ATTACHMENT EIGHT

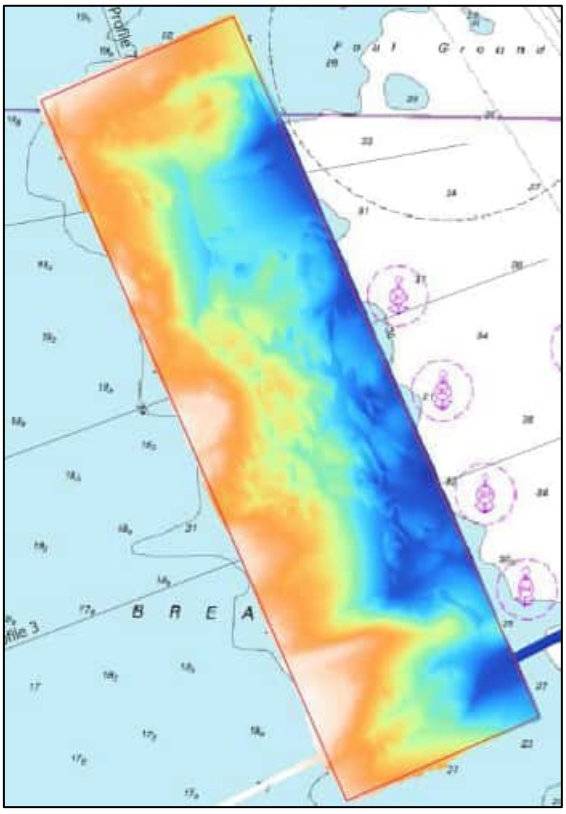
Te Ākau Bream Bay Sand Extraction: Coastal Process Effects Assessment (T&T)

McCALLUM BROS LTD
Established 1904

Appendix B DLM survey report

REPORT OF SURVEY

Bream Bay – Bathymetric Survey



REPORT PREPARED FOR:

McCALLUM BROS LTD
Established 1904

REPORT PREPARED BY:

DML
DISCOVERY MARINE LTD

Surveyed by:	Discovery Marine Ltd.
Surveyor in Charge:	Oliver Rogers, CAT A
Survey dates:	02 April 2024 – 08 April 2024 & 13 May 2024
Report date:	17 May 2024
Report version:	2.0

Control Status

Document Title: Report of Survey – Bream Bay Hydrographic Survey

Document Number: DML_ROS_2422_McCallum_Bream Bay_Rev2.0

Revision: 2.0

Role	Name	Signed	Date
Author	Oliver Rogers	[redacted]	17 May 2024
Approved by	Declan Stubbing (BSURV, CPHS1)	[redacted]	17 May 2024

Revision Control

Revision	Date	Author	Description
0.1		ORO	Internal QC
1.0	17 April 2024	ORO	Final
1.1	18 April 2024	ORO	Revised Final
2.0	17 May 2024	ORO	Added 4 Remaining Transects

Contents

1. EXECUTIVE SUMMARY

Discovery Marine Ltd (DML) was contracted by McCallum Brothers to conduct a bathymetric survey of the seabed in Bream Bay, New Zealand. The purpose of the survey is to accurately determine the bathymetric depths along Bream Bay in 2 main areas the application area and the control area. There is also a requirement to run 6 bathymetric transects into the coastline. The location and extent of the survey area is shown in Figure 1.

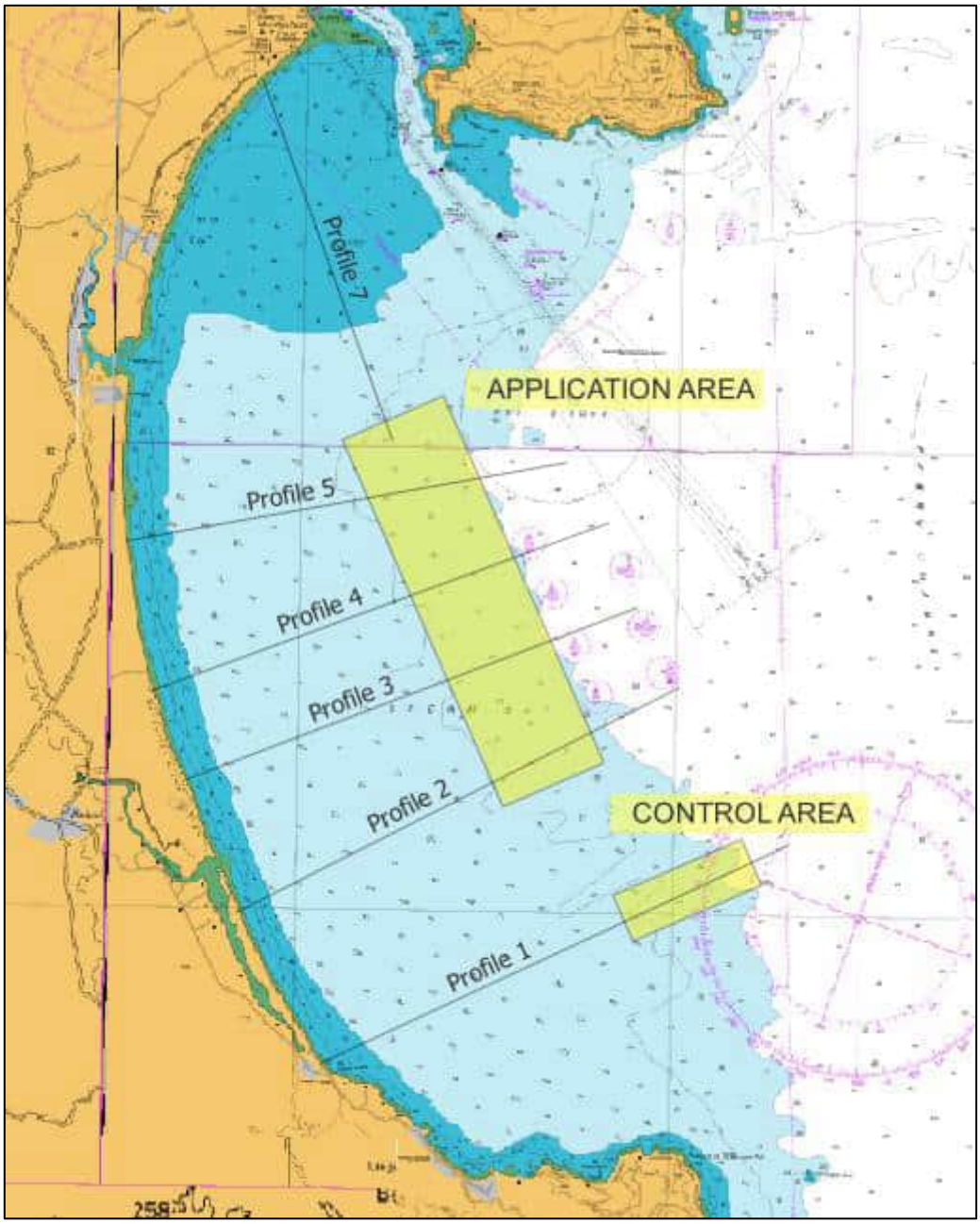


Figure 1: Survey Areas

Vessel setup and calibration verified was conducted in Calliope Bay off Marsden Point on the 02 April 2024. *Tupaia* was onsite conducting survey operations between 02 – 08 April 2024. 4 remaining transects were completed on the 13 May 2024. Data post processing and reporting was completed at DML's office in Tauranga between 09 – 17 April & 16 – 17 May 2024.

