

Resource Consent

Document Date: 15.03.2022

*Pursuant to the Resource Management Act 1991, the Northland Regional Council
(hereinafter called "the council") does hereby grant a Resource Consent to:*

FAR NORTH HOLDINGS LIMITED

To undertake the following activities on the Paihia waterfront adjacent to Lot 1 DP 74742 at or about location co-ordinates 1699390E 6095200N:

Note: All location co-ordinates in this document refer to Geodetic Datum 2000, New Zealand Transverse Mercator Projection.

- | | |
|-------------------------|--|
| AUT.043619.01.01 | Occupy space in the coastal marine area with, and use, the following structure: <ul style="list-style-type: none">▪ Rock abutment (Eastern Abutment) for the purpose of beach protection at or about location coordinates 1699290E 6095294N. |
| AUT.043619.02.01 | Occupation area within the coastal marine area. |
| AUT.043619.03.01 | Capital dredging of the coastal marine area for the construction of a rock abutment. |
| AUT.043619.04.01 | Deposit dredged material in the coastal marine area for purposes of beach re-nourishment. |
| AUT.043619.05.01 | Discharge decant water to the coastal marine area from dredged material placed on the beach as part of beach replenishment activities. |
| AUT.043619.06.01 | Construct a rock abutment (Eastern Abutment) in the coastal marine area. |

Subject to the following conditions:

AUT.043619.01 – Occupy Space with Structures

- 1 This consent applies only to the 'Eastern Abutment' identified on the Shorewise Engineering Consultants drawing referenced as Northland Regional Council Plan Number **5046/3**.

AUT.043619.02 – Occupation Area

- 2 This consent only applies to the area identified as 'FNHL Proposed Eastern Abutment Occupation Area' on the **attached** Shorewise Engineering Consultants drawing referenced as Northland Regional Council Plan Number **5046/1**.

- 3 The occupation of space is not an exclusive occupation of space. All areas authorised by this consent that are located in the coastal marine area shall be available for public pedestrian access and use, free of charge, at all times, other than times when it is necessary to limit public pedestrian access for reasons of safety or operational necessity. Any limitation of public access for reasons of safety or operational necessity shall be over the minimum area and for the minimum time necessary.

AUT.043619.03 to AUT.043619.05 – Capital Dredging, Deposition of Dredged Material and Discharge of Decant Water

- 4 Capital dredging for construction of the Eastern Abutment shall be confined to the area identified as 'Capital Dredging Area for Footprint of Eastern Abutment' on the **attached** Shorewise Engineering Consultants drawing referenced as Northland Regional Council Plan Number **5046/2**.
- 5 The Consent Holder shall notify the council's assigned monitoring officer, in writing of the date dredging is intended to commence, at least two weeks beforehand, on each occasion. The notification shall include details of method of dredging, the disposal site for dredged spoil, and duration of the planned work.

Advice Note: *Notification of the commencement of works may be made by email to info@nrc.govt.nz.*

- 6 As part of the written notification required by Condition 29, the council's assigned monitoring officer shall be provided with written certification from a suitably qualified and experienced person that all plant and equipment entering the coastal marine area associated with the exercise of these consents are free from unwanted or risk marine species.
- 7 A copy of the consents shall be provided to the person who is to carry out the dredging works. A copy of the consents shall be held on site, and available for inspection by the public, during dredging.
- 8 Capital dredging for construction of the Eastern Abutment shall not exceed 2.5 metres below Chart Datum.
- 9 Works associated with these consents shall only be carried out between 7.00 a.m. and sunset or 6.00 p.m., whichever occurs earlier, and only on days other than Sundays and public holidays.
- 10 Dredging works shall only be carried out between 1 March and 15 December.
- 11 Dredging operations shall not result in the complete blockage of navigation channels at any time.
- 12 The exercise of these consents shall not cause any of the following effects on the quality of the receiving waters, as measured at or beyond a 100 metre radius from the dredger or deposition area:
- (a) The visual clarity, as measured using a Secchi disk, shall not be reduced by more than 50% of the background visual clarity at the time of measurement;
 - (b) The turbidity of the water (Nephelometric Turbidity Units (NTU)) shall not be increased by more than 50% of the background turbidity at the time of measurement;

- (c) The Total Suspended Solids shall not exceed 40 grams per cubic metre above the background measurement;
 - (d) The production of any conspicuous oil or grease film, scums or foams, or floatable or suspended materials, or emissions of objectionable odour; and
 - (e) The destruction of natural aquatic life by reason of a concentration of toxic substances.
- 13 Monitoring of dredging shall be undertaken in accordance with the **attached Schedule 2**.
- 14 Other than disposal of suitable dredged material to the renourished beach identified on the Haigh Workman Civil & Structural Consultants Ltd drawing referenced as Northland Regional Council Plan Number **4975A** as part of authorised beach replenishment and reclamation activities, no disposal of dredged material shall take place to the coastal marine area.
- 15 All of the capital dredged material that is suitable for constructing the base layer of the nourished beach is to be used for this purpose. All dredged material from maintenance dredging shall be disposed of to an authorised land based site.
- 16 The council's assigned monitoring officer shall be notified in writing as soon as capital dredging is completed-
- 17 Following completion of dredging, a bathymetric survey of the dredged area shall be carried out at, or better than, the following specifications:
- (a) Sample rate: Maximum of 2 Hz;
 - (b) Survey line spacing: Maximum of 20 metres, located perpendicular to the dredged channel;
 - (c) Accuracy: RTK-GPS or similar methodology that can provide equivalent or higher accuracy;
 - (d) Datum: Datum 2000, NZTM projection, with elevations referenced to OTP1964 vertical datum or Chart Datum;
 - (e) Data Supply: ASCII X, Y, Z file in csv format.
- A copy of the ASCII X, Y, Z file, referred to in (e) above shall be provided to the council's assigned monitoring officer at the same time as the bathymetric plan. The datum used for the bathymetric survey shall be the applicable Chart Datum at the site.
- 18 Immediately upon completion of the bathymetric survey, the Consent Holder shall notify the following organisations in writing, providing details of the survey. Evidence of this notification shall be provided to the council's assigned monitoring officer.

Hydrographic Surveyor
Land Information New Zealand
PO Box 5501
Wellington 6145

Far North District Council
Private Bag 752
Kaikohe 0440

The Maritime Safety Inspector
Maritime New Zealand
PO Box 195
Ruakākā 0151

The Consent Holder shall include a scale plan of the bathymetric survey with the notification.

AUT.043619.06 – Construction of the Eastern Abutment

19 The Eastern Abutment shall be constructed in general accordance with the **attached** Shorewise Engineering Consultants drawings referenced as Northland Regional Council Plan Numbers **5046/2, 5046/3, and 5046/4** and the **attached** Civil Engineering drawings and documents referenced as Northland Regional Council Plan Numbers **5061/8, 5061/9, 5061/10, 5061/11, 5061/12 and 5061/13.**

20 The Consent Holder shall notify the council's assigned monitoring officer, in writing of the date construction of the Eastern Abutment is intended to commence, at least 15 working days beforehand. The Consent Holder shall arrange for a site meeting between the Consent Holder's contractor(s) and the council's assigned monitoring officer prior to the commencement of the works.

Advice Note: *Notification of the commencement of works may be made by email to info@nrc.govt.nz.*

21 As part of the written notification required by Condition 20 the council's assigned monitoring officer shall be provided with written certification from a suitably qualified and experienced person that all plant and equipment entering the coastal marine area associated with the exercise of this consent are free from unwanted or risk marine species.

22 At least 15 working days prior to the commencement of works associated with this consent, the Consent Holder shall provide a detailed Construction Management Plan (CMP) to the council's assigned monitoring officer for certification by the council's Compliance Manager.

The CMP shall specify, but not necessarily be limited to, the following matters:

(a) A construction timetable and updated copies of any construction plans and sediment controls to be implemented.

(b) Site management, including details of:

- Site access.
- Storage of fuels and lubricants.

(Advice Note: *These should be banded or contained in such a manner so as to prevent the discharge of contaminants from spillages).*

- Maintenance of machinery and plant to minimise the potential for leakage of fuels and lubricants.
- Confirmation that no equipment or machinery is cleaned, or refuelled in any part of the coastal marine area, except for machinery operating on the barge that may require refuelling.

(c) Methods to minimise discolouration of the coastal marine area during construction and dredging activities.

(d) Methods to ensure compliance with noise standards.

(e) Methods to remedy any disturbance to the foreshore during works.

(f) A contingency plan in the event that there is any discharge to the coastal marine area.

(g) Measures to provide for public safety.

(h) A Construction Traffic Management Plan, prepared in consultation with the New Zealand Transport Agency and Far North District Council, which shall include, but not by way of limitation, specific details relating to avoiding, remedying or mitigating any adverse effects of:

- Machinery during site works.
- Proposed numbers and timing of truck movements throughout the day and the proposed routes including the identification of heavy vehicle routes which avoid residential streets.
- Safe and clear pedestrian access and thoroughfare on roads and footpaths adjacent to the site.
- Storage of materials and loading and unloading of equipment.

