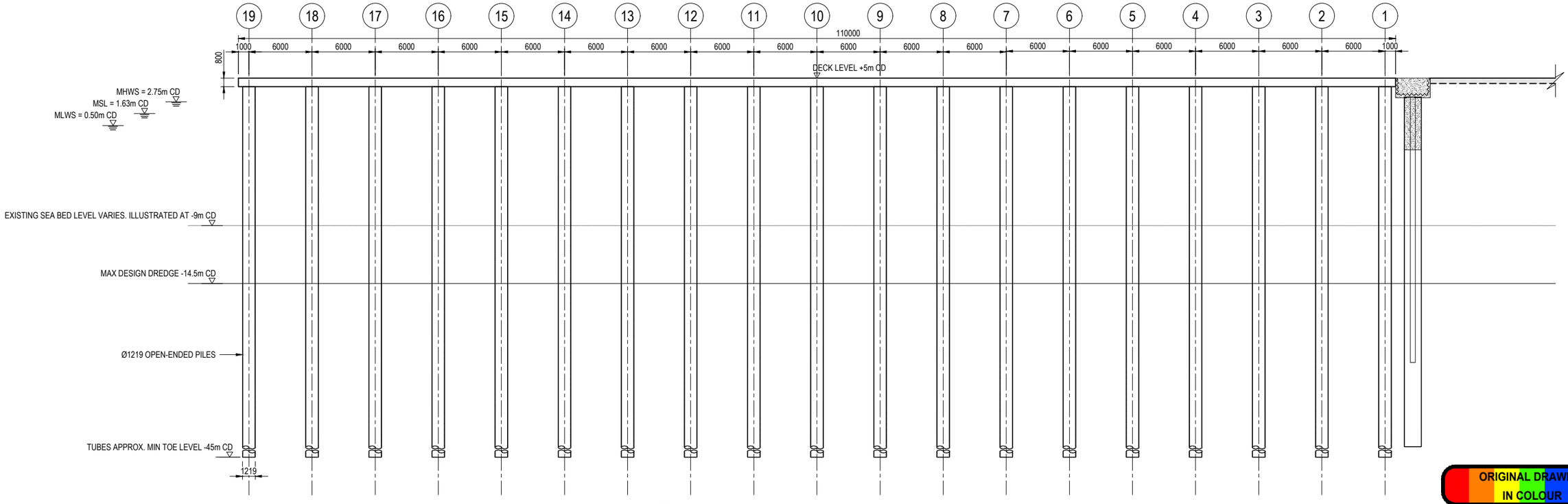
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2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.
4. FENDERS AND BOLLARDS ARE NOT SHOWN.



TIDE BAR
(m CD)



3 SK-2000 ELEVATION - SUSPENDED DECK
SCALE 1:100

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RESOURCE CONSENT
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	FP	RH	AH	22.05.26

Original Scale (A1) AS SHOWN	Design	RH/WP	30.04.26	Approved For Construction*
	Drawn	WP/FP	30.04.26	
Reduced Scale (A3) HALF SHOWN	Dsg Verifier			Date
	Drg Check			
	* Refer to Revision 1 for Original Signature			

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Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: QUAYWALL TYPICAL SECTIONS SUSPENDED DECK

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K2002

Rev.: C

DO NOT SCALE FOR SET OUT DIMENSIONS

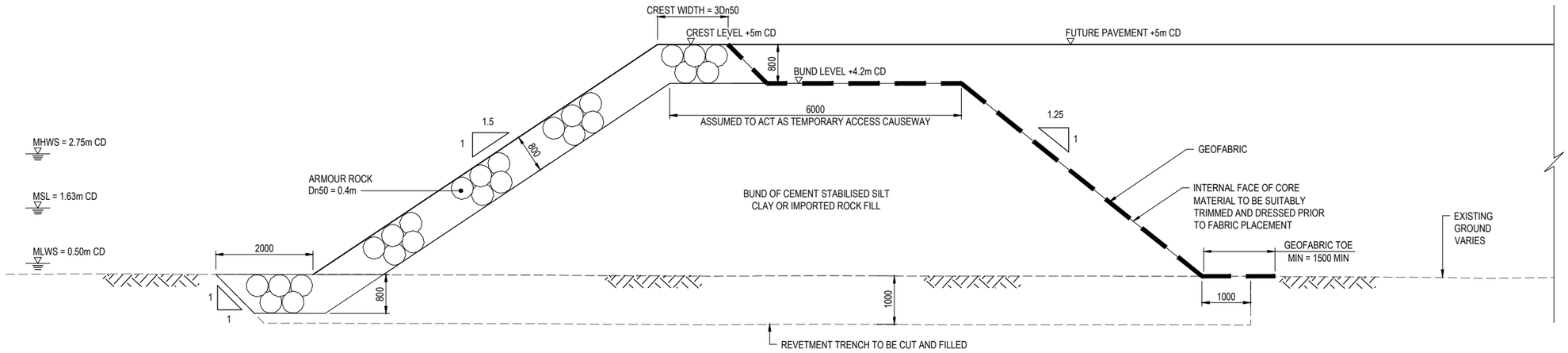
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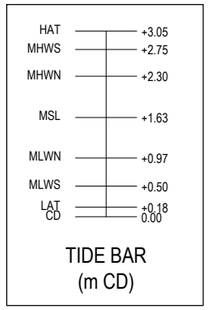
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Document No. 3237966-CA-K2002.DWG

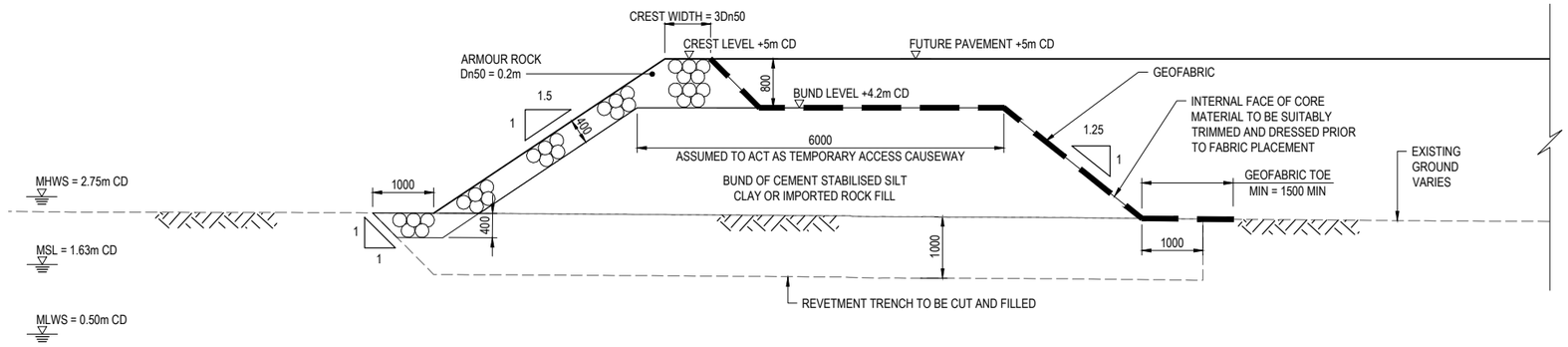
NOTES:

1. VERTICAL LEVEL TO CHART DATUM.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.





4 SK-2000 TYPICAL SECTION - ROCK REVETMENT TYPE A
SCALE 1:50



5 SK-2000 TYPICAL SECTION - ROCK REVETMENT TYPE B
SCALE 1:50

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	FP	RH	AH	22.05.26

Original Scale (A1)	AS SHOWN	Design	RH/WP	30.04.26	Approved For Construction*
Reduced Scale (A3)	HALF SHOWN	Drawn	WP/FP	30.04.26	
		Dsg Verifier			Date
		Drg Check			
		* Refer to Revision 1 for Original Signature			

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: REVETMENT TYPICAL SECTIONS