The survey coverage achieved is shown in Figure 2.

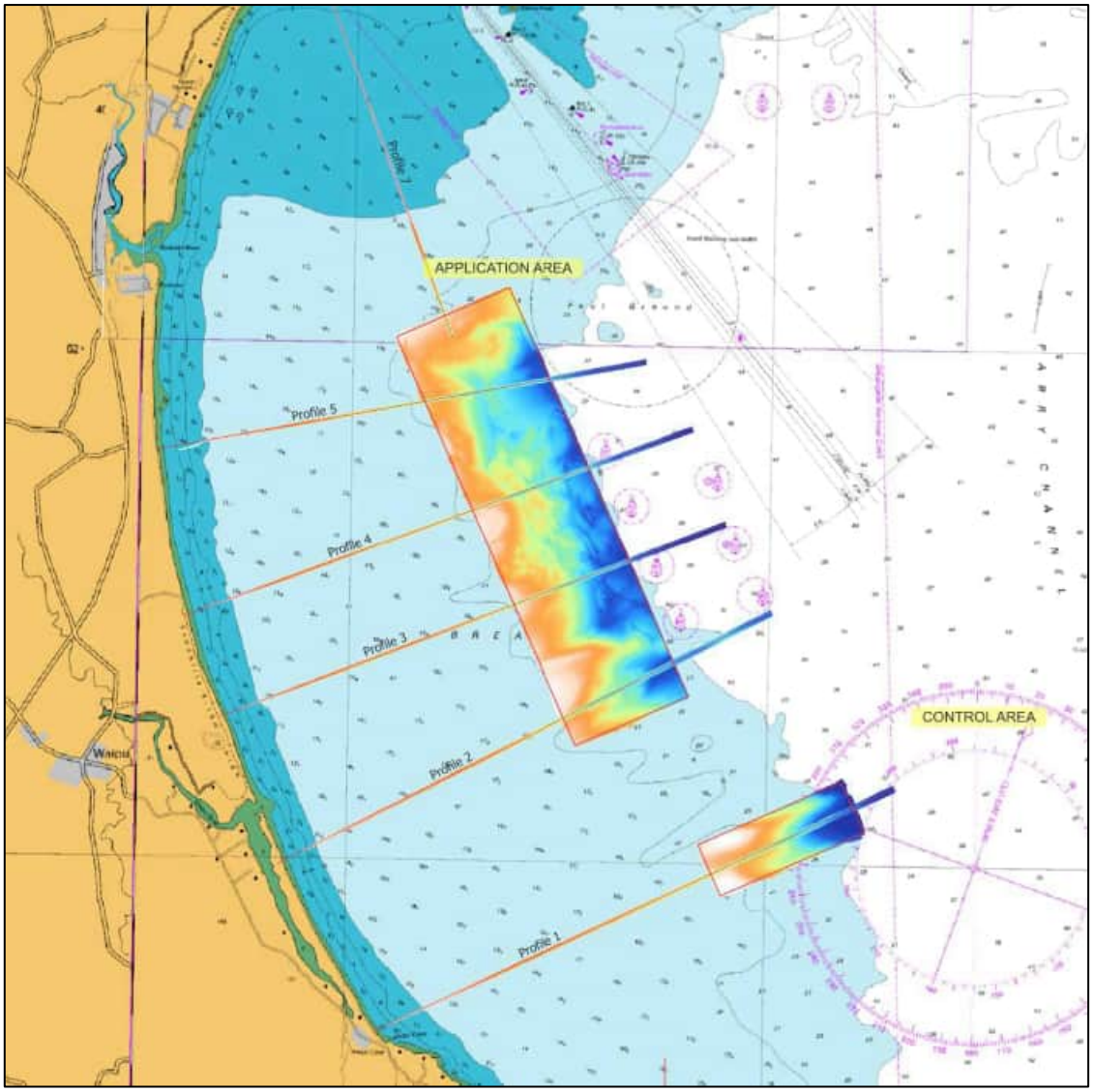


Figure 2: Survey Coverage Achieved

The Survey was undertaken in accordance with the Maritime New Zealand "Good practice guidelines for Hydrographic Surveys in Ports and Harbours" as well as the hydrographic survey principles and standards outlined in LINZ HYSPEC V 2.0. Weblinks to the two specification guideline docs are provided below.

https://www.maritimenz.govt.nz/commercial/ports-and-harbours/documents/Hydrographic-surveys-guidelines.pdf

https://www.linz.govt.nz/sea/charts/standards-and-technical-specifications-for-our-chart-and-hydrographic-work

2. WEATHER & SEA CONDITIONS

The survey was completed under favourable weather conditions. The first 3 days between 2 – 4 April 2024 saw data captured in light winds and small to no swell. Afternoon sea breezes were accounted each day up to 12kts from the NE. Friday the 5 April 2024 saw winds from the S-SW gusting up to 20kts. On 08 April 2024 the survey was abandoned due to increasing wind and wave conditions causing a degradation in the data quality. The survey was recommenced on the 13 May 2024 when the weather was favourable with light variable winds and 0-0.5m swell.

The tidal range between high water and low water at Bream Bay averaged 2.4m during the survey.

The weather and sea conditions experienced did not affected the overall quality of the final survey data.

3. SURVEY VESSEL AND EQUIPMENT

The platform selected for the fieldwork was *Tupaia* (Figure 3). *Tupaia* is a 7.7m (length), 2.49m (beam), Senator 770. Typically, *Tupaia* was manned by a skipper and two hydrographic surveyors. Vessel particulars are provided in Table 1.

Figure 3: DML Survey Vessel – *Tupaia*

Table 1: Specifications of Survey Vessel Tupaia

Name	*Tupaia*
MNZ Number	142238
Owner	Discovery Marine Limited
Type	Senator 770
Year Built	2019
Dimensions	Length: 7.7m, Beam: 2.49m, Draught: 0.7m
Propulsion	Twin Mercury 150HP 4 stroke outboard engines
Electrical	12V DC and 230V AC (1500w inverter)
Survey Class	MNZ Survey for 8 Pax – Inshore Waters, (within 12nm) and Enclosed Waters
Health & Safety Considerations	Operates under the direction of the vessel skipper and within MNZ MOSS requirements, MBES and SVP deployment and recovery SOP.
Operating Hours	12-hour operations (daylight), with provision and safety equipment for overnight sounding.

The vessel was fitted with a modern survey suite comprising a high accuracy POS MV Wavemaster II positioning and inertial motion system and high-resolution, Reson SEABAT T50 Multibeam Echosounder (MBES). The MBES is mounted on a custom-built strut on the stern of the vessel as shown in Figure 4.

Figure 4: MBES Sonar stern mounted strut in deployed position.

All data was logged into the Qinsy hydrographic acquisition and navigation software package (v9.6.1).