(i) Measures to address biosecurity.

23 The Consent Holder shall undertake the activities authorised by this consent in accordance with the certified CMP. Certification and compliance with the CMP does not override the requirement to comply with any/all other conditions of this consent.

Advice Note: *The council's Compliance Manager's certification of the CMP is in the nature of certifying that adoption of the CMP is likely to result in compliance with the conditions of this consent. The Consent Holder is encouraged to discuss its proposed CMP with council monitoring staff prior to finalising this plan.*

24 A copy of these consents shall be provided to the person who is to carry out the construction works. A copy of these consents shall be held on site, and available for inspection by the public, during construction.

25 The exercise of this consent shall not result in any of the following effects on coastal water quality, as measured at any point 50 metres from location of the works:

	Standard
Natural visual clarity	Not reduced more than 20%.
Oil/grease film, scum, foam, odour	No conspicuous oil or grease film, scums or foams, floatable or suspended materials, or emissions of objectionable odour.

26 All vehicles or equipment entering the coastal marine area associated with the exercise of this consent shall be in good state of repair and free of any leaks e.g. oil, diesel etc.

27 The Consent Holder shall ensure that an oil spill kit, appropriate to the equipment being used, is provided and maintained on site during dredging and earthworks activities.

28 No machinery operating from the land shall be left within the intertidal zone during high tide periods, or in a position where it could come into contact with coastal water.

29 The council's assigned monitoring officer shall be notified in writing as soon as the construction has been completed.

- 30 A certificate of compliance, or a written statement, from an independent Chartered Professional Engineer that the works are constructed in general accordance with the drawings identified in Condition 44 shall be provided to the council's assigned monitoring officer within two weeks of completion of the works.
- 31 Immediately upon completion of the installation of the Eastern Abutment, the Consent Holder shall notify the following organisations in writing of its completion. Evidence of this notification shall be provided to the council's assigned monitoring officer.

Hydrographic Surveyor
Land Information New Zealand
PO Box 5501
Wellington 6145
The Maritime Safety Inspector
Maritime New Zealand
PO Box 195
Ruakākā 0151

Far North District Council
Private Bag 752
Kaikohe 0440

A scale plan of the completed works shall be included with the notification.

- 32 In the event of archaeological sites or kōiwi being uncovered, activities in the vicinity of the discovery shall cease and the Consent Holder shall contact Heritage New Zealand Pouhere Taonga. Work shall not recommence within the area of the discovery until the relevant Heritage New Zealand Pouhere Taonga approval has been obtained.

Advice Note: *The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to destroy, damage or modify the whole or any part of an archaeological site without the prior authority of Heritage New Zealand Pouhere Taonga.*

- 33 The Consent Holder shall not damage State Highway 11 nor any Crown owned infrastructure, or adversely affect State Highway drainage during construction activities, beyond those activities specifically authorised by resource consent or otherwise agreed with the land owner. Should damage occur, then the Consent Holder shall promptly advise this to the land owner.

General Conditions – Applying to all Consents

- 34 Noise levels associated with the exercise of these consents shall not exceed those set out in **Schedule 1 attached**.
- 35 The Consent Holder shall ensure that an oil spill kit, appropriate to the equipment being used, is provided and maintained on site during dredging and earthworks activities.
- 36 The coastal marine area shall be kept free of debris resulting from the Consent Holder's activities.
- 37 The Consent Holder shall, on becoming aware of any discharge associated with the Consent Holder's operations that is not authorised by these consents:
- (a) Immediately take such action, or execute such work as may be necessary, to stop and/or contain the discharge; and
 - (b) Immediately notify the council by telephone of the discharge; and

- (c) Take all reasonable steps to remedy or mitigate any adverse effects on the environment resulting from the discharge; and
- (d) Report to the council's Compliance Manager in writing within one week on the cause of the discharge and the steps taken or being taken to effectively control or prevent the discharge.

For telephone notification, during the council's opening hours, the council's assigned monitoring officer for these consents shall be contacted. If that person cannot be spoken to directly, or it is outside of the council's opening hours, then the Environmental Emergency Hotline shall be contacted.

Advice Note: *The Environmental Emergency Hotline is a 24 hour, seven day a week, service that is free to call on 0800 504 639.*

38 These consents shall not lapse until 31 March 2030.

39 The council may, in accordance with Section 128 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions annually during the month of March to deal with any adverse effects on the environment that may arise from the exercise of these consents and which it is appropriate to deal with at a later stage. The Consent Holder shall meet all reasonable costs of any such review.

EXPIRY DATE: 31 MARCH 2044

These consents are granted this Fourteenth day of December 2021 under delegated authority from the council by:


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Stuart Savill
Consents Manager

SCHEDULE 1

ENVIRONMENTAL STANDARDS – NOISE

CONSTRUCTION NOISE

The noise from all construction activities seaward of the line of Mean High Water Springs (MHWS) shall comply with the construction noise limits prescribed in NZS6803:1999 “Acoustics – Construction Noise

Sound levels shall be measured in accordance with New Zealand Standard NZS 6801:2008 “Acoustics – Measurement of environmental sound” and assessed in accordance with NZS 6802:2008 “Acoustics – Environmental noise”.

Based on Table 2, NZS 6803: 1999 “Acoustics – Construction Noise”, Standards New Zealand

Time of Week	Typical Duration	Typical Duration (dBA)		Short-term Duration		Long-term Duration	
		L _{eg}	L _{max}	L _{eg}	L _{max}	L _{eg}	L _{max}
Weekdays	0630 – 0730	60	75	65	75	55	75
	0730 – 1800	75	90	80	95	70	85
	1800 – 2000	70	85	75	90	65	80
	2000 – 0630	45	75	45	75	45	75
Saturdays	0630 – 0730	45	75	45	75	45	75
	0730 – 1800	75	90	80	95	70	85
	1800 – 2000	45	75	45	75	45	75
	2000 – 0630	45	75	45	75	45	75

Noise measurements shall be measured in accordance with NZS 6801: 2008 “Acoustics – Measurement of environmental sound” and assessed in accordance with NZS 6802: 2008 “Acoustics – Environmental noise”. Measurement shall be at the notional boundary of any dwelling landward of mean high water springs. Construction noise shall comply with, and be measured and assessed in accordance with, the requirements of the Standard.

The notional boundary is defined in NZS 6801:2008 “Acoustics – Measurement of environmental sound” as a line 20 metres from any part of any dwelling, or the legal boundary where this is closer to the dwelling.

OPERATION

Noise emitted from any activity, when measured at the boundary of the zone (as defined below), shall not exceed the following noise levels.

<i>Time Period</i>	<i>Noise Limit</i>
<i>0700 hrs to 2200 hrs</i>	<i>55 dBA L₁₀</i>
<i>2200 hrs to 0700 hrs the following day</i>	<i>45 dBA L₁₀</i>
	<i>70 dBA L_{max}</i>

Note: The boundary of the zone shall be the line of mean high water springs and the radius of 100 metres of the source of the noise.