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K3000

Rev.: C

DO NOT SCALE FOR SET OUT DIMENSIONS

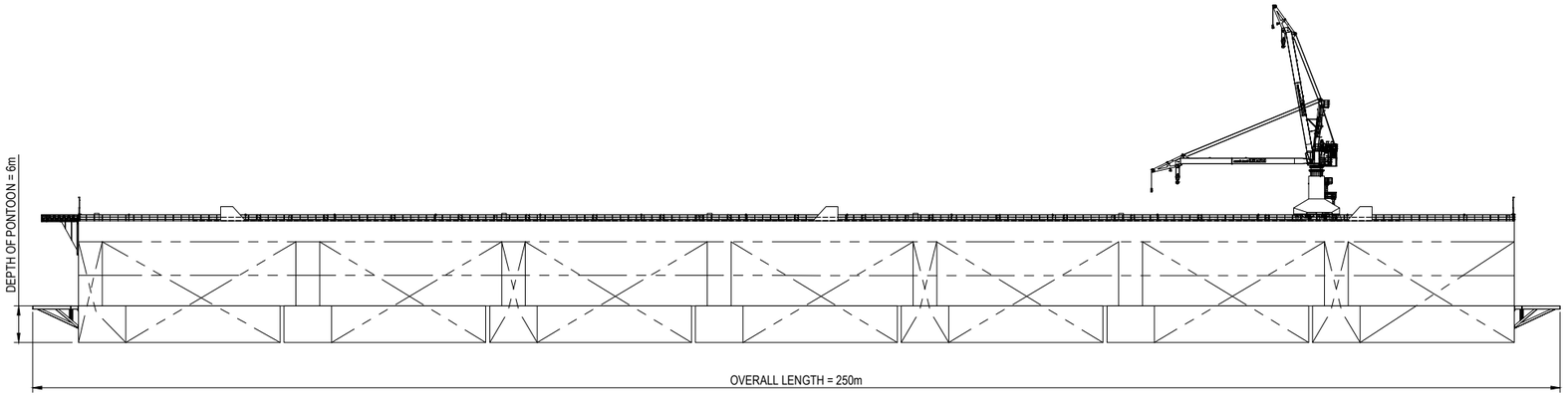
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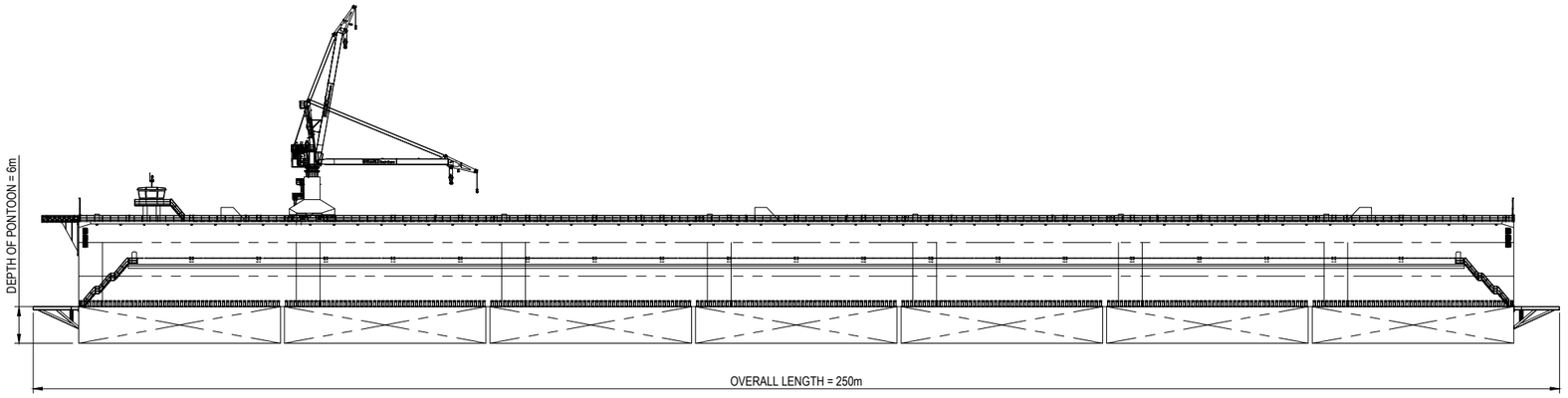
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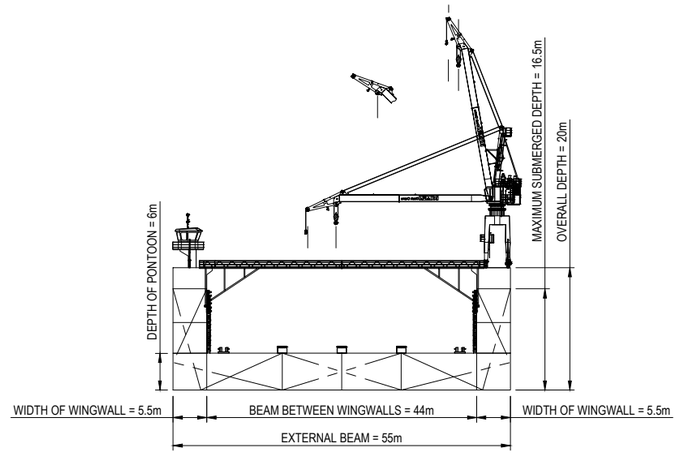
1. EXAMPLE DRY DOCK ARRANGEMENT BASED ON A DAMEN MODULAR FLOATING DRY DOCK.



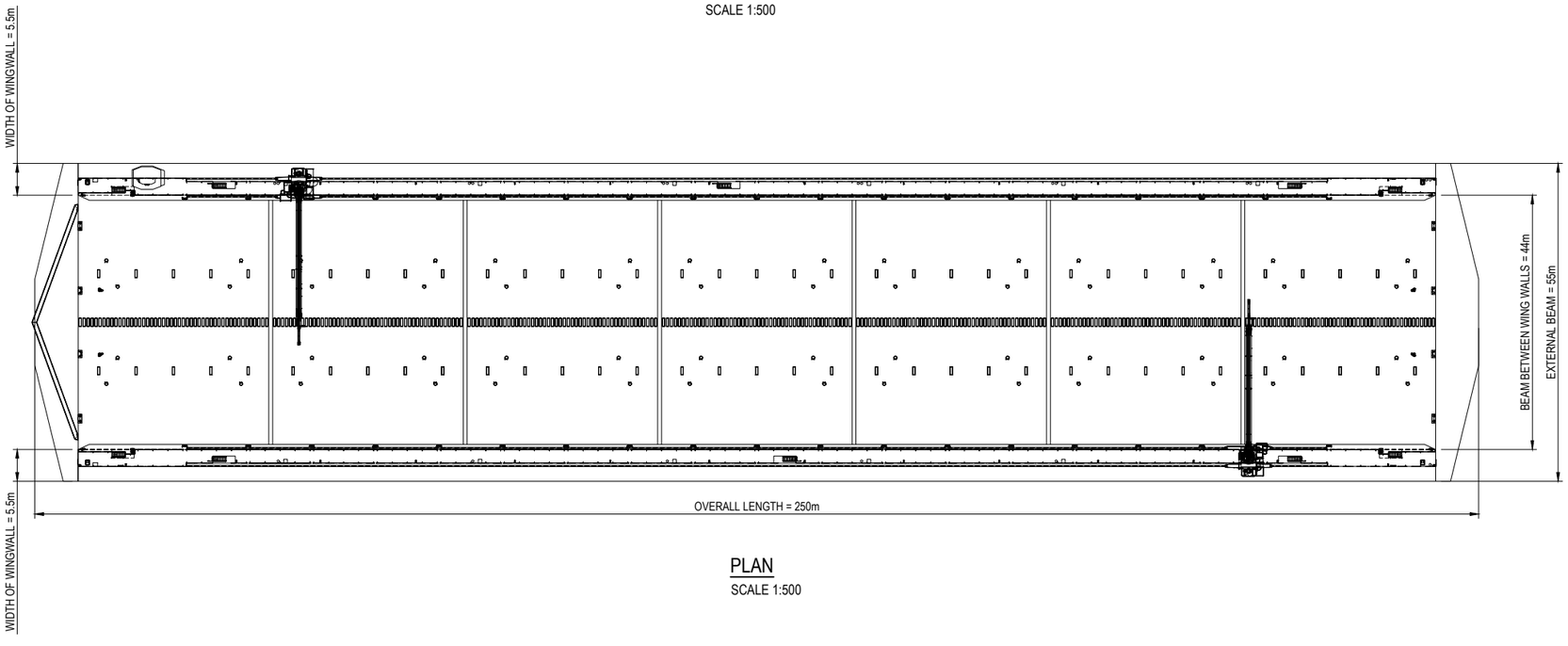
SIDE VIEW
SCALE 1:500



SIDE VIEW
SCALE 1:500



CROSS SECTION
SCALE 1:500



PLAN
SCALE 1:500

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	FP	RH	AH	22.05.26

Original Scale (A1) AS SHOWN / Reduced Scale (A3) HALF SHOWN				Approved For Construction* Date
	Design	RH/WP	30.04.26	
	Drawn	WP/FP	30.04.26	
	Dsg Verifier			
	Drg Check			

* Refer to Revision 1 for Original Signature

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: EXAMPLE DRY DOCK ARRANGEMENT