The survey equipment used is listed in Table 2

Table 2: Hydrographic Survey System Equipment

EQUIPMENT	MAKE / MODEL /TECHNICAL SETTINGS
Vessel GNSS / Motion compensation system	**Applanix POS MV Wavemaster II**
	Integrated Fugro MarineSTAR G4+ real-time Precise Point Positioning (PPP). 0.15m 3D accuracy)
	Inertial aided post processed kinematic (IAPPK) positioning applied during post processing.
	Motion data rate: 100Hz
Multibeam Echo Sounder	**Teledyne RESON SeaBat T50 R Multibeam Echo Sounder**
	Operating Frequency: 300khz
	Operating Depth Range: 2m -500m
	Maximum Swathe Angle: Limited to 130° for this survey
	Beam Forming: 800 beams, 1.5° beam width at 300khz.
	Mode: Equidistant Sounding Spacing
	Roll Stabilisation: Real-time
	Depth Resolution: 6mm
Speed of sound sensor	**AML -3 SVPT (Sound velocity, pressure, temperature sensors)**
	Resolution: 0.001m/s
	Precision: 0.006m/s

4. SURVEY CONTROL

4.1 HORIZONTAL DATUM

The survey was completed on the NZGD2000 Datum, NZTM 2000, EPSG:2193.

4.2 VERTICAL DATUM

ASCII data (XYZ format) for the survey are provided as depths below New Zealand Vertical Datum 2016 (NZVD2016) and depths below Chart Datum (Marsden Point).

- NZVD16 depths are reduced from the GRS80 ellipsoid to NZVD2016 in real time using the NZGeoid2016 Geoid separation model applied in the Qinsy acquisition software.
- Chart Datum (Marsden Point) is documented as 1.746m below NZVD2016. Therefore, Chart Datum depths are reduced by deducting 1.746m from the NZVD16 depths.
- Chart Datum (Marsden Point) is described as: *Marsden: Point 4.816m below the RNZN benchmark (LINZ code DJM9), an iron bolt set in concrete near the base of the light standard on the inshore east end of the Northport Ltd. pier near the launch steps.*

4.2.1 Summary of Levels

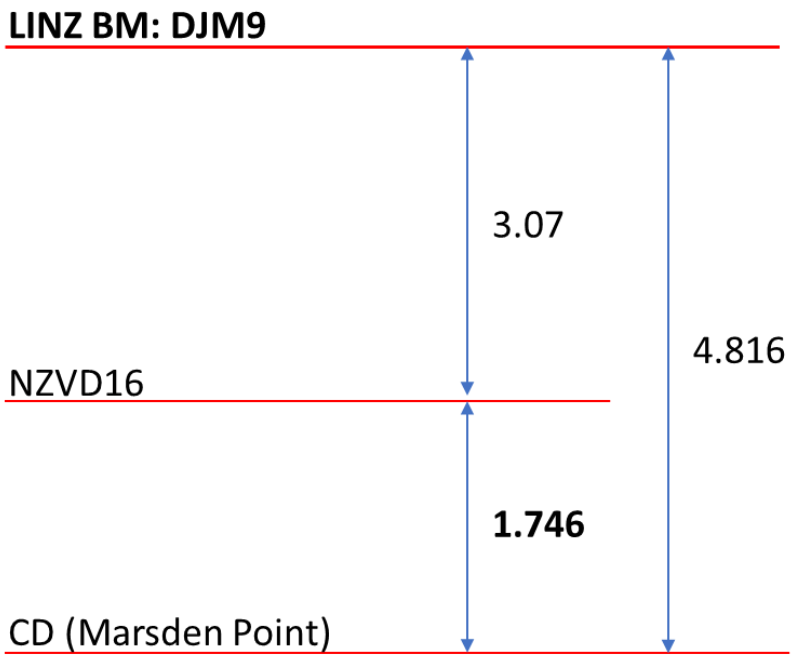


Figure 5: Summary of Levels

4.3 CONNECTION TO DATUM

POSPAC 'Smart Base' Inertial Aided Post Processed Kinematic Positioning (IAPPK), Smoothed Best Estimate of Trajectory (SBET). The coordinates of the LINZ Continuously Operating Reference Stations (CORS) used in the calculation are in shown in Table 3

Table 3: LINZ CORS Station Coordinates

LINZ CORS Station	Latitude	Longitude	Ellipsoid Height
AUCK	S36°36'10.24073"	E174°50'03.78764"	132.681
WARK	S36°26'03.89165"	E174°39'46.00568"	111.273
WHNG	S35°48'13.57788"	E174°18'52.43929"	172.770
CORM	S36°51'55.55985"	E175°44'58.40635"	170.242

5. CONDUCT OF SURVEY

5.1 PRE-DEPLOYMENT CALIBRATIONS

Tupaia is permanently mobilised. Verifications and vessel checks conducted for the original vessel mobilisation consisted of the following.

- Patch test confirming the existing values used on the Northport survey in March 2024.
- MBES Reference surface was surveyed at DML common reference surface in Calliope Bay which is used for Northport surveys (Results compared against previous survey Northport March 2024).

5.2 FIELD SURVEY METHODOLOGY

Tupaia was launched at Marsden Cove Marina at 1500 02 April 2024, calibrations and verifications were carried out. Mainline sounding commenced 03 April and survey was partly completed by 08 April 2024. Deteriorating weather conditions and an unfavourable forecast required a pause in survey operations with four transects remaining.

Survey operations were recommenced on 13 May 2024 at 0600 with *Tupaia* launched at Gulf Harbour Marina before a 2-hour transit to Bream Bay. Survey of the four remaining transects was complete by midday and *Tupaia* returned to Gulf Harbour Marina that afternoon.

During both campaigns he survey area was systematically mapped running lines parallel to the general contours. Real-time MBES coverage was generated in QINSY data acquisition software and displayed for the helmsman, allowing lines to be run based directly off the previous line's swath edge (maintaining at least 20% overlap between adjacent swaths). Survey vessel speed was maintained at approximately 6.5 – 7.0kts.

Sound velocity profiles were conducted regularly throughout the survey to account for any geographical or temporal variations of the speed of sound through the water column. The profiles only fluctuated by minor amounts of 1 to 2 m/s.

Data quality was observed in real time and rejection criteria for horizontal position data and depth logging were established to cease data logging if data fell below these standards.

5.3 ON SITE VERIFICATION AND ACCURACY CHECKS

5.3.1 Patch Test

A MBES Patch Test was conducted onsite to determine any angular MBES mounting errors. Multiple sets of reciprocal survey lines were run perpendicular to a prominent feature. A rock located opposite Marsden Point at 6033611mN,1735435mE. Reciprocal lines over the feature were used for pitch calibration, offset lines in the same direction over the feature were utilised for yaw calibration, and reciprocal lines over the flat featureless seabed adjacent to the feature were utilised for roll calibration.

5.3.2 Reference Surface

A reference surface exists in Calliope Bay off Marsden Point. This is North of the survey extents located at 1736486mE, 6033200mN and is regularly used during Northport / Whangarei Harbour hydrographic survey works.

The reference surface was surveyed to compare against the March 2024 Northport survey and verification lines were run over the reference surface in a dynamic motion to check for any systematic errors and as a vertical reference check (see Figure 6). The reference surface comparison results are presented in Section 7 below.