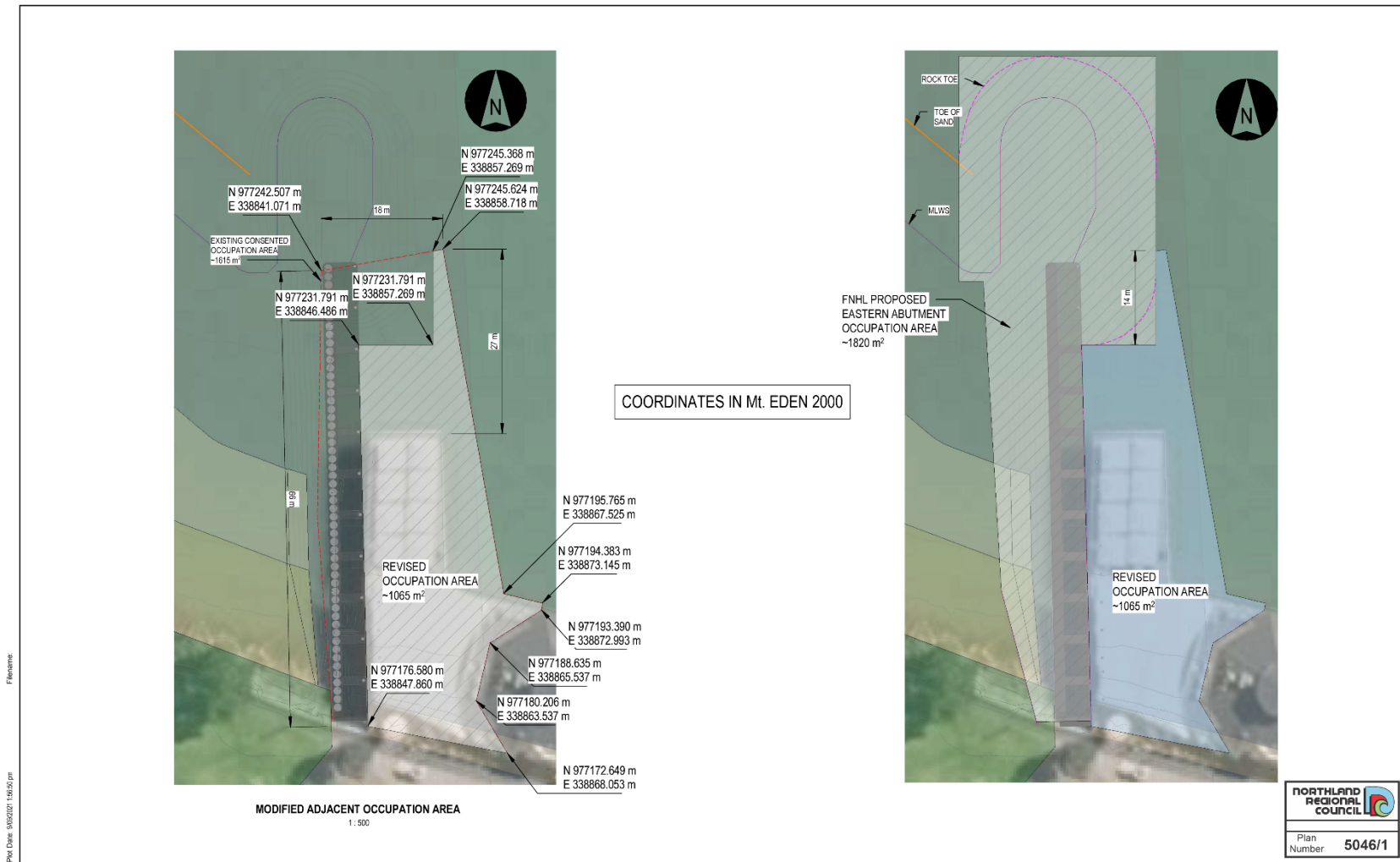
SCHEDULE 2

DREDGE MONITORING PROGRAMME

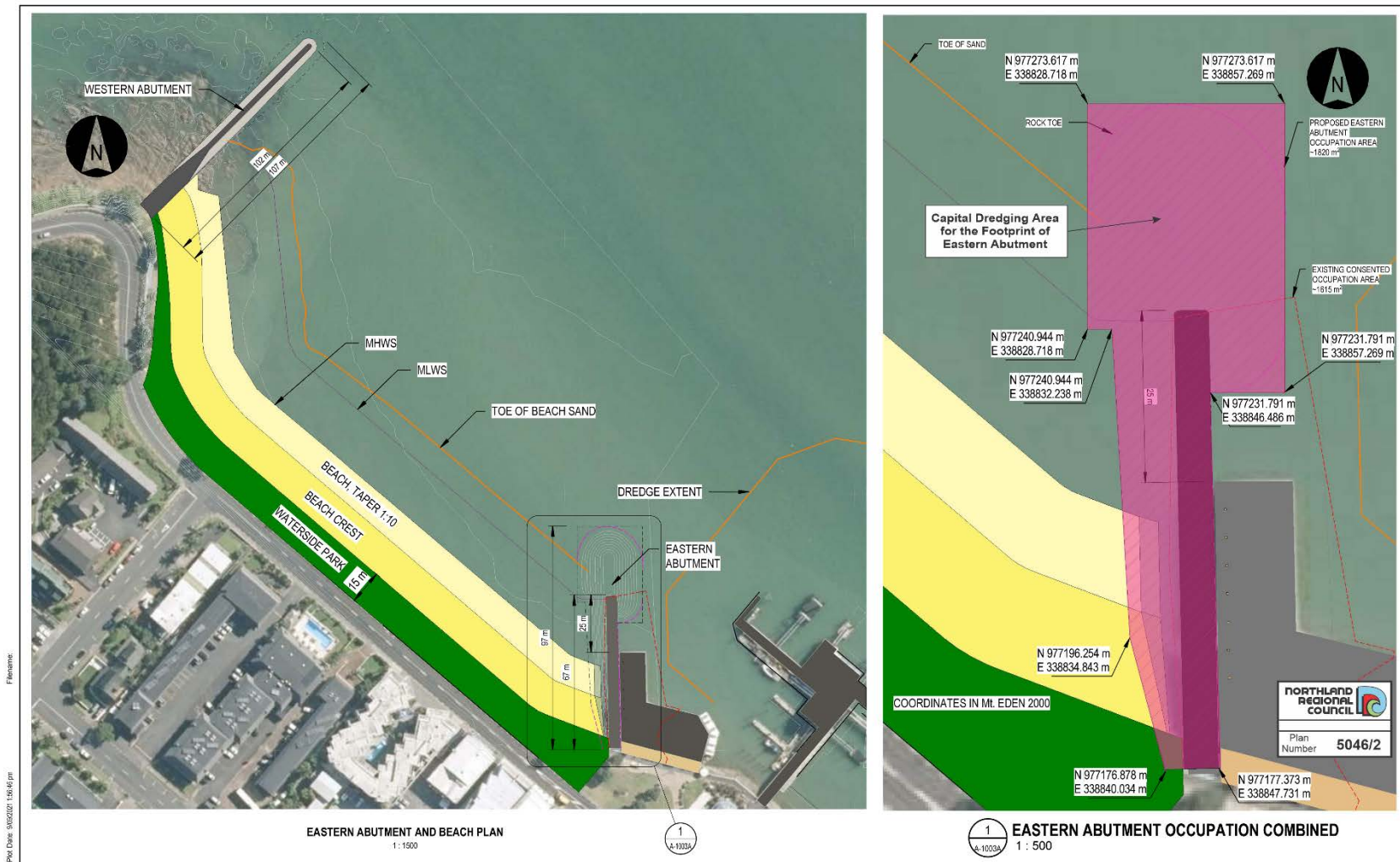
During dredging operations, daily inspections of the waters adjacent to the dredge excavation areas will be undertaken by the dredging contractor, or the Consent Holder's nominated agent, in order to identify any visually observable change in clarity (turbidity) of the receiving waters at or beyond 100 metres from the point of the dredging operations. Results of the daily inspections are to be recorded in a written log book by the Consent Holder or the Consent Holder's nominated agent, and submitted weekly to the council's assigned monitoring officer by email.

Should the visual inspection indicate any change in clarity at or beyond 100 metres from the point of the dredging operations, then the Consent Holder will implement the following monitoring programme to assess compliance with the relevant conditions of this consent.

Clarity measurements, using Secchi disc methods are to be taken at the boundary of the down-current edge of the mixing zone within the area of changed clarity. The same measurements are to be taken at least 50 metres up-current from the dredging activity to be used as control measurements for comparison with the down-current effect measurements. Three measurements are to be undertaken at each upstream and downstream location and the median used to assess compliance with the water quality standards stated and identified in the consent. Water samples shall also be collected at the edge of the mixing zone and at the control sites for analysis of suspended solids (TSS) and turbidity (NTU) for analysis for compliance against the standards in Condition 12. Results of this monitoring are to be reported to the council's assigned monitoring officer in writing within one week of the occurrence of monitoring.



REV	DETAILS	DATE	PROJECT	STATUS		
0	ISSUED FOR CONSENT	09/09/2021	20-0057 PAIHIA WATERFRONT	FOR CONSENT		
			SHEET DESCRIPTION	DRAWN BY	APPROVED BY	SHT
			MODIFIED ADJACENT OCCUPATION AREAS	MW	RB	A3
				PROJECT NO.	SHEET NO.	REV
				20-0057	A-1003C	0



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Beca
LITTORALIS
LANDSCAPE ARCHITECTURE