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K4000

Rev.: C

Document No. 3237966-CA-K4000.DWG

DO NOT SCALE FOR SET OUT DIMENSIONS

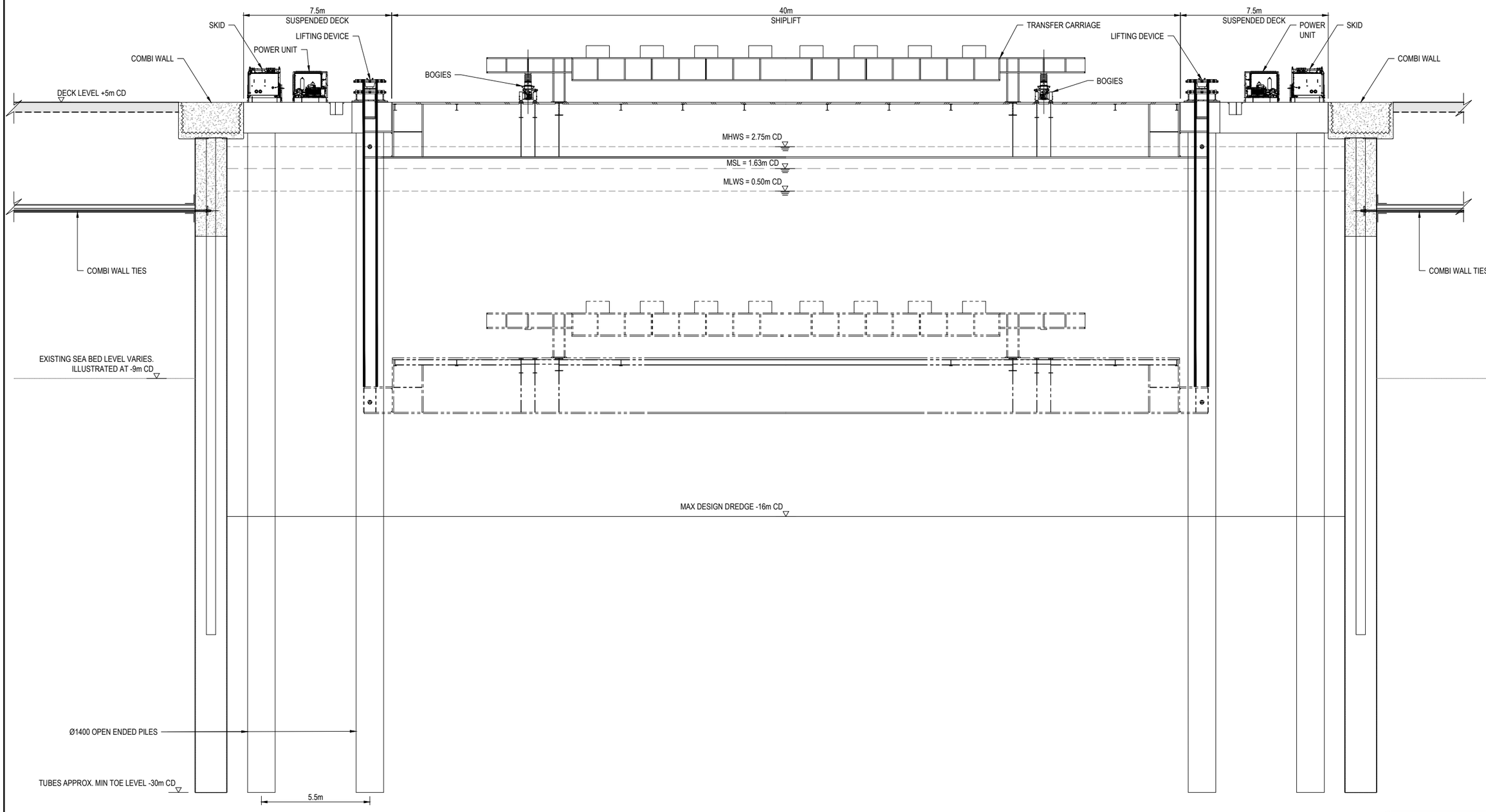
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Drawing Plotted: 1:32 pm

NOTES:

1. VERTICAL LEVEL TO CHART DATUM.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.



LIFTING DEVICE CROSS SECTION

SCALE 1:100

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	FP	RH	AH	22.05.26

Original Scale (A1)	AS SHOWN	Design	RH/WP	30.04.26	Approved For Construction*
Reduced Scale (A3)	HALF SHOWN	Drawn	WP/FP	30.04.26	
		Dsg Verifier			
		Drg Check			Date
		* Refer to Revision 1 for Original Signature			

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: EXAMPLE SHIPLIFT ARRANGEMENT

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K4002

Rev.: C

Document No. 3237966-CA-K4002.DWG

DO NOT SCALE FOR SET OUT DIMENSIONS

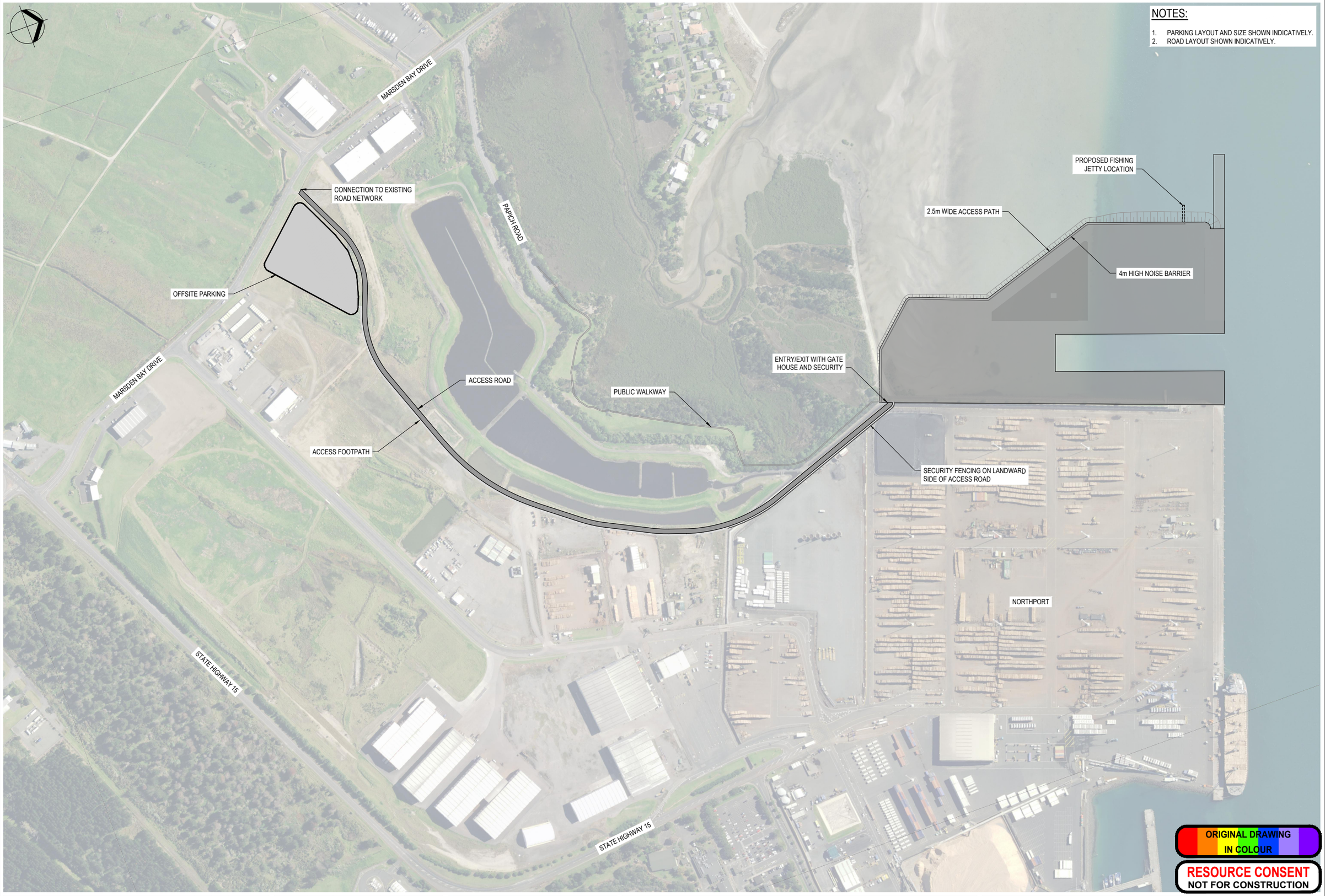
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Drawing Plotted: 1:33 pm

NOTES:

1. PARKING LAYOUT AND SIZE SHOWN INDICATIVELY.
2. ROAD LAYOUT SHOWN INDICATIVELY.



ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
D	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
C	FOR INFORMATION	FP	RH	BM	08.06.26
B	FOR INFORMATION	FP	RH	AH	22.05.26
A	FOR STAKEHOLDER ENGAGEMENT	WP/FP	RH	BM	14.05.26

Original Scale (A1) 1:2500
Reduced Scale (A3) 1:5000

Design	RH/WP	30.04.26	Approved For Construction*
Drawn	WP/FP	30.04.26	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: EXTERNAL ROAD LAYOUT