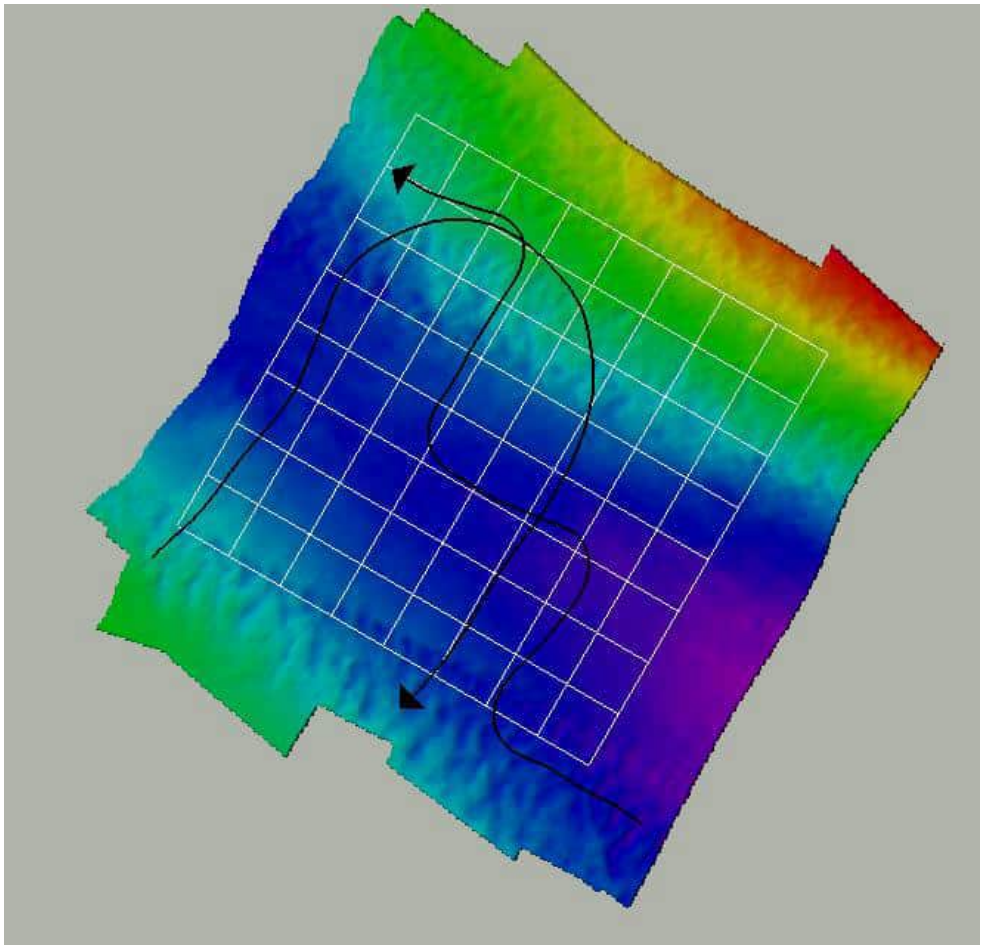


Figure 6: Reference Surface and Verification Track-lines

5.3.3 Crossline Checks

One transect line was been used as crossline, being perpendicular to the main sounding lines. Crossline check is to provide a check on vertical height application and data integrity. A summary of the crossline statistical analysis is provided in Table 6. The crossline passed the test for bathymetric data repeatability within LINZ Special Order limits.

6. DATA POST PROCESSING

6.1.1 Vessel Positioning

Vessel positioning data was post processed by a method known as Inertial Aided Post Processed Kinematic Positioning (IAPPK). The IAPPK processing was completed using Applanix POSPac MMS 9.0 software. The software utilises real time recorded GNSS positioning, inertial motion, and heave measurements and post processes them using finalised satellite orbits and a network of continuously operating GNSS reference stations (CORS).

The CORS stations utilised in the PPK solution for the survey were Whangarei (WHNG), Warkworth (WARK), Auckland (AUCK) and Coromandel (CORM), depicted in Figure 7. Positional accuracies achieved by this method are in the order of 5cm 3D. Total survey uncertainty is discussed further in Section 9.