CLIENT

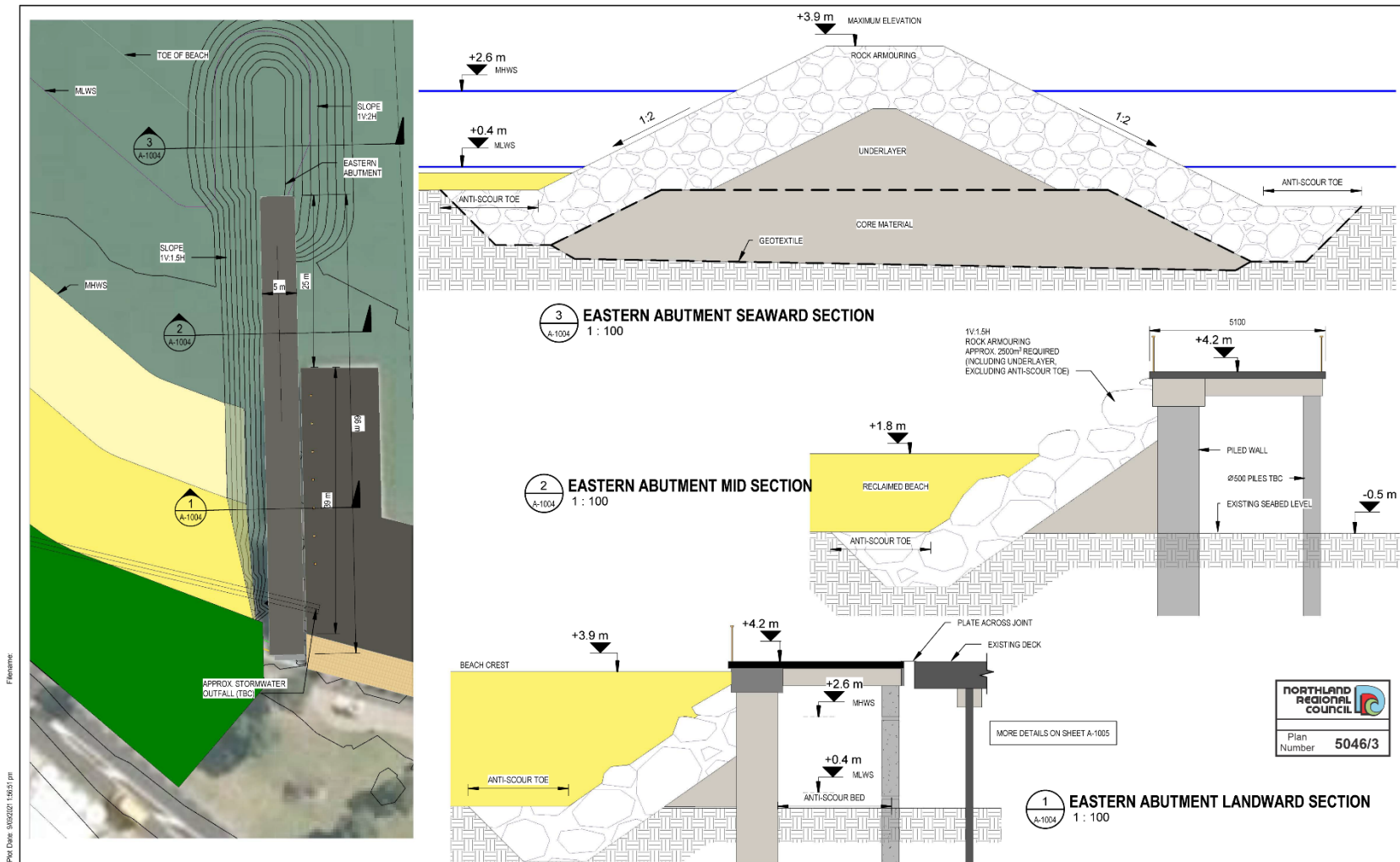
Far North
Holdings Limited

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REV	DETAILS	DATE
0	ISSUED FOR REVIEW	19/04/2021
1	ISSUED FOR REVIEW	07/05/2021
2	RE-ISSUED FOR REVIEW	21/07/2021
3	ISSUED FOR CONSENT	30/08/2021

PROJECT
20-0057 PAIHIA WATERFRONT
SHEET DESCRIPTION
EASTERN ABUTMENT AND BEACH AREAS

STATUS		
FOR CONSENT		
DRAWN BY	APPROVED BY	SHT
MW	RB	A3
PROJECT NO.	SHEET NO.	REV
20-0057	A-1003A	3



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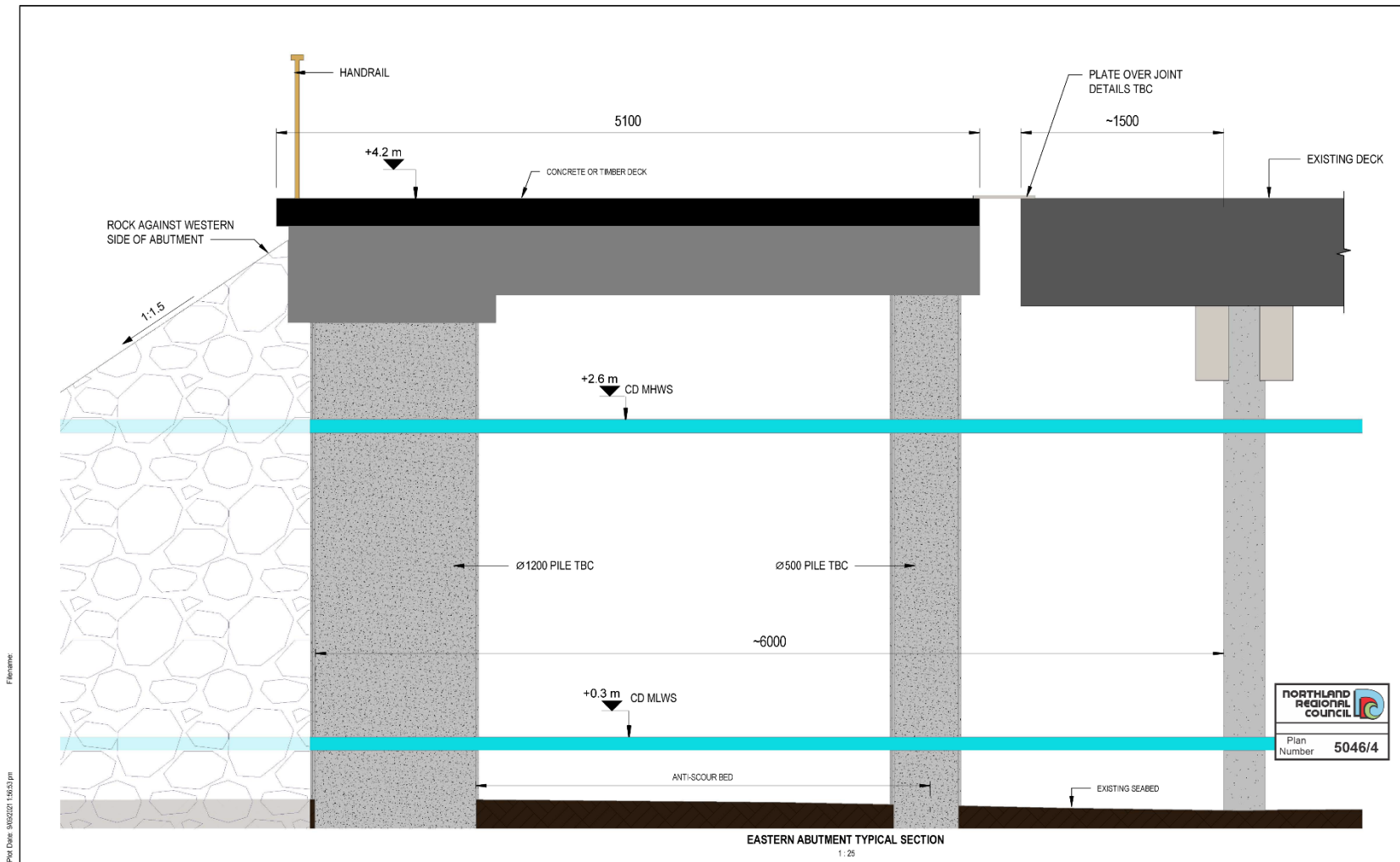
Beca
LITTORALIS
LANDSCAPE ARCHITECTURE

CLIENT

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Holdings Limited

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REV	DETAILS	DATE	PROJECT	STATUS		
0	ISSUED FOR REVIEW	23/08/2021	20-0057 PAIHIA WATERFRONT	FOR CONSENT		
1	ISSUED FOR CONSENT	30/08/2021	SHEET DESCRIPTION	DRAWN BY	APPROVED BY	SHT
			EASTERN ABUTMENT DETAIL	MW	RB	A3
				PROJECT NO.	SHEET NO.	REV
				20-0057	A-1004	1