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K7000

Rev.: D

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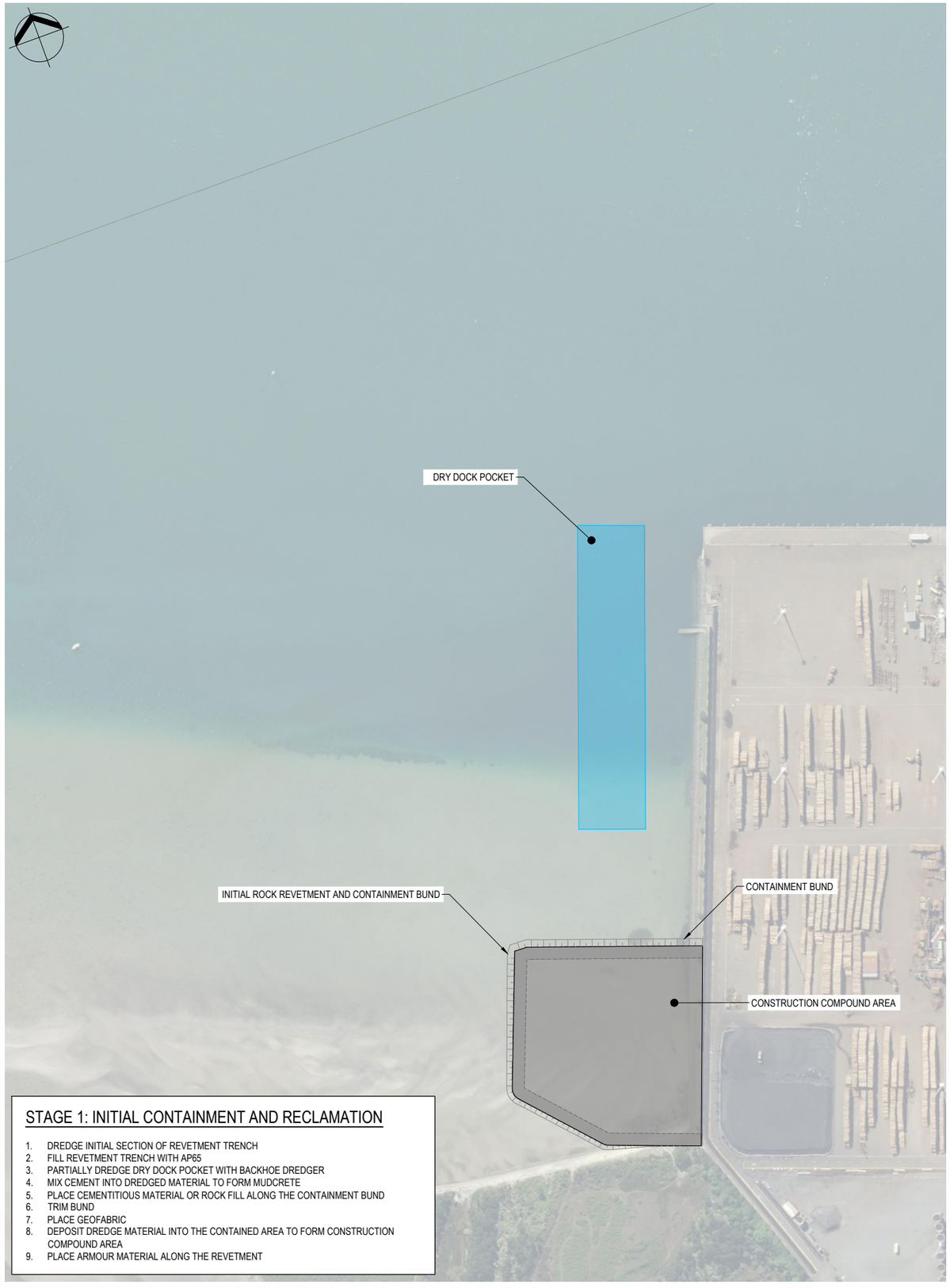
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Document No.: 3237966-CA-K7000.DWG

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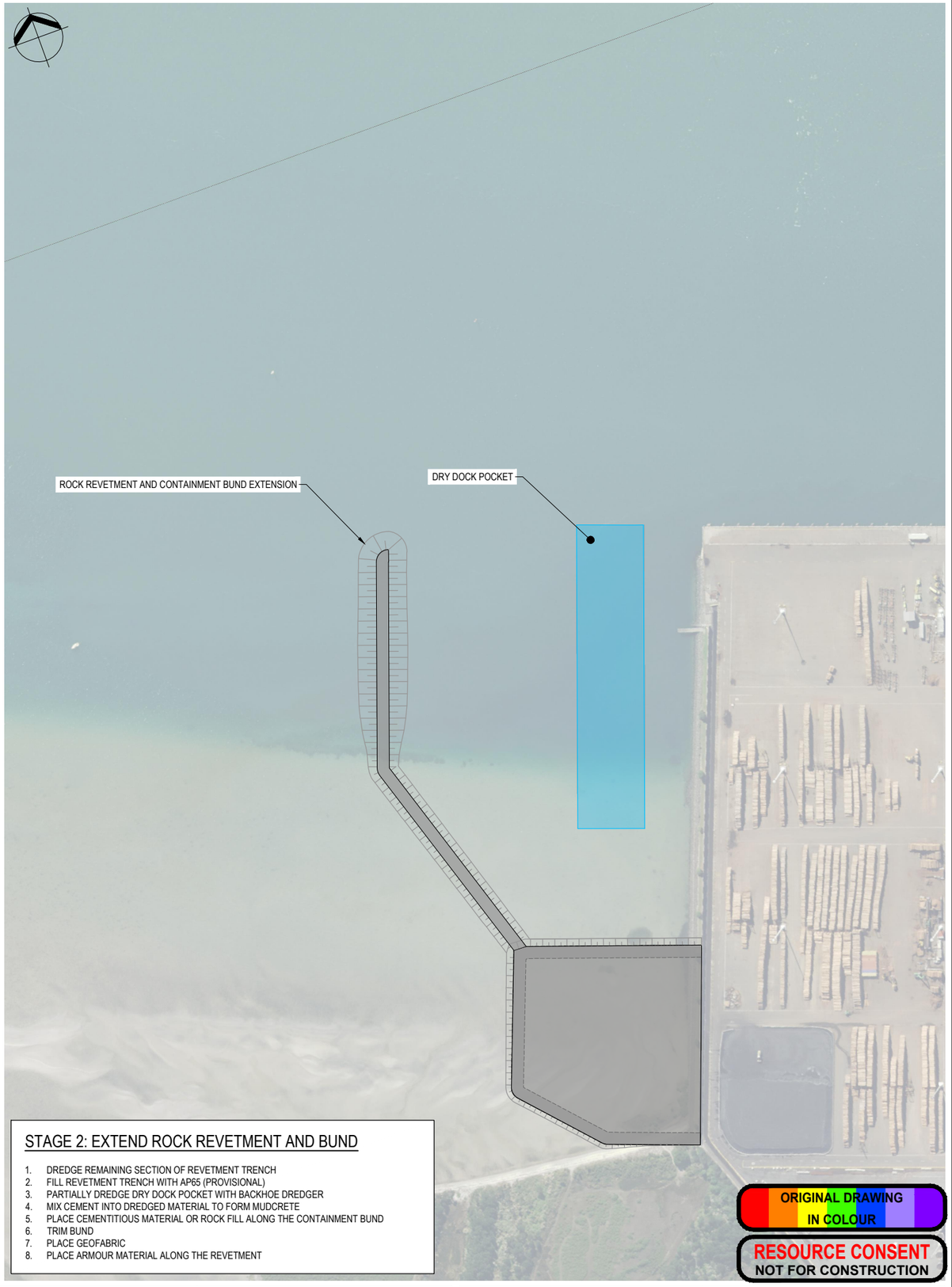
Appendix B – Proposed Concept Construction Sequence

Drawing Plotted: 1:33 pm



STAGE 1: INITIAL CONTAINMENT AND RECLAMATION

1. DREDGE INITIAL SECTION OF REVETMENT TRENCH
2. FILL REVETMENT TRENCH WITH AP65
3. PARTIALLY DREDGE DRY DOCK POCKET WITH BACKHOE DREDGER
4. MIX CEMENT INTO DREDGED MATERIAL TO FORM MUDCRETE
5. PLACE CEMENTITIOUS MATERIAL OR ROCK FILL ALONG THE CONTAINMENT BUND
6. TRIM BUND
7. PLACE GEOFABRIC
8. DEPOSIT DREDGE MATERIAL INTO THE CONTAINED AREA TO FORM CONSTRUCTION COMPOUND AREA
9. PLACE ARMOUR MATERIAL ALONG THE REVETMENT



STAGE 2: EXTEND ROCK REVETMENT AND BUND

1. DREDGE REMAINING SECTION OF REVETMENT TRENCH
2. FILL REVETMENT TRENCH WITH AP65 (PROVISIONAL)
3. PARTIALLY DREDGE DRY DOCK POCKET WITH BACKHOE DREDGER
4. MIX CEMENT INTO DREDGED MATERIAL TO FORM MUDCRETE
5. PLACE CEMENTITIOUS MATERIAL OR ROCK FILL ALONG THE CONTAINMENT BUND
6. TRIM BUND
7. PLACE GEOFABRIC
8. PLACE ARMOUR MATERIAL ALONG THE REVETMENT

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	WP/FP	RH	AH	27.05.26

Original Scale (A1)	1:2000	Reduced Scale (A3)	1:4000
Design	RH/WP	19.05.26	Approved For Construction* Date
Drawn	WP/FP	19.05.26	
Dsg Verifier			
Drg Check			

* Refer to Revision 1 for Original Signature

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: CONSTRUCTION STAGING PLAN STAGES 1 AND 2