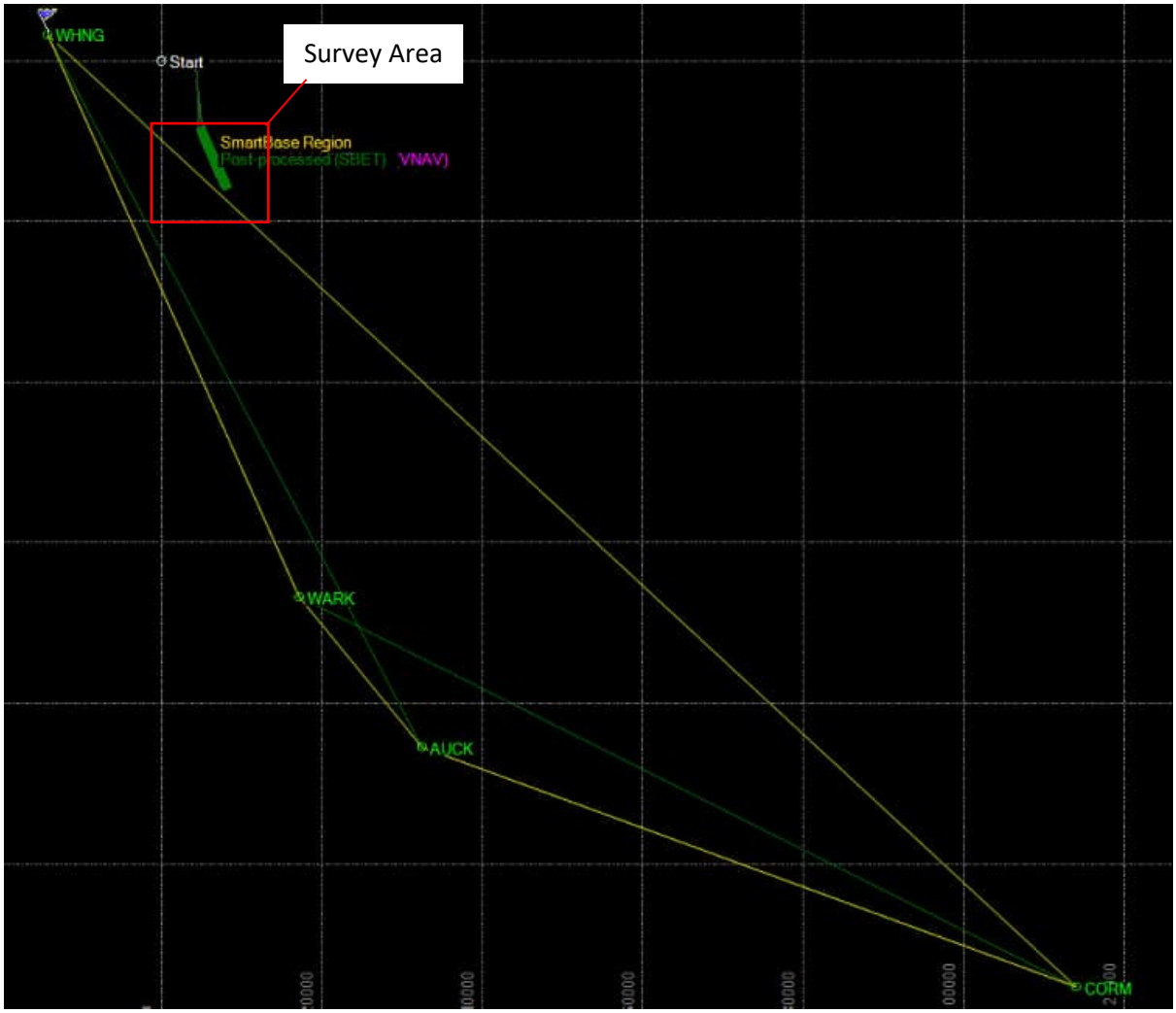


Figure 7: Post Processed Positioning Network

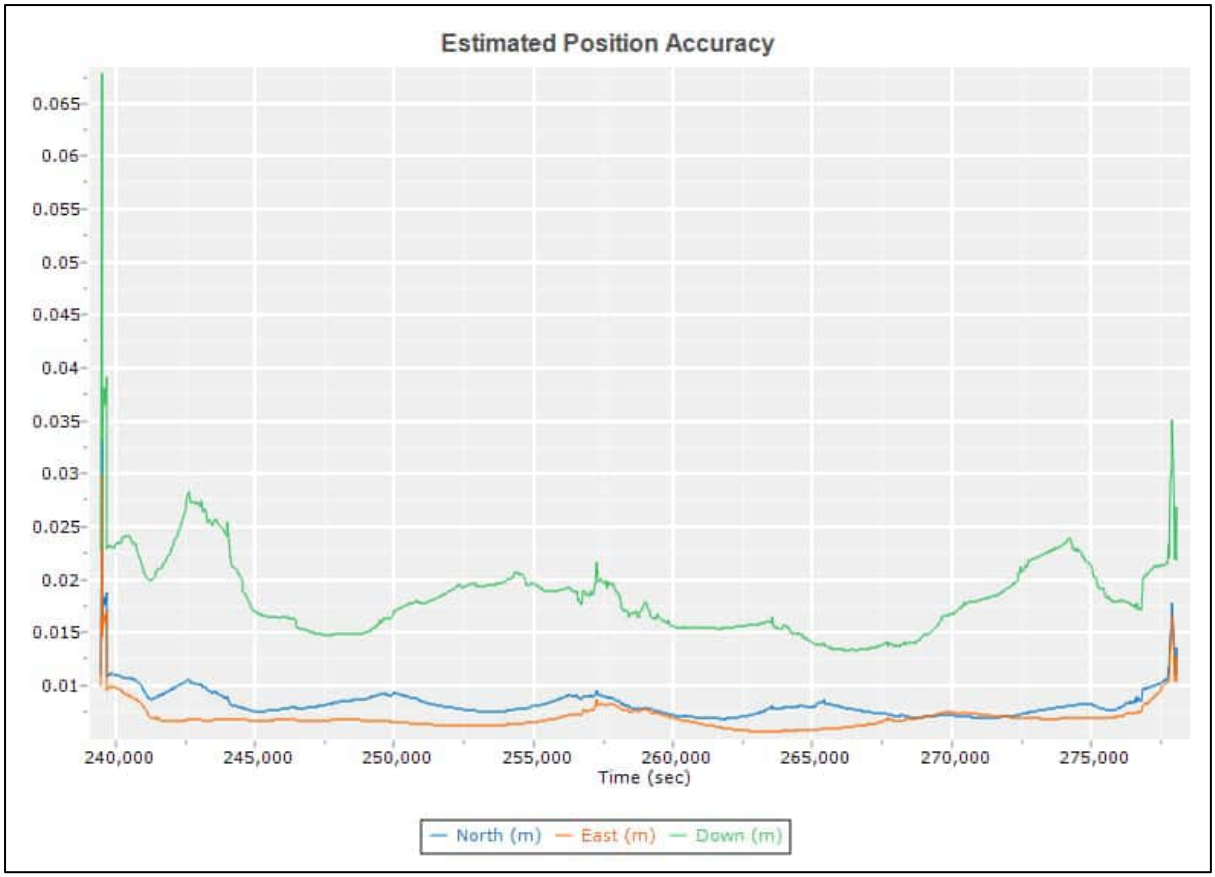


Figure 8: IAPPK Post Processed Positioning Estimated Position Accuracy

6.1.2 MBES Data Processing

Bathymetric data has been processed and validated using Qimera v2.6.2. The final processed MBES bathymetry dataset has been supplied as a 1m x 1m cell resolution average seafloor surface.

7. QUALITY CHECKS AND ADJUSTMENTS

The reference surface verification lines and crossline results were then examined and all meet specification with excellent standard deviation results at 95% Confidence Interval (2σ Std. Dev.). The reference surface was then compared to a previous hydrographic survey undertaken by DML in March 2024. Results of the reference surface and crossline comparisons are displayed in Table 4 to Table 6 below.

Table 4: Surface Comparisons - Tupaia March 2024 vs Tupaia April 2024

Area	Mean Diff. between Surfaces	Std. Deviation	Difference - Range	LINZ Special Order TVU Error Limit	Error Limit PASS or FAIL
Calliope Bay Reference Surface Tupaia March 2024 vs Tupaia April 2024	0.06	0.02	-0.93 to 0.22	0.27	PASS

Table 5: Reference Surface Verification Lines

Line	Reference Surface mean depth	Mean Diff. from main bathy Surface	Std. Dev. (Verification line to Surface)	2σ Std. Dev. (Verification line to Surface)	Difference to Bathy Surface - Range	LINZ Special Order TVU Error Limit	Error Limit PASS or FAIL
U-turn	-19.23	-0.02	0.01	0.04	-0.17 to 0.09	0.28	PASS
Zig Zag	-19.31	-0.02	0.01	0.06	-0.25 to 0.41	0.28	PASS

Table 6: Crossline Statistics

Line	Bathy Surface mean depth	Mean Diff. from main bathy Surface	Std. Dev. (X-line to Surface)	2σ Std. Dev. (X-line to Surface)	Difference to Bathy Surface - Range	LINZ Special Order TVU Error Limit	Error Limit PASS or FAIL
Transect Profile 2	-29.34	-0.07	0.08	0.23	-11.67 to 26.76	0.33	PASS

8. DIFFICULTIES ENCOUNTERED

The survey was completed without any major interruptions or difficulties. Profile number 5 had to divert off the planned line due to a fishing Kontiki directly on the line. See Figure 9 below showing the deviation.

Figure 9: showing deviation from profile line due to fisherman

9. TOTAL PROPAGATED UNCERTAINTY

The accuracy of the MBES bathymetry captured for this survey is assessed as +/-0.15m or better. The uncertainty value was attained by combining all potential systematic and environmental error sources and computing an A Posteriori Root Mean Square (RMS) error assessment. Results of the A Posteriori Horizontal and Vertical Total Propagated Uncertainties (THU, TVU) are provided in Figure 10 and Figure 11.