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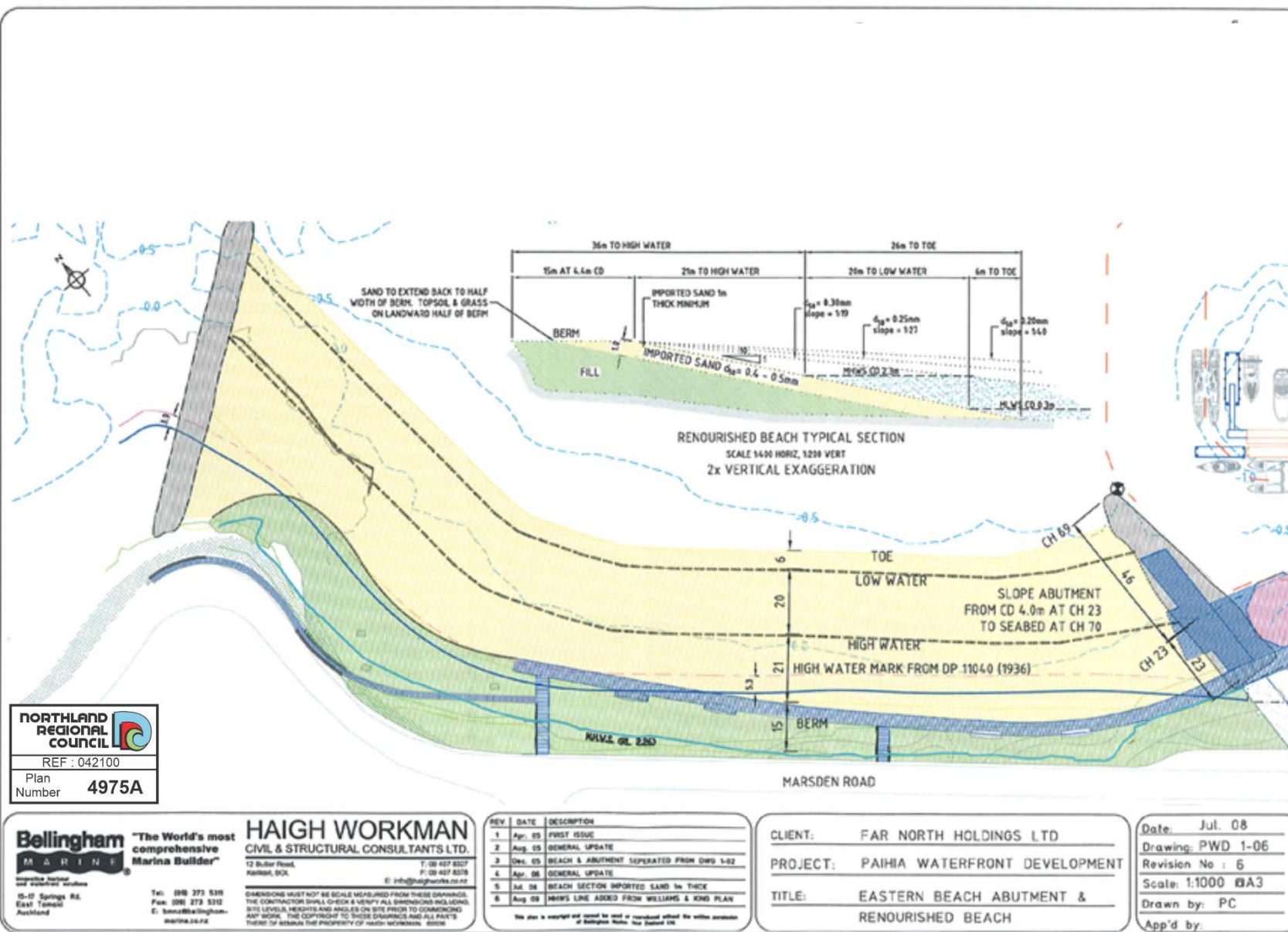
Beca **LITTORALIS**
LANDSCAPE ARCHITECTURE

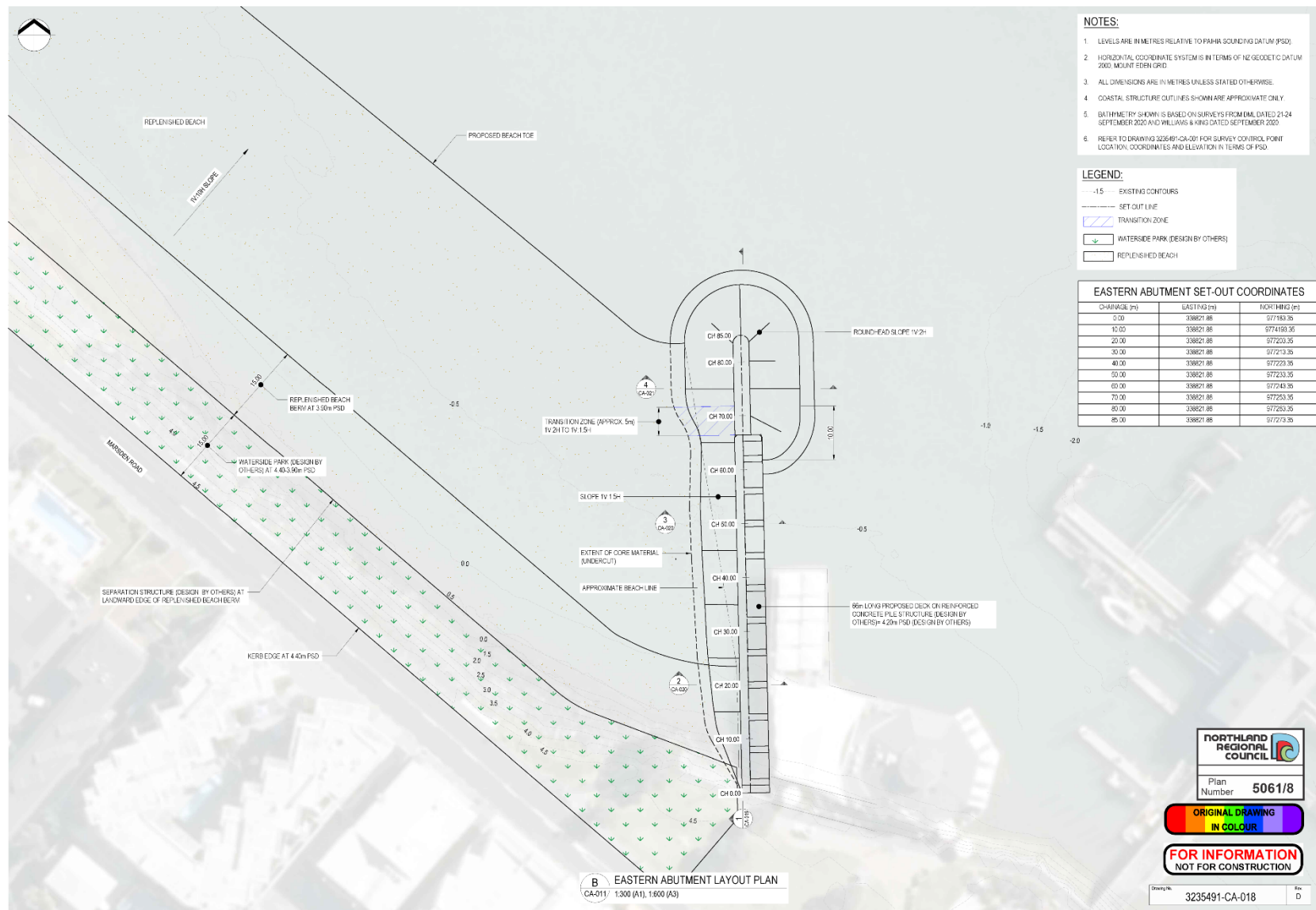
CLIENT

Far North Holdings Limited

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REV	DETAILS	DATE	PROJECT	STATUS
0	ISSUED FOR REVIEW	21/07/2021	20-0057 PAIHIA WATERFRONT	FOR CONSENT
1	ISSUED FOR CONSENT	30/08/2021		
			SHEET DESCRIPTION	
			EASTERN ABUTMENT TYPICAL SECTION	
				DRAWN BY
				APPROVED BY
				SHT
				MW
				RB
				A3
				PROJECT NO.
				SHEET NO.
				REV
				20-0057
				A-1005
				1



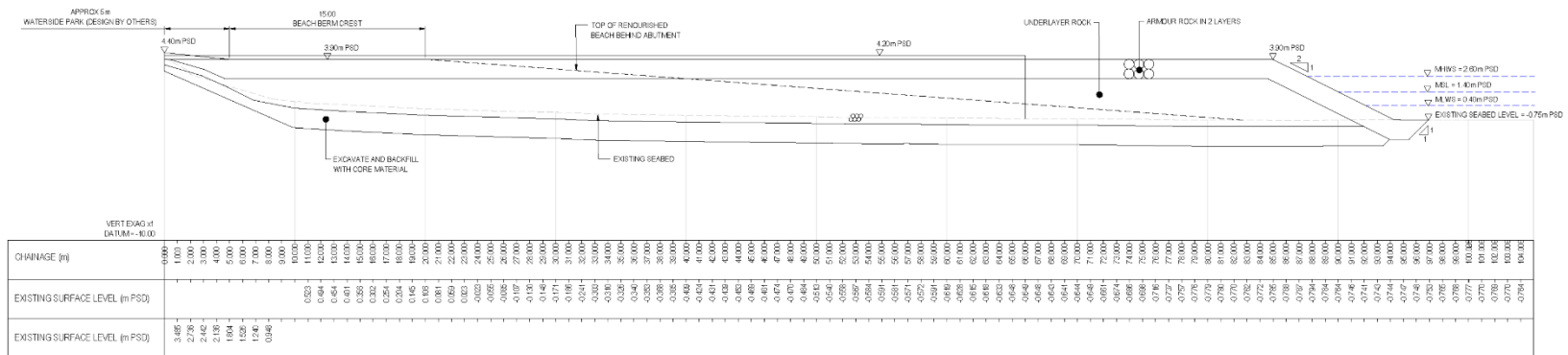


NOTES:

1. LEVELS ARE IN METRES RELATIVE TO PAHA SOUNDING DATUM (PSD).
2. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
3. BATHYMETRY SHOWN IS BASED ON SURVEYS FROM 2014 DATED 21/24 SEPTEMBER 2020 AND WILLIAMS & KING DATED SEPTEMBER 2020.
4. TO BE READ IN ACCORDANCE WITH THE ROCK SPECIFICATION (DRAWING 3335-491-CA-025 AND 3335-491-CA-026).
5. GEOTEXTILE AS SHOWN ON DRAWING 3335-491-CA-020 AND 3335-491-CA-021.
6. EXISTING ROCK SEAWALL TO BE REMOVED PRIOR TO CONSTRUCTION OF THE ABUTMENT AND EXISTING ROCK TO BE RE-USED WHERE POSSIBLE.