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K8001

Rev.: C

Document No. 3237966-CA-K8001.DWG

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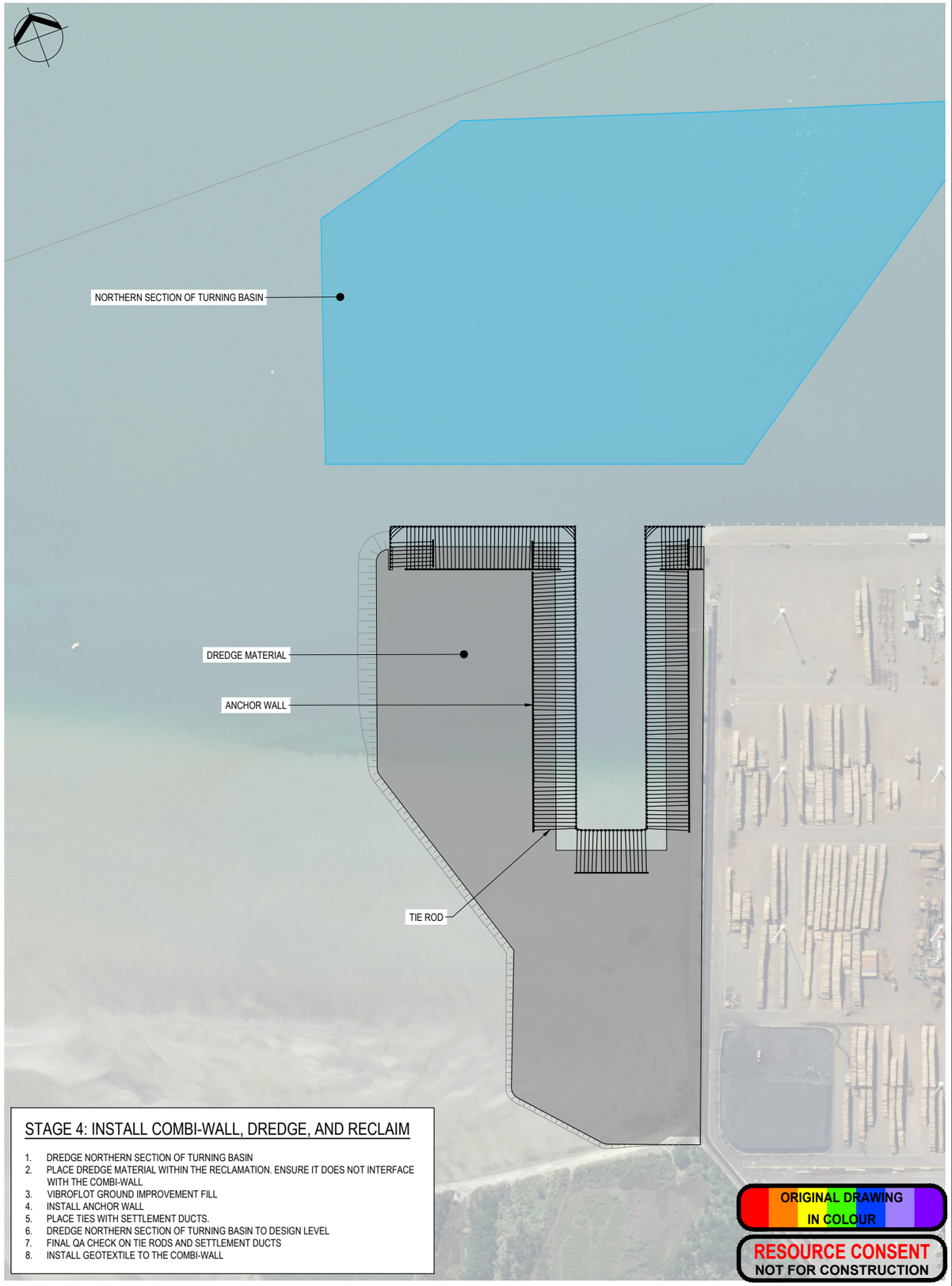
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STAGE 3: COMBI-WALL CONSTRUCTION

1. DRIVE COMBI-WALL



STAGE 4: INSTALL COMBI-WALL, DREDGE, AND RECLAIM

1. DREDGE NORTHERN SECTION OF TURNING BASIN
2. PLACE DREDGE MATERIAL WITHIN THE RECLAMATION. ENSURE IT DOES NOT INTERFACE WITH THE COMBI-WALL
3. VIBROFLOT GROUND IMPROVEMENT FILL
4. INSTALL ANCHOR WALL
5. PLACE TIES WITH SETTLEMENT DUCTS.
6. DREDGE NORTHERN SECTION OF TURNING BASIN TO DESIGN LEVEL
7. FINAL QA CHECK ON TIE RODS AND SETTLEMENT DUCTS
8. INSTALL GEOTEXTILE TO THE COMBI-WALL

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	WP/FP	RH	AH	27.05.26

Original Scale (A1)	1:2000	Reduced Scale (A3)	1:4000

Design	RH/WP	19.05.26	Approved For Construction*
Drawn	WP/FP	19.05.26	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: CONSTRUCTION STAGING PLAN STAGES 3 AND 4

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K8002

Rev.: C

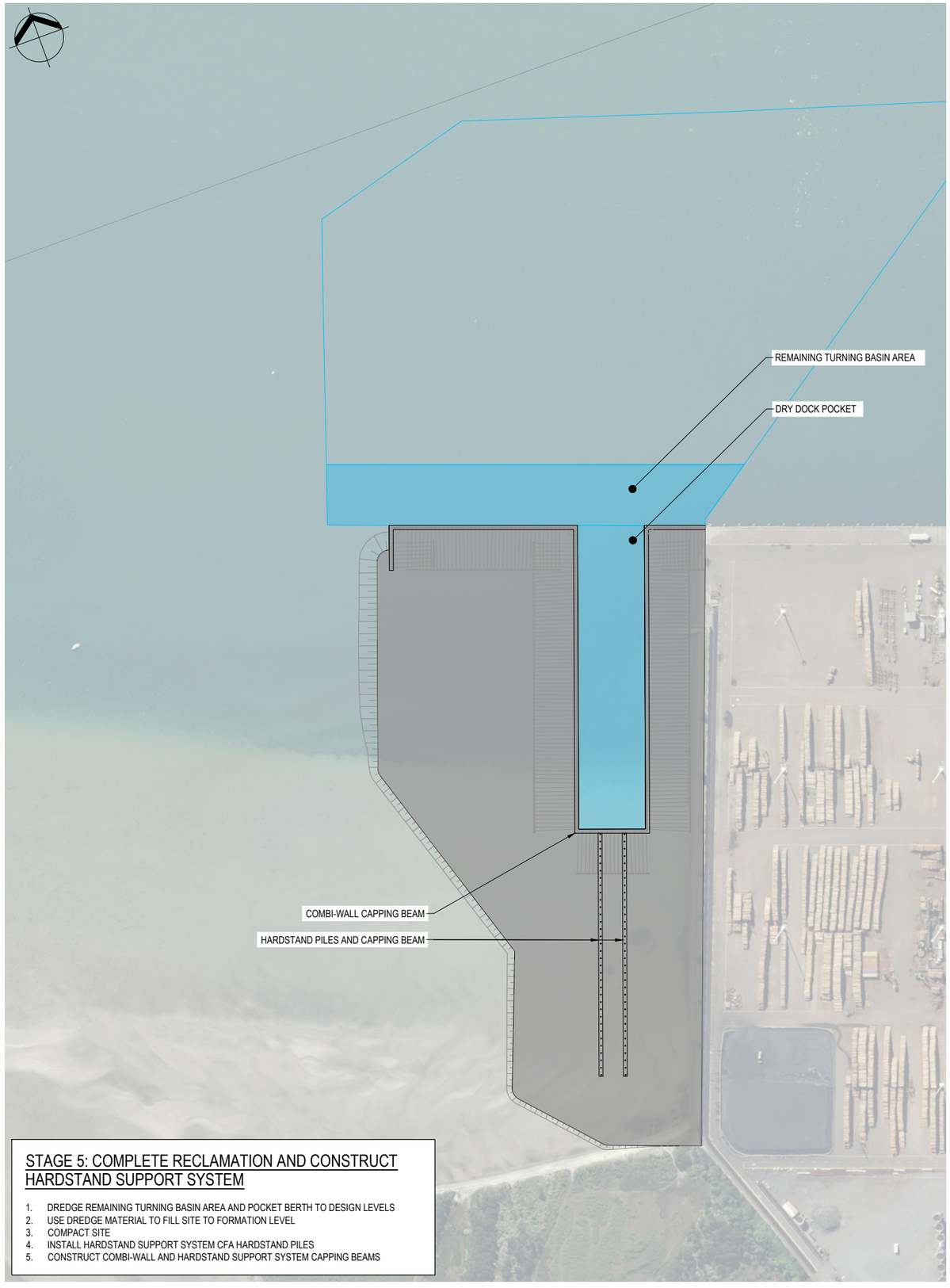
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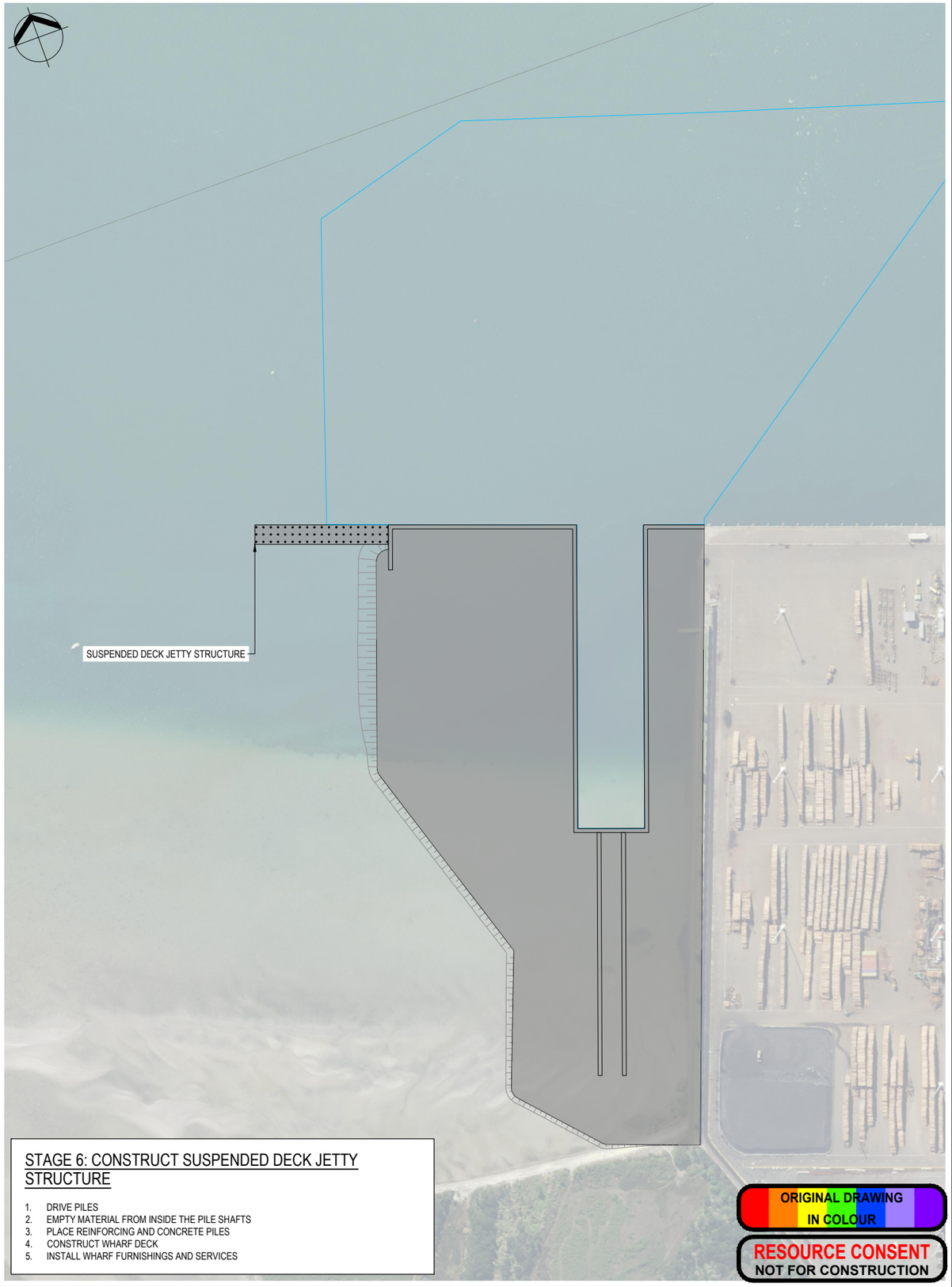
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STAGE 5: COMPLETE RECLAMATION AND CONSTRUCT HARDSTAND SUPPORT SYSTEM