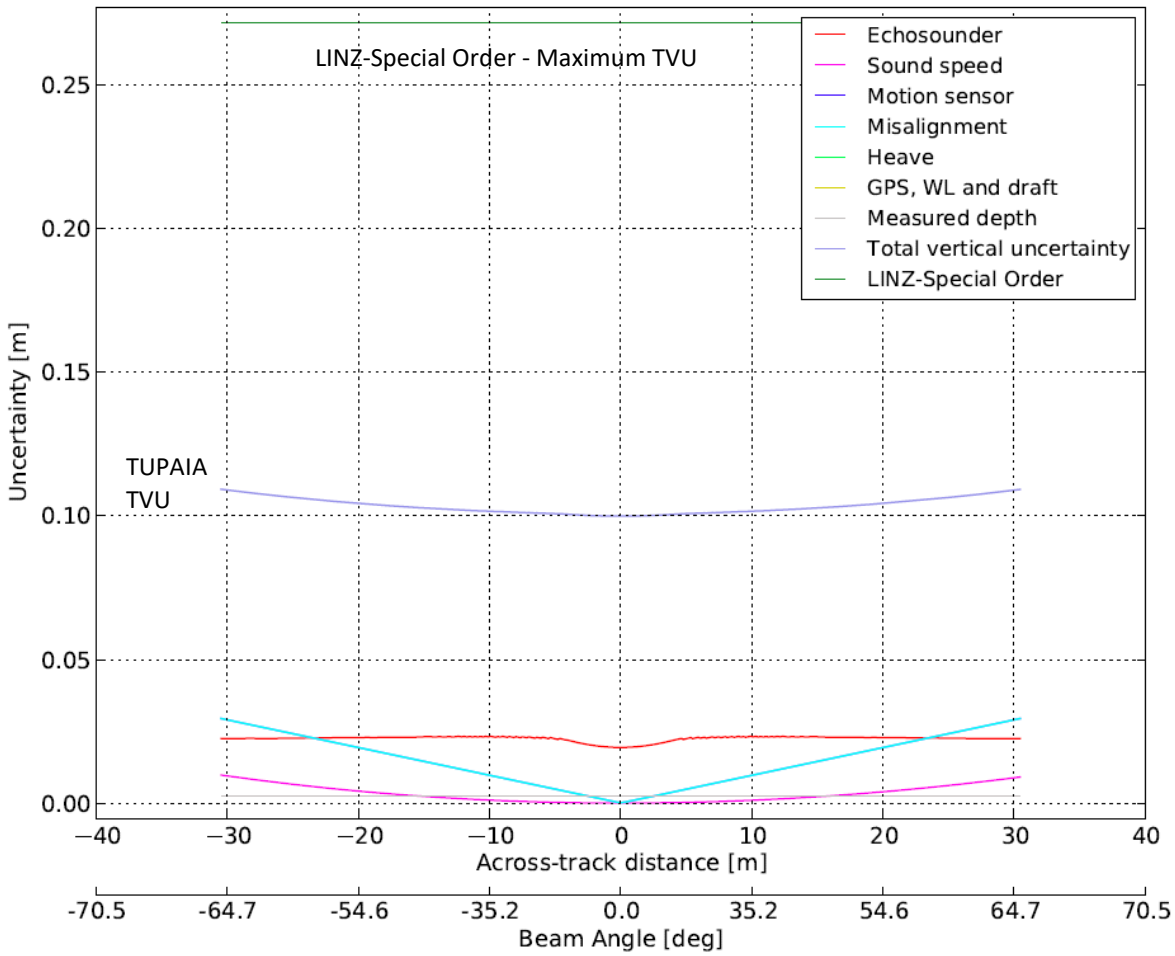


Figure 10: Vertical Uncertainty - A Posteriori TPU

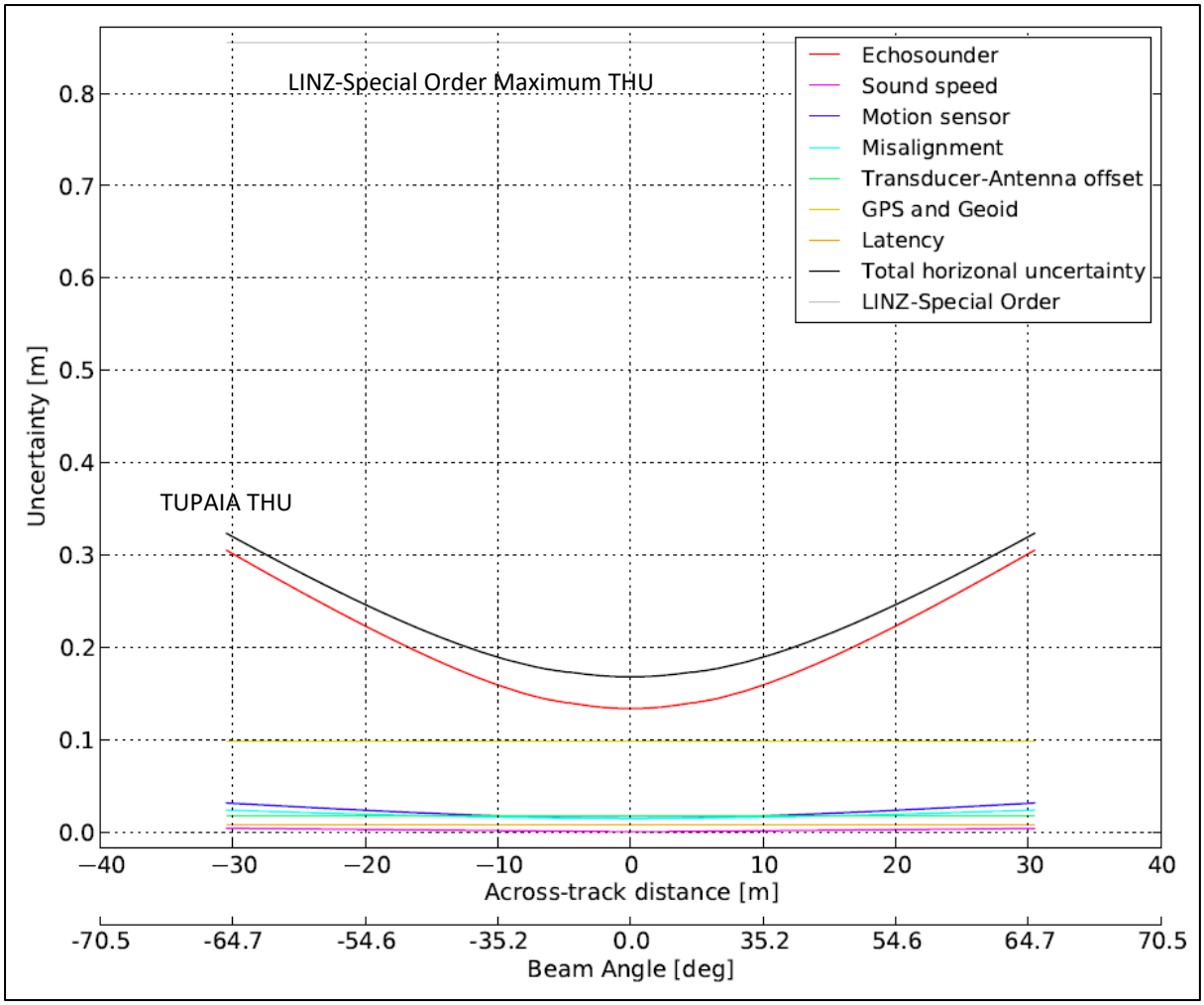


Figure 11: Horizontal Uncertainty - A Posteriori TPU

10.COMMENTS & RESULTS

The MBES bathymetric survey completed the application area, control area and six bathymetric transects within specification.