LEGEND:

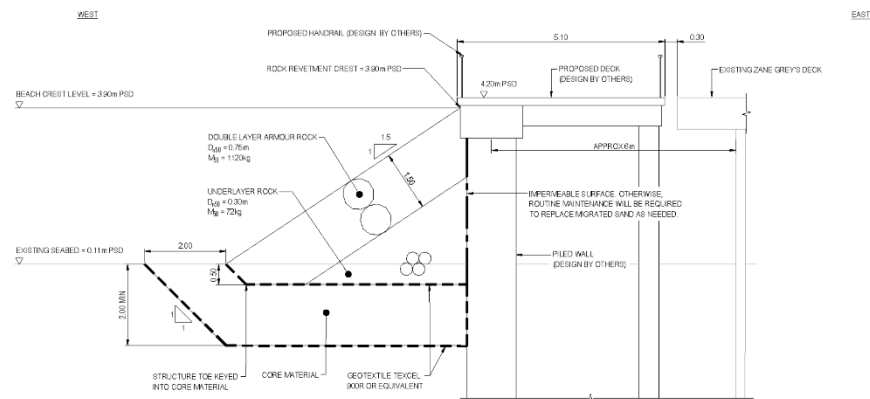
— EXISTING SEABED
 --- BEACH LINE



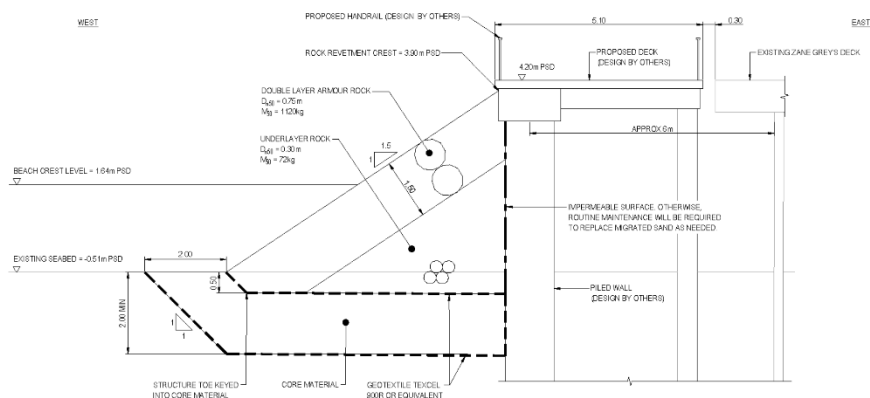
1 EASTERN ABUTMENT LONG SECTION
 CA-019 / 1:150 (A1), 1:300 (A3)



Drawing No: 3235491-CA-019 Rev: D



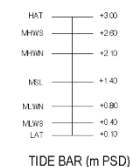
2 EASTERN ABUTMENT CROSS SECTION AT CHAINAGE 20.00m
(CA-018) 1:50 (A1), 1:100 (A3)



3 EASTERN ABUTMENT CROSS SECTION AT CHAINAGE 50.00m
(CA-018) 1:50 (A1), 1:100 (A3)

NOTES:

1. LEVELS ARE IN METRES RELATIVE TO PAKIA SOUNDING DATUM (PSD).
2. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
3. TO BE READ IN ACCORDANCE WITH THE ROCK SPECIFICATION (2003-000481-CA-018 AND 2003-000481-CA-018).
4. BATHYMETRY SHOWN IS BASED ON THE D.M. SURVEY DATED 21-24 SEPTEMBER 2003.
5. THE CROSS SECTION WILL VARY ALONG THE LENGTH OF THE ABUTMENT.



TIDE BAR (m PSD)

LEGEND:

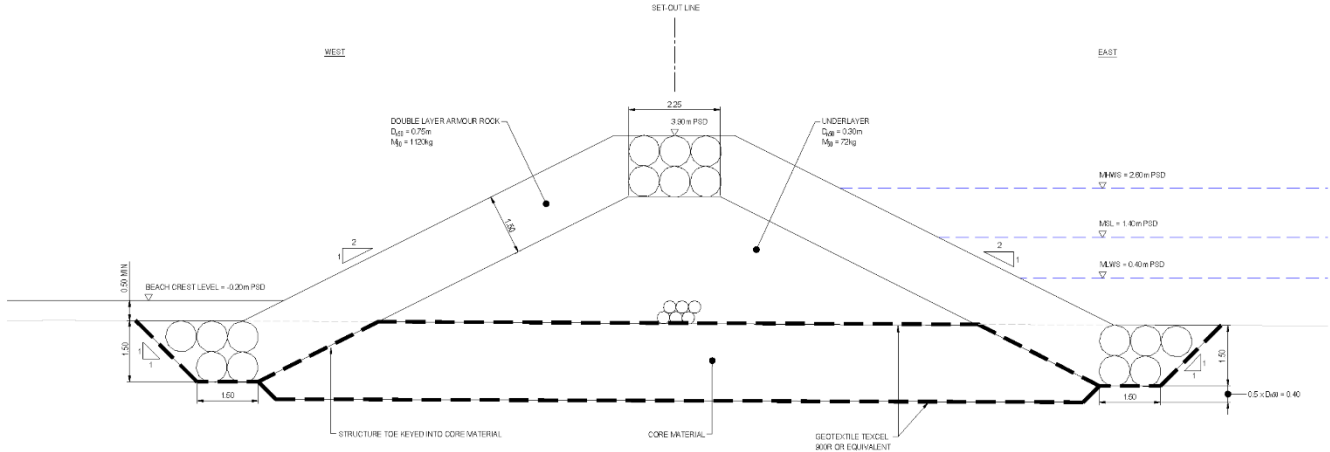
EXISTING SEABED



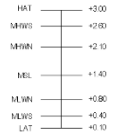
Drawing No.	3235491-CA-020	Rev.	D
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NOTES:

- 1. LEVELS ARE IN METRES RELATIVE TO PAKIA SOUNDING DATUM (PSD)
- 2. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE
- 3. TO BE READ IN ACCORDANCE WITH THE ROCK SPECIFICATION (DRAWING 3235491-CA-025 AND 3235491-CA-026)
- 4. BATHYMETRY SHOWN IS BASED ON THE DML SURVEY DATED 21-24 SEPTEMBER 2020



4 EASTERN ABUTMENT CROSS SECTION AT CHAINAGE 75m
CA-018 1:50 (A1), 1:100 (A3)



TIDE BAR (m PSD)

LEGEND:

EXISTING BEARED



Plan Number 5061/11

ORIGINAL DRAWING
IN COLOUR

FOR INFORMATION
NOT FOR CONSTRUCTION

Drawing No. 3235491-CA-021 Rev. D

ARMOUR ROCK SPECIFICATION

GENERAL

THIS SPECIFICATION SHALL BE READ IN CONJUNCTION WITH THE STANDARD YORK 083 THE ROCK MANUAL. THE USE OF HYDRAULIC ROCK IN ENGINEERING, 2007 AND ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THIS STANDARD UNLESS EXPRESSLY NOTED OTHERWISE.