1. DREDGE REMAINING TURNING BASIN AREA AND POCKET BERTH TO DESIGN LEVELS
2. USE DREDGE MATERIAL TO FILL SITE TO FORMATION LEVEL
3. COMPACT SITE
4. INSTALL HARDSTAND SUPPORT SYSTEM CFA HARDSTAND PILES
5. CONSTRUCT COMBI-WALL AND HARDSTAND SUPPORT SYSTEM CAPPING BEAMS



STAGE 6: CONSTRUCT SUSPENDED DECK JETTY STRUCTURE

1. DRIVE PILES
2. EMPTY MATERIAL FROM INSIDE THE PILE SHAFTS
3. PLACE REINFORCING AND CONCRETE PILES
4. CONSTRUCT WHARF DECK
5. INSTALL WHARF FURNISHINGS AND SERVICES

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	WP/FP	RH	AH	27.05.26

Original Scale (A1) 1:2000	Design	RH/WP	19.05.26
	Drawn	WP/FP	19.05.26
Reduced Scale (A3) 1:4000	Dsg Verifier		
	Drg Check		

Approved For Construction* Date

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Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: CONSTRUCTION STAGING PLAN STAGES 5 AND 6

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K8003

Rev.: C

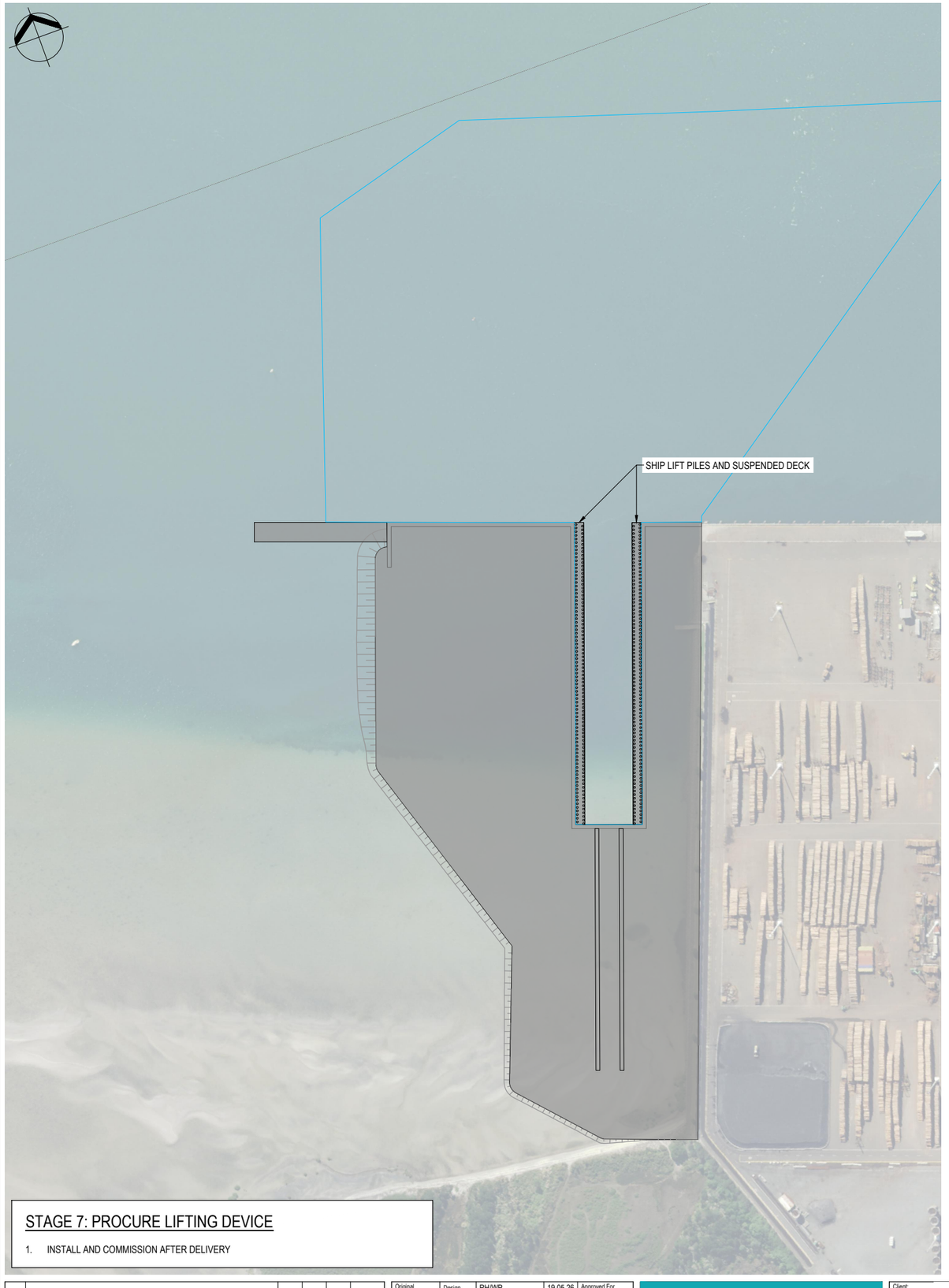
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STAGE 7: PROCURE LIFTING DEVICE