The seabed in the application area is generally shoaling from east to west and shows evidence of low-lying abstract features. The low-lying features are defined by sharp vertical change to the seabed bathymetry and can be seen in the backscatter mosaic.

The backscatter mosaic delivered alongside this report (and shown at Figure 12) depicts the spatial organisation of seafloor areas with common acoustic response. The backscatter mosaic does not provide a direct measurement tool for seabed characteristics, and hence the backscatter cannot directly provide an objective information about the seabed. However, it does provide visual indication of relative scale of change to the backscatter response across a general area. The mosaic can be ground truthed through physical sampling of the seabed (sediment cores or grabs) and assessed visually through camera or video techniques.

The lighter areas in the mosaic (higher backscatter response level) could indicate areas of larger particle grain size, higher density (highly consolidated) or seabed roughness. The darker areas (lower backscatter response) could be particles of a smaller grain size, lower density (loosely consolidated). A real-world example would suggest higher backscatter response from a coarse sand and lower backscatter response from mud.

Figure 12 below shows the bathymetry and backscatter in the application area.

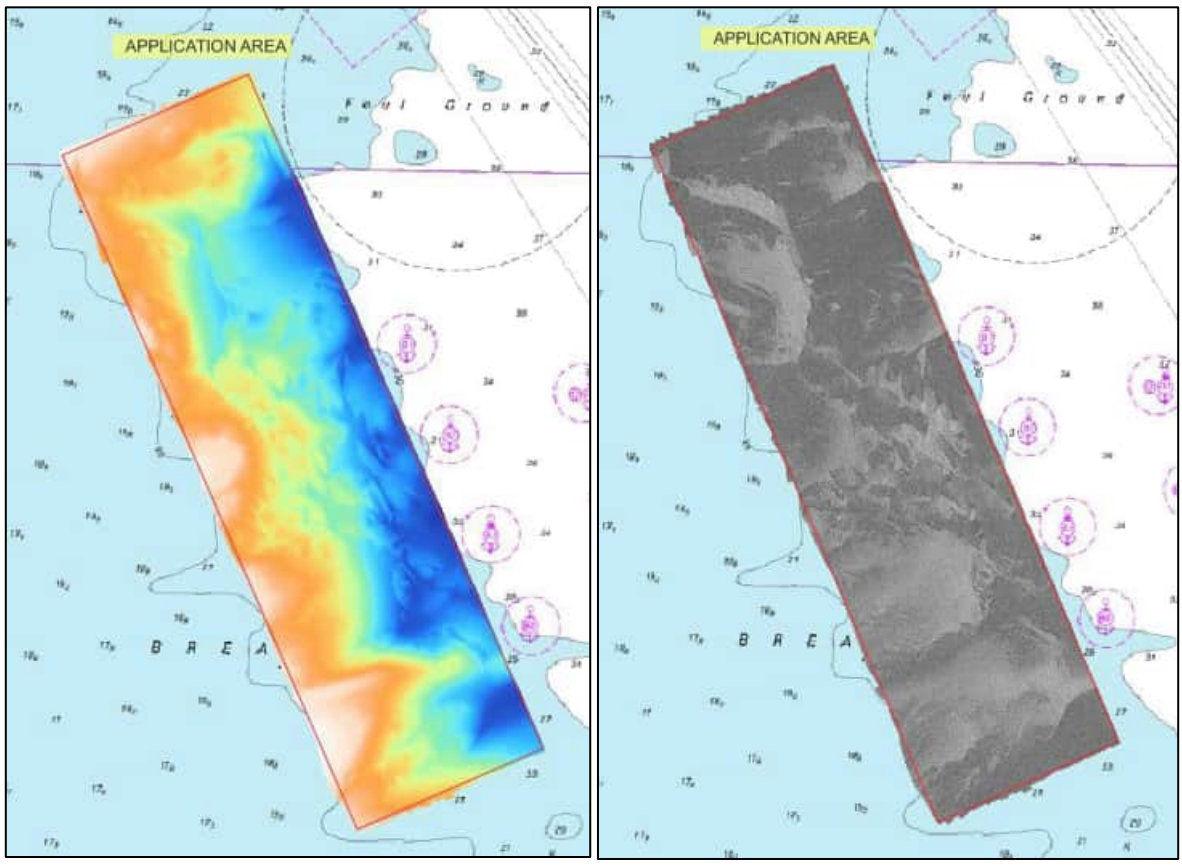


Figure 12: Application area displaying the bathymetry on the left and backscatter data on the right

The seabed in the control area shoals on a gentle slope towards the west and shore. The seabed appears to be relatively homogeneous displaying no significant seabed features. (see Figure 13).

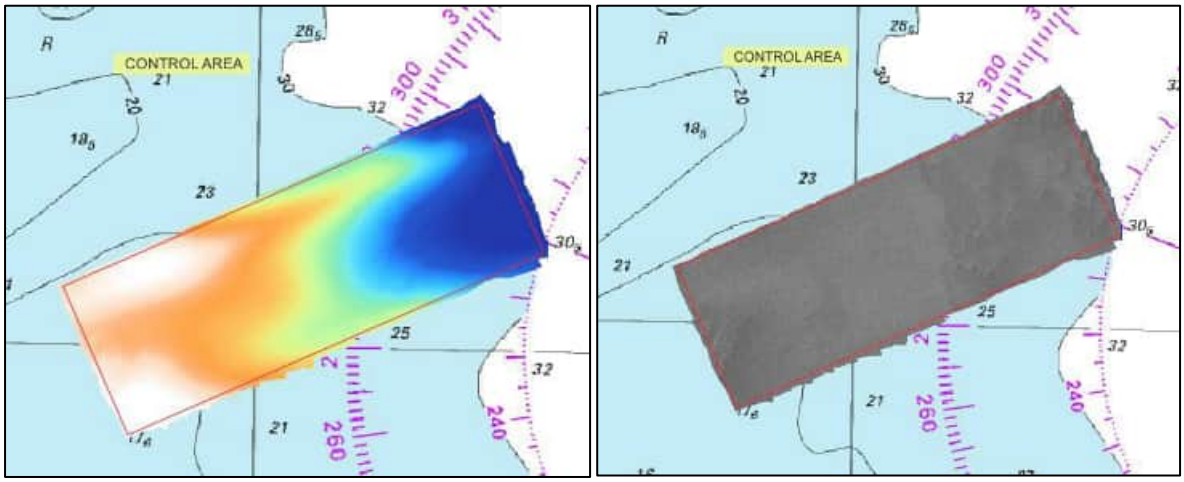


Figure 13: Control area displaying the bathymetry on the left and backscatter data on the right