THE CONTRACTOR SHALL PREPARE A METHOD STATEMENT FOR THE ENGINEER'S REVIEW INCLUDING SOURCES OF MATERIALS AND QUARRYING, HOW THE SPECIFIED ROCK GRADINGS WILL BE ACHIEVED, HANDLING, TRANSPORT AND STOCKPILING OF ROCK, WORK SEQUENCE, ROCK PLACEMENT AND TOLERANCES, EXPERIENCE OF KEY PERSONNEL, DIVING INSPECTIONS, INCLUDING SAFETY AND LEGISLATIVE REQUIREMENTS, EMERGENCY PLANS FOR STORM AND NATURAL HAZARD EVENTS, WEATHER, AN, WAVE, CLIMATE, FORECASTING AND WARNING SYSTEMS, SURVEY TECHNIQUES, PROCEDURES FOR SAMPLING AND TESTING PROCEDURES, HEALTH AND SAFETY AND ENVIRONMENTAL MATTERS, THE WORK METHOD STATEMENT SHALL ADDRESS THE SPECIFIED TOLERANCES FOR THE MATERIALS TO BE PLACED, THE WAVE AND WEATHER SEASONS AND CONDITIONS, THE OPERATING WHARF, VESSEL TRAFFIC, AND THE MEASURES TO CONTRAIN MATERIALS DURING CONSTRUCTION AND TO PREVENT LOSS OF MATERIALS IN ADVERSE CONDITIONS.

THE CONTRACTOR SHALL NOMINATE AT THE TIME OF TENDER, THE SOURCE AND MATERIAL TYPE FOR THE ROCK. SOURCE TESTING AND GRADING IS REQUIRED FOR EACH OF THE TESTS DESCRIBED BELOW UNDER ROCK QUALITY AND ROCK GRADING AND RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO THE COMMENCEMENT OF WORKS. TESTING IS TO BE UNDERTAKEN AT AN UNZ ACCREDITED LABORATORY.

THE CONTRACTOR SHALL CONDUCT A TRIAL TO DEMONSTRATE HOW THE PROPOSED WORK METHODS AND RESOURCES WILL RESULT IN THE BREAKWATER BEING BUILT IN FULL ACCORDANCE WITH THE SPECIFICATION. THE TRIAL SHALL EXTEND OVER THE FULL LAYER HEIGHT IN A SINGLE PASS AND A MINIMUM WIDTH OF 10m. PROVIDED THE TRIAL MEETS THE SPECIFICATION, THE TRIAL PANEL MAY BE INCORPORATED INTO THE PERMANENT WORKS.

THE CONTRACTOR SHALL CARRY OUT PRE AND POST WORK SURVEYS, MEASUREMENT SURVEYS TO SUPPORT PROGRESS PAYMENT APPLICATIONS, SURVEYS TO MONITOR SETTLEMENT OF ROCK STRUCTURE BELOW AND ABOVE WATER AND INTERMEDIATE SURVEYS UPON COMPLETION OF EACH FACE OF WORKS. SURVEY OF ROCKS BE OARDED OUT USING A COMBINATION OF DGPS SURVEY SYSTEMS RIGGED TO CONSTRUCTION EQUIPMENT, NARROW BEAM ECHO SOUNDING OR MULTIBEAM ECHO SOUNDING MAY BE USED. THE PROPOSED SURVEY SYSTEMS TO BE INCLUDED IN THE CONTRACTORS WORK METHOD STATEMENT FOR REVIEW BY THE ENGINEER.

ROCK QUALITY: ARMOUR ROCK AND UNDERLAYER

EACH TEST SPECIFIED BELOW SHALL COMPRISE A MINIMUM OF THREE SAMPLES.

- ARMOUR ROCK AND UNDERLAYER SHALL BE HARD, DURABLE, CRUSHED, QUARRIED OR NATURAL STONE FREE FROM VISIBLY OBSERVABLE OR CHEMICALLY DETECTABLE IMPURITIES, DUST, CLAY, ORGANIC MATTER AND OTHER COLLOIDAL MATERIAL. THE STONE SHALL BE FREE FROM CRACKS AND CLEAVAGES AND SHALL NOT DISINTEGRATE ON EXPOSURE TO WEATHERING.
- ROCK SHALL BE CRUSHED, ANGULAR SHAPED MATERIAL, CONFORMING WITH THE REQUIREMENTS OF THE SPECIFICATION, FROM A SOURCE WHICH SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. UNCONFINED COMPRESSIVE STRENGTH SHALL BE A MINIMUM OF 100MPa WHEN TESTED WITH ASTM STANDARD D2038-05 UNLESS OTHERWISE SPECIFIED. EACH TEST SHALL COMPRISE A MINIMUM OF THREE SAMPLES.
- THE MINIMUM SOLID DENSITY (SSD) OF ARMOUR ROCK AND UNDERLAYER FOR THE BREAKWATERS SHALL BE 2.85 t/m³ WHEN TESTED IN ACCORDANCE WITH NZS 4407.
- THE MINIMUM SOLID DENSITY (SSD) OF ARMOUR ROCK AND UNDERLAYER FOR THE EASTERN ABUTMENT SHALL BE 2.50 t/m³ WHEN TESTED IN ACCORDANCE WITH NZS 4407.
- THE ARMOUR ROCK AND UNDERLAYER SHALL HAVE A WATER ABSORPTION LESS THAN 10% IN ACCORDANCE WITH NZS 3111.
- ARMOUR ROCK AND UNDERLAYER RESISTANCE TO ABRASION - LOS ANGELES ABRASION NOT MORE THAN 25% LOSS IN WEIGHT IN ACCORDANCE WITH NZS 4407.
- THE QUARRY STONE USED FOR ARMOUR ROCK AND UNDERLAYER SHALL HAVE A QUALITY INDEX OF AA, AB, OR BA WHEN TESTED IN ACCORDANCE WITH NZS 4407.

ROCK GRADING

- QUARRY RUN CORE:

QUARRY RUN MATERIAL FOR USE IN THE BREAKWATER CORE SHALL BE CAPABLE OF ACHIEVING A RELATIVELY HIGH DENSITY WITHOUT COMPACTION WHEN DUMPED UNDER WATER.

QUARRY RUN SHALL BE EVENLY GRADED 10mm TO 500mm, WITH MATERIAL SMALLER THAN 75mm NOT TO EXCEED 10% OF TOTAL HEIGHT. THE TARGET GRADING IS:

QUARRY RUN GRADING						
ROCK SIZE (mm)	10	20	75	150	400	500
% PASSING	0	4	18	34	75	97

THE CONTRACTOR SHALL DEVELOP A QUARRY RUN GRADING WITH UPPER AND LOWER LIMITS AND SUBMIT TO THE ENGINEER FOR REVIEW PRIOR TO ROCK PRODUCTION.

2. UNDERLAYER, ARMOUR AND ARCHITECTURAL ROCK:

THE MASS DISTRIBUTION AND THE MEDIAN MASS SHALL BE DETERMINED IN ACCORDANCE WITH SECTION 3.4.3 OF CIRIA 083, THE ROCK MANUAL, AND SHALL CONFORM TO THE FOLLOWING TABLE:

ROCK GRADING							
M ₅₀	D ₅₀	GRADING CLASS DESIGNATION	LAYER THICKNESS	ELL.	NUL.	N.L.	EUL.
800	200	800	200	800	800	800	800
WESTERN BREAKWATER, NORTHERN BREAKWATER, WESTERN ABUTMENT, EASTERN ABUTMENT							
1120	0.75	ARMOUR	1.50	380	540	1800	2500
72	0.30	UNDERLAYER	VARIES	15	20	130	220

WHERE M₅₀ IS THE MEAN MASS, M = SSD x D₅₀³

D₅₀ IS THE NOMINAL DIAMETER CONSIDERING THE ROCK AS AN EQUIVALENT CUBE

D IS THE SIEVE SIZE AND USED FOR ON SITE MEASUREMENT. CONVERSION TO BE CONFIRMED ON CONFIRMATION OF ROCK SUPPLY.

THE CONTRACTOR SHALL DEVELOP GRADINGS WITH UPPER AND LOWER LIMITS BASED ON DATA IN THE ROCK GRADING TABLE AND SUBMIT TO THE ENGINEER FOR REVIEW PRIOR TO ROCK PRODUCTION.

- EXTREME LOWER LIMIT (ELL) - THE MASS BELOW WHICH MORE THAN 5% PASSING BY MASS IS PERMITTED FOR M₅₀ GREATER THAN 300KG, 2% FOR M₅₀ LESS THAN 300KG.
- NORMAL LOWER LIMIT (NLL) - THE MASS BELOW WHICH NO MORE THAN 10% PASSING BY MASS IS PERMITTED.
- NORMAL UPPER LIMIT (NUL) - THE MASS BELOW WHICH NO LESS THAN 70% PASSING BY MASS IS PERMITTED.
- EXTREME UPPER LIMIT (EUL) - THE MASS BELOW WHICH NO LESS THAN 97% PASSING BY MASS IS PERMITTED.

SAMPLING AND TESTING SHALL BE ACCORDING TO CIRIA 083, THE ROCK MANUAL, USING AT LEAST 30 PIECES TAKEN AT RANDOM FROM STONES GREATER IN MASS THAN THE ELL.