1. INSTALL AND COMMISSION AFTER DELIVERY



STAGE 8: CONSTRUCT UTILITIES AND PAVEMENTS

1. INSTALL UTILITIES AND SERVICES (NOT SHOWN)
2. CONSTRUCT PAVEMENT TO FINAL SURFACE LEVELS

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	WP/FP	RH	AH	27.05.26

Original Scale (A1)	1:2000	Reduced Scale (A3)	1:4000
Design	RH/WP	19.05.26	Approved For Construction*
Drawn	WP/FP	19.05.26	
Dsg Verifier			Date
Drg Check			

* Refer to Revision 1 for Original Signature

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: CONSTRUCTION STAGING PLAN STAGES 7 AND 8

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K8004

Rev.: C

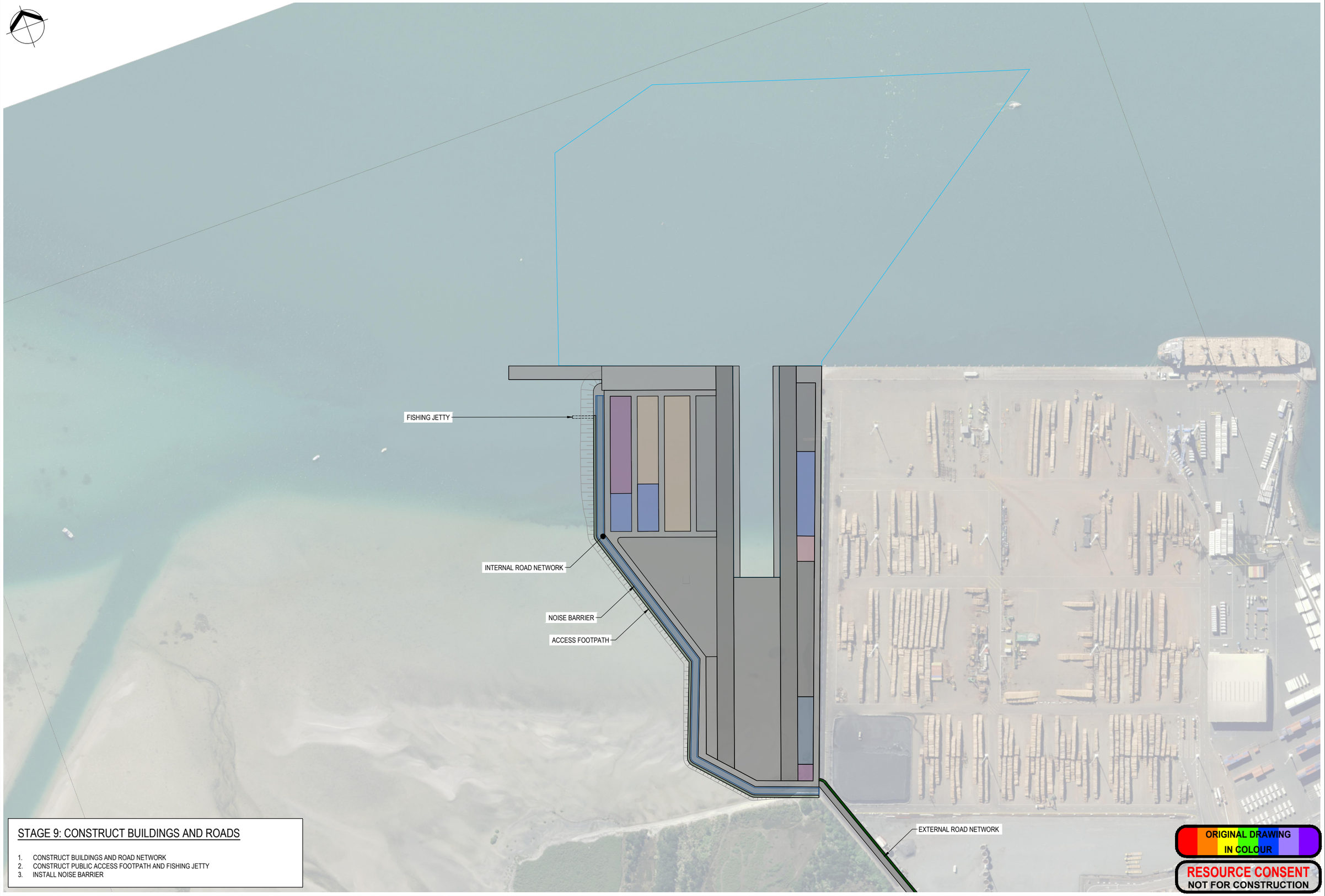
Document No. 3237966-CA-K8004.DWG

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STAGE 9: CONSTRUCT BUILDINGS AND ROADS

1. CONSTRUCT BUILDINGS AND ROAD NETWORK
2. CONSTRUCT PUBLIC ACCESS FOOTPATH AND FISHING JETTY
3. INSTALL NOISE BARRIER

ORIGINAL DRAWING IN COLOUR

RESOURCE CONSENT NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	FOR RESOURCE CONSENT	FP	RH	AH	28.07.26
B	FOR INFORMATION	FP	RH	BM	08.06.26
A	FOR INFORMATION	WP/FP	RH	AH	27.05.26

Original Scale (A1) 1:2000
Reduced Scale (A3) 1:4000

Design	RH/WP	19.05.26	Approved For Construction*
Drawn	WP/FP	19.05.26	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Client: MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

Project: MARINE OPERATIONS MAINTENANCE FACILITY

Title: CONSTRUCTION STAGING PLAN STAGE 9

Discipline: CIVIL - GENERAL

Drawing No.: 3237966-CA-K8005

Rev.: C

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Document No. 3237966-CA-K8005.DWG

C

Appendix C – Drawing Package B.02



ISSUE	DATE	DETAILS	APPRVD	BY

DREDGE VOLUME
FOR MANOEVERING AREA - 622,229m3

DREDGE VOLUME
FOR SHIP LIFT POCKET- 130,980m3

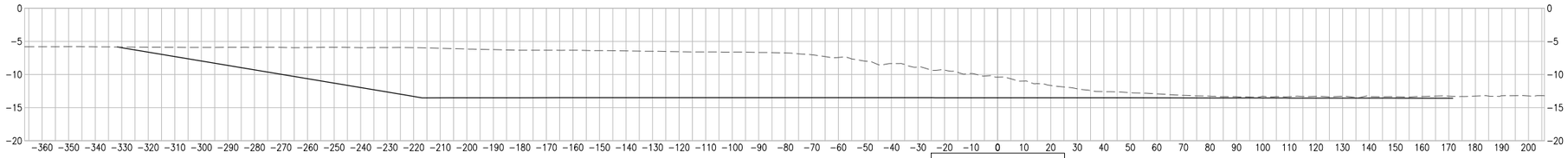
RECLAMATION VOLUME
654,144m3

Northport
P.O BOX 44
RUAKAKA, NEW ZEALAND
TEL 09 432 5010

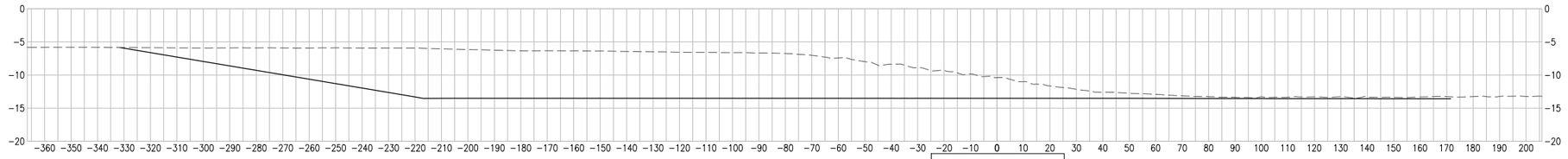
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NORTHPORT
NORTHLAND MARINE MAINTENANCE FACILITY
DREDGING AND RECLAMATION - OVERVIEW PLAN

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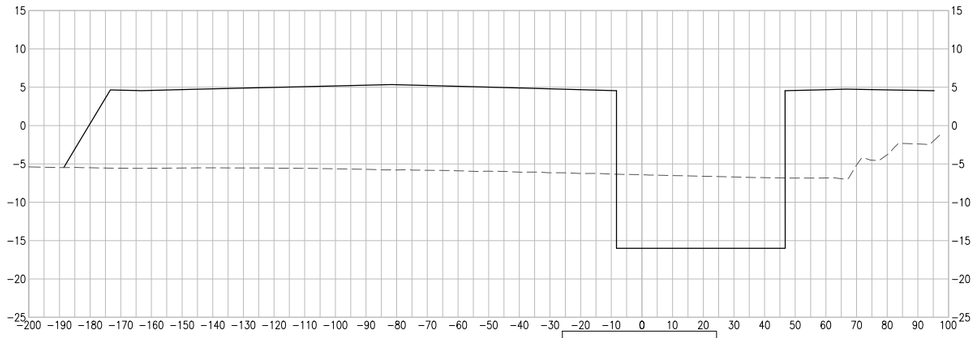
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SECTION C-C



SECTION B-B



SECTION A-A

ISSUE	DATE	DETAILS	APPRVD	BY

1H:2.5V
EXAGGERATION

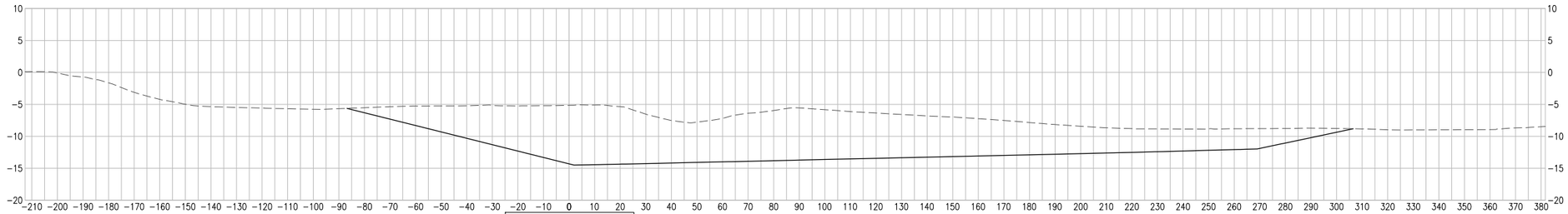
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Northport
P.O BOX 44
RUAKAKA, NEW ZEALAND
TEL 09 432 5010

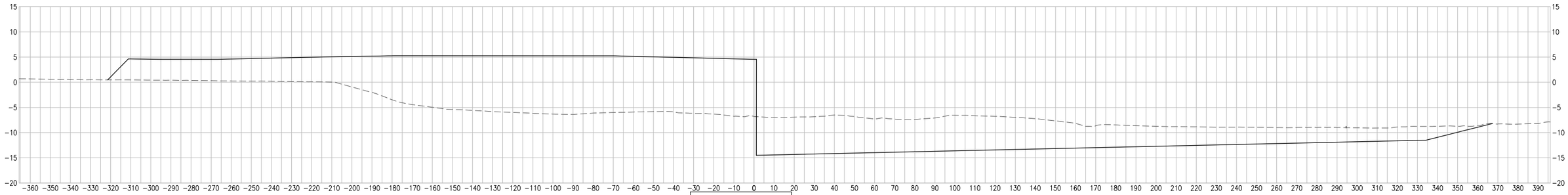
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NORTHPORT
NORTHLAND MARINE MAINTENANCE FACILITY
DREDGING AND RECLAMATION - CROSS SECTIONS

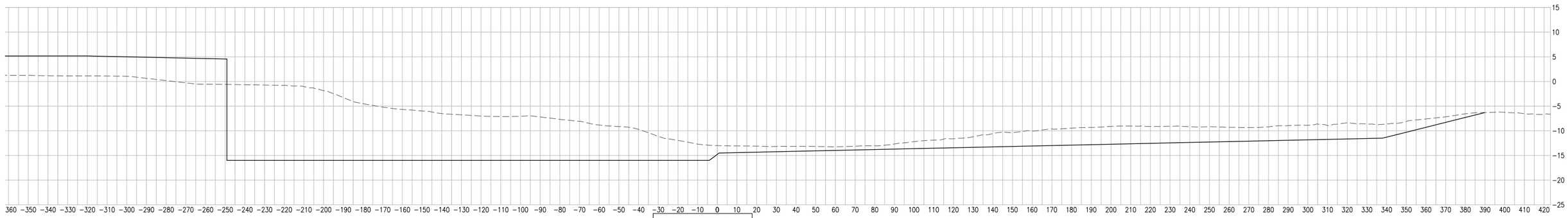
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SECTION 3-3



SECTION 2-2



SECTION 1-1

ISSUE	DATE	DETAILS	APPRVD	BY

1H:2.5V
EXAGGERATION

0 25 50 Meters

Northport
P.O BOX 44
RUAKAKA, NEW ZEALAND
TEL 09 432 5010

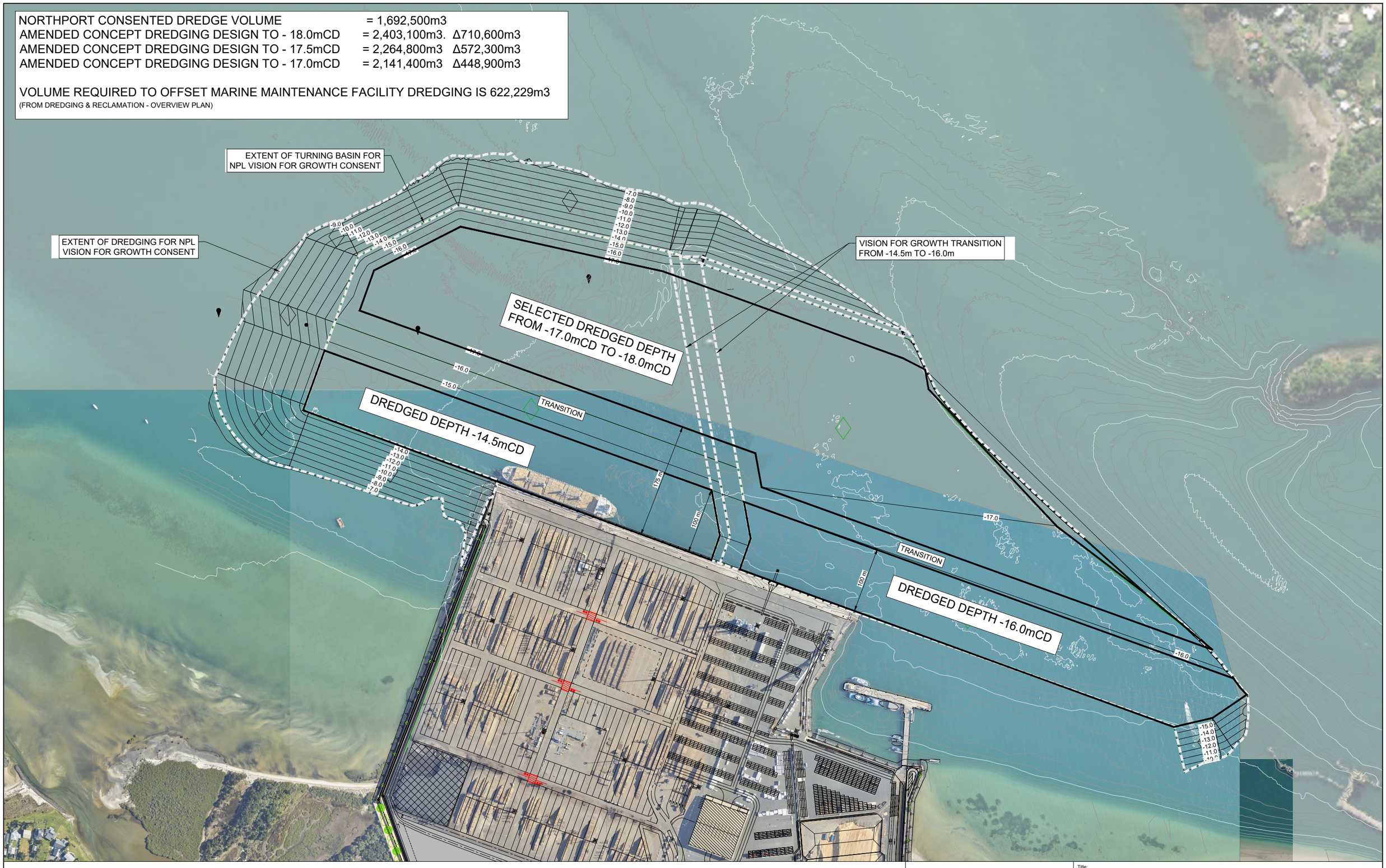
Title:

NORTHPORT
NORTHLAND MARINE MAINTENANCE FACILITY
DREDGING AND RECLAMATION - CROSS SECTIONS

Path		Dwg No		Issue:
		D60-X		R0
Drawn: B SWEENY	Checked:	Scale: 1:1000 (A1) 1:2000(A3)	Date: JULY 2026	Sheet: 03

NORTHPORT CONSENTED DREDGE VOLUME = 1,692,500m3
AMENDED CONCEPT DREDGING DESIGN TO - 18.0mCD = 2,403,100m3. Δ710,600m3
AMENDED CONCEPT DREDGING DESIGN TO - 17.5mCD = 2,264,800m3 Δ572,300m3
AMENDED CONCEPT DREDGING DESIGN TO - 17.0mCD = 2,141,400m3 Δ448,900m3

VOLUME REQUIRED TO OFFSET MARINE MAINTENANCE FACILITY DREDGING IS 622,229m3
(FROM DREDGING & RECLAMATION - OVERVIEW PLAN)



ISSUE	DATE	DETAILS	APPRVD	BY

Northport
P.O BOX 44
RUAKAKA, NEW ZEALAND
TEL 09 432 5010

Title:
NORTHPORT
NORTHLAND MARINE MAINTENANCE FACILITY
ADDITIONAL DREDGING VOLUME MODEL

Path		Dwg No		Issue:
		D60-X		R0
Drawn: B SWEENY	Checked:	Scale: NTS	Date: JULY 2026	Sheet: 01