ROCK SHAPE

- ALL ROCK SHALL BE ESSENTIALLY EQUI-DIMENSIONAL WITH ELONGATED OR THIN SLABS OF ROCK BEING UNDESIRABLE. QUARRY STONE USED FOR ARMOUR, UNDERLAYER AND ARCHITECTURAL ROCK SHALL HAVE A LENGTH (L) TO WIDTH (W) RATIO OF LESS THAN 3. FIFTY PERCENT (50%) OF STONES SHALL NOT HAVE A L/W RATIO GREATER THAN 2.
- SAMPLING AND TESTING SHALL BE ACCORDING TO CIRIA 083, THE ROCK MANUAL, USING AT LEAST 30 PIECES TAKEN AT RANDOM FROM STONES GREATER IN MASS THAN THE ELL.
- BLOCKS OF QUARRY STONE IN HEAVY GRADINGS SHOWING CLEAR SIGNS OF SIGNIFICANT EDGE OR CORNER WEAR OR OF SEVERE ROUNDING SHALL NOT BE ACCEPTED.

TEST FREQUENCY

- ROCK PROPERTIES AND GRADING TO BE UNDERTAKEN AND SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO WORK COMMENCING.
- THE CONTRACTOR SHALL CARRY OUT TESTING IN ACCORDANCE WITH THE FOLLOWING TABLES. THE ENGINEER MAY CARRY OUT CHECK TESTING. THE CONTRACTOR SHALL BE REQUIRED TO COOPERATE.
- ROCK PROPERTIES AND GRADING TO BE REPEATED IF MATERIAL SOURCE CHANGES.

SOURCE TESTING BEFORE CONSTRUCTION

MATERIAL	TEST	FREQUENCY
QUARRY RUN CORE, ARCHITECTURAL ROCK, UNDERLAYER AND ARMOUR ROCK	DENSITY GRADING SHAPE WEATHERING RESISTANCE RESISTANCE TO IMPACT AND MINERAL FABRIC BREAKAGE CRUSHING RESISTANCE RESISTANCE TO ABRASION DROP TEST ABSORPTION UNCONFINED COMPRESSIVE STRENGTH	DENSITY: ONE SET (10 TESTS PER SET) PER MATERIAL TYPE AND SOURCE ALL REMAINING: ONE SET (5 TESTS PER SET) PER MATERIAL TYPE AND SOURCE

NO ROCK SHALL BE PLACED UNTIL ALL THE TEST RESULTS HAVE BEEN SUBMITTED TO AND REVIEWED BY THE ENGINEER.

TESTS AND INSPECTIONS DURING CONSTRUCTION

MATERIAL	TEST	FREQUENCY
QUARRY RUN CORE	DENSITY, WATER ABSORPTION AND LA ABRASION	1 TEST PER 7,000m ³
	GRADING AND SHAPE	1 TEST PER 3,000m ³
ARMOUR AND ARCHITECTURAL ROCK	DENSITY, WATER ABSORPTION AND LA ABRASION	1 TEST PER 7,000m ³
	GRADING AND SHAPE	1 TEST PER 3,000m ³
UNDERLAYER	DENSITY, WATER ABSORPTION AND LA ABRASION	1 TEST PER 3,000m ³
	GRADING AND SHAPE	1 TEST PER 2,000m ³
TRIMMED CORE, ARCHITECTURAL ROCK, ARMOUR AND UNDERLAYER	LINE AND LEVEL OF EACH LAYER	1 PER 5m LONGITUDINALLY AND AT TRANSITIONS AND 1 PER 3m SLOPE TRANSVERSELY AND AT ANGLE CHANGES

THE CONTRACTOR SHALL ALLOW FOR THE COSTS OF SAMPLING AND TESTING AS DESCRIBED ABOVE. TESTING SHALL BE CARRIED OUT BY AN UNZ ACCREDITED LABORATORY AND THE RESULTS SHALL BE SUBMITTED TO THE ENGINEER AND REVIEWED PRIOR TO ANY CONSTRUCTION.

CONSTRUCTION

- PLACING OF EACH LAYER SHALL COMMENCE AT THE TOE AND SHALL PROCEED UPWARDS TOWARDS THE TOP, CONSTRUCTING THE FULL LAYER THICKNESS IN A SINGLE PASS.
- ROCKS SHALL BE PLACED TO:
 - ACHIEVE A WELL KEYED, DENSELY PACKED STRUCTURE AND SUBMIT TO THE ENGINEER FOR REVIEW PRIOR TO CONSTRUCTION. WHERE THE CONTRACTOR USES A HIGHER ROCK DENSITY (SSD) SPECIFIED THEY SHALL SPECIFY THE REQUIRED ROCK DENSITY AND ADJUST THE TARGET PLACED DENSITY PRO-RATA.
 - ACHIEVE EFFECTIVE INTERLOCKING, SO THAT EACH ROCK IS SECURELY HELD IN PLACE BY ITS NEIGHBOURS AND DOES NOT DEPEND ON FRICTIONAL RESISTANCE. FOR STABILITY PRIOR TO PLACING FURTHER STONES.
 - ACHIEVE A FINISHED LAYER AT LEAST TWO ROCKS THICK UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
 - AVOID FORMING WITHIN THE OVERALL THICKNESS OF THE LAYER, SEPARATE LAYERS IN THE PLANE PARALLEL TO THE SLOPE OF THE UNDERLYING MATERIAL.
 - MINIMISE ANY DISTURBANCE TO ALREADY PLACED ROCK.
 - AVOID DAMAGE TO ANY EXISTING STRUCTURES.
- UNDERLAYER AND ARMOUR ROCK SHALL BE PLACED AS SOON AS PRACTICABLE TO PROTECT THE UNDERLYING MATERIAL, MATERIAL ERODED BY WAVE ACTION OR ANY OTHER CAUSE SHALL BE MADE GOOD BY THE CONTRACTOR, AT THE CONTRACTOR'S OWN EXPENSE, BEFORE PLACING THE APPROPRIATE PROTECTIVE LAYER.
- UNDERLAYER ROCK SHALL BE DEPOSITED CAREFULLY SO THAT GROTTOLES (PIES) IS NOT PUNCTURED. WHERE GROTTOLES ARE PRESENT ROCKS SHALL NOT BE CRUSHED. MAXIMUM DROP HEIGHT OF THE UNDERLAYER ROCK SHALL BE LIMITED TO 10m. THE CONTRACTOR SHALL BE PERMITTED TO USE ROCK TRAYS FOR PLACEMENT OF THE UNDERLAYER.
- ARMOUR AND ARCHITECTURAL ROCK SHALL BE INDIVIDUALLY PLACED PIECE BY PIECE INTO THE STRUCTURE TO ACHIEVE A MINIMUM POINT SUPPORT AND BE STABLE TO THE LINE AND LEVELS SHOWN ON THE DRAWINGS. THE STONE SHALL BE DEPOSITED CAREFULLY SO THAT THE GROTTOLES FABRIC IS NOT PUNCTURED. THE DROP TEST BREAKAGE INDEX BASED ON SAMPLING AND TESTING AS DESCRIBED IN CIRIA 083 SHALL BE LESS THAN 5%.

TOLERANCES

- HORIZONTAL TOLERANCE FOR THE BREAKWATER AXIS AND FOOTPRINT TO BE ±0.50m.

- THE VERTICAL TOLERANCES FOLLOW ACCORDING TO ROCK CLASS AND LOCATION:

LEVEL OF PLACING	QUARRY RUN CORE	UNDERLAYER, ARMOUR AND ARCHITECTURAL ROCK	
		ON INDIVIDUAL MEASUREMENTS (m)	DESIGN PROFILE TO ACTUAL MEAN PROFILE (m)
ABOVE CHART DATUM (Dn CD)	± 0.20m	± 0.30m x C _{dg}	+ 0.35m x C _{dg} - 0.25m x C _{dg}
BELOW CHART DATUM (Dn CD)	+ 0.20m - 0.30m	± 0.50m x C _{dg}	+ 0.60m x C _{dg} - 0.40m x C _{dg}

NOTWITHSTANDING THE TOLERANCES ABOVE, THE FOLLOWING SHALL APPLY TO ARMOUR LAYERS:

- THE TOLERANCES ON TWO CONSECUTIVE MEAN ACTUAL PROFILES SHALL NOT BE NEGATIVE.
- NOTWITHSTANDING ANY ACCUMULATION OF POSITIVE TOLERANCES ON UNDERLYING LAYERS, THE THICKNESS OF THE LAYER SHALL NOT BE LESS THAN 80% OF THE NOMINAL THICKNESS SHOWN ON THE DRAWINGS WHEN CALCULATED USING MEAN PROFILES.
- THE ACTUAL MEAN PROFILE IS THE LINE TAKEN AT THE BOTTOM OF THE SLOPE AND AT THE TOP OF THE SLOPE.



GEOTEXTILE

- | JOINT METHOD | MINIMUM LAP WIDTH (mm) |
|------------------|------------------------|
| FACTORY STITCHED | 150 |
| LAP ONLY | 1,000 |