11.DELIVERABLES

The table below contain the deliverables and naming convention. Area names have been shortened to reduce the file name characters:

- Application area: APPL
- Control Area: CONT
- Transects: TRAN

Table 7: Deliverables List

XYZ
2422_BATHY_CONT_1M_AVE_NZGD2000_CD_REV1.xyz
2422_BATHY_APPL_1M_AVE_NZGD2000_CD_REV1.xyz
2422_BATHY_TRAN_1M_AVE_NZGD2000_CD_REV1.xyz
2422_BATHY_TRAN_1M_AVE_NZGD2000_CD_REV2.xyz
2422_BATHY_CONT_1M_AVE_NZGD2000_NZVD16_REV1.xyz
2422_BATHY_APPL_1M_AVE_NZGD2000_NZVD16_REV1.xyz
2422_BATHY_TRAN_1M_AVE_NZGD2000_NZVD16_REV1.xyz
2422_BATHY_TRAN_1M_AVE_NZGD2000_NZVD16_REV2.xyz
TIFS
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2422_BATHY_APPL_1M_AVE_NZGD2000_CD_REV1.tif
2422_BS_CONT_1M_AVE_NZGD2000_CD_REV1.tif
2422_BS_APPL_1M_AVE_NZGD2000_CD_REV1.tif
2422_BATHY_TRAN_1M_AVE_NZGD2000_CD_REV2.tif
2422_BS_TRAN_1M_AVE_NZGD2000_CD_REV2.tif
Plans
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2422_BS_APPL_A3_REV1.pdf
2422_BS_CONT_A3_REV1.pdf
2422_BATHY_TRAN1-3_A1_REV1.pdf
2422_BATHY_TRAN4-7_A1_REV1.pdf

12.RETENTION OF DATA

DML will retain copies of the project deliverables, including source data files, on its servers for a period of 12 months from completion of the project. The data will then be archived to a digital medium and retained for 7 years. After the initial 12-month period client requests to access and supply project data will incur a fee.

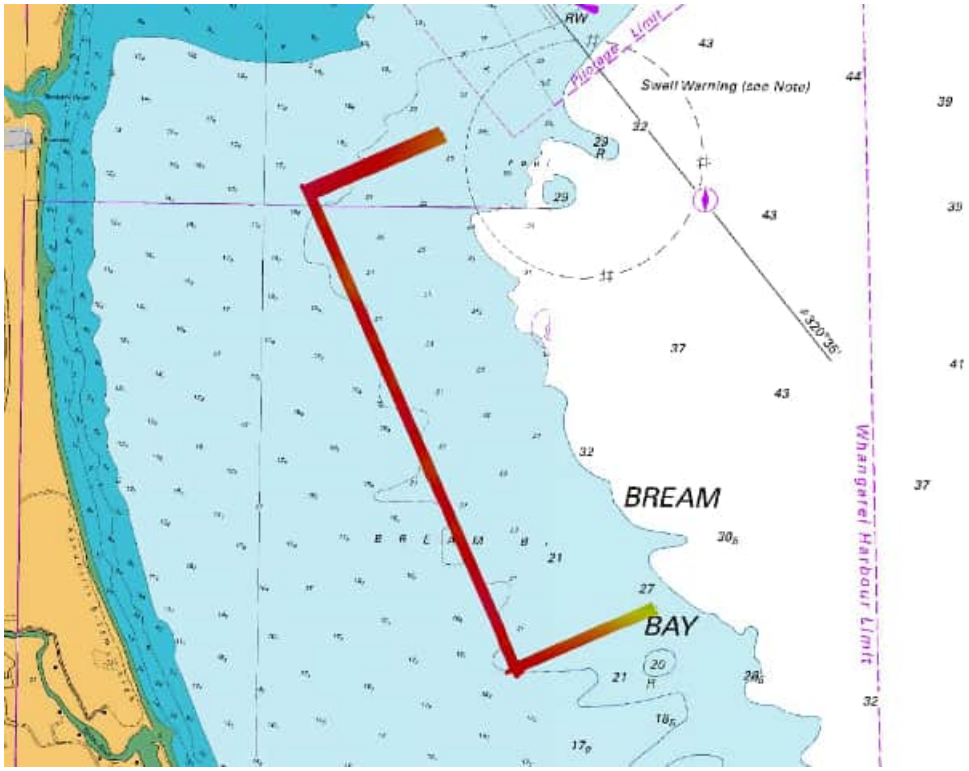
DML wishes to thank McCallum Bros. Ltd for the opportunity to undertake this project and looks forward to working with McCallum Bros. Ltd again in the future.

APPENDIX A – METADATA

Survey Company	Discovery Marine Ltd		
Project Name	Bream Bay Bathymetric survey		
Project Number	2422		
Location	Bream Bay, New Zealand		
Client	McCallum Bros. Ltd		
Contract Number	-		
Survey Start Date	02/04/2024	Survey End Date	08/04/2024/ 13/05/2024
Surveyor In Charge	ORO		
Field Personnel	ORO, AMC, JMD,BJ		
Office Personnel	ORO		
Horizontal Datum and Projection Vertical Datum	NZGD2000 – EPSG 2193 NZVD2016 – Offset to Chart Datum 1.746m		
Sea Level Reduction	N/A	Tide Stations:	N/A
Origin of Coordinates and Levels	PPK Network solution from CORS reference stations WHNG, AUCK, WARK, CORM. Survey referenced utilising ellipsoid to NZVD20216 separation model.		
Survey Vessel	TUPAIA		
Positioning System Sonar System Sonar System Freq.	POSMV + MarineSTAR G4+ real-time PPP. Post processed POSPAC IAPPK Teledyne Reson T50 R MBES 300kHz Fixed Frequency		
Acquisition Software Processing and Delivery Software	Qinsy v9.6.1 POSPac MMS 9.0, Qimera v2.6.2		
Data Collected	Bathymetry		
Coverage Achieved	Full seafloor		
Accuracy Standard Achieved	Yes		
Bathymetric Gridded Surface Method	Average surface		
Gridded Surface Resolution	1m x 1m		
Seafloor backscatter file type	GSF, processed to 0.5m x 0.5m grid resolution mosaic.		
File Format	GTIFF		
Data Custodian Contact Details	DML		

REPORT OF SURVEY

Bream Bay Extension Area



REPORT PREPARED FOR:

McCALLUM BROS LTD
Established 1904

REPORT PREPARED BY:

DML
DISCOVERY MARINE LTD

Surveyed by:	Discovery Marine Ltd.
Surveyor in Charge:	Dillon Shields, MS+SNZ, CPHS2
Survey dates:	10 December 2024 – 13 December 2024
Report date:	21 February 2025
Report version:	1.0

REPORT OF SURVEY – BREAM BAY APPLICATION AREA - EXTENSION

1. EXECUTIVE SUMMARY

Discovery Marine Ltd (DML) was contracted by McCallum Brothers to conduct a bathymetric survey of the seabed at the Extension area located off Bream Bay, Northland, New Zealand. The purpose of the survey was to cover an extension area to be added to the original dataset collected in April 2024. The location and extent of the survey area is shown in Figure 1.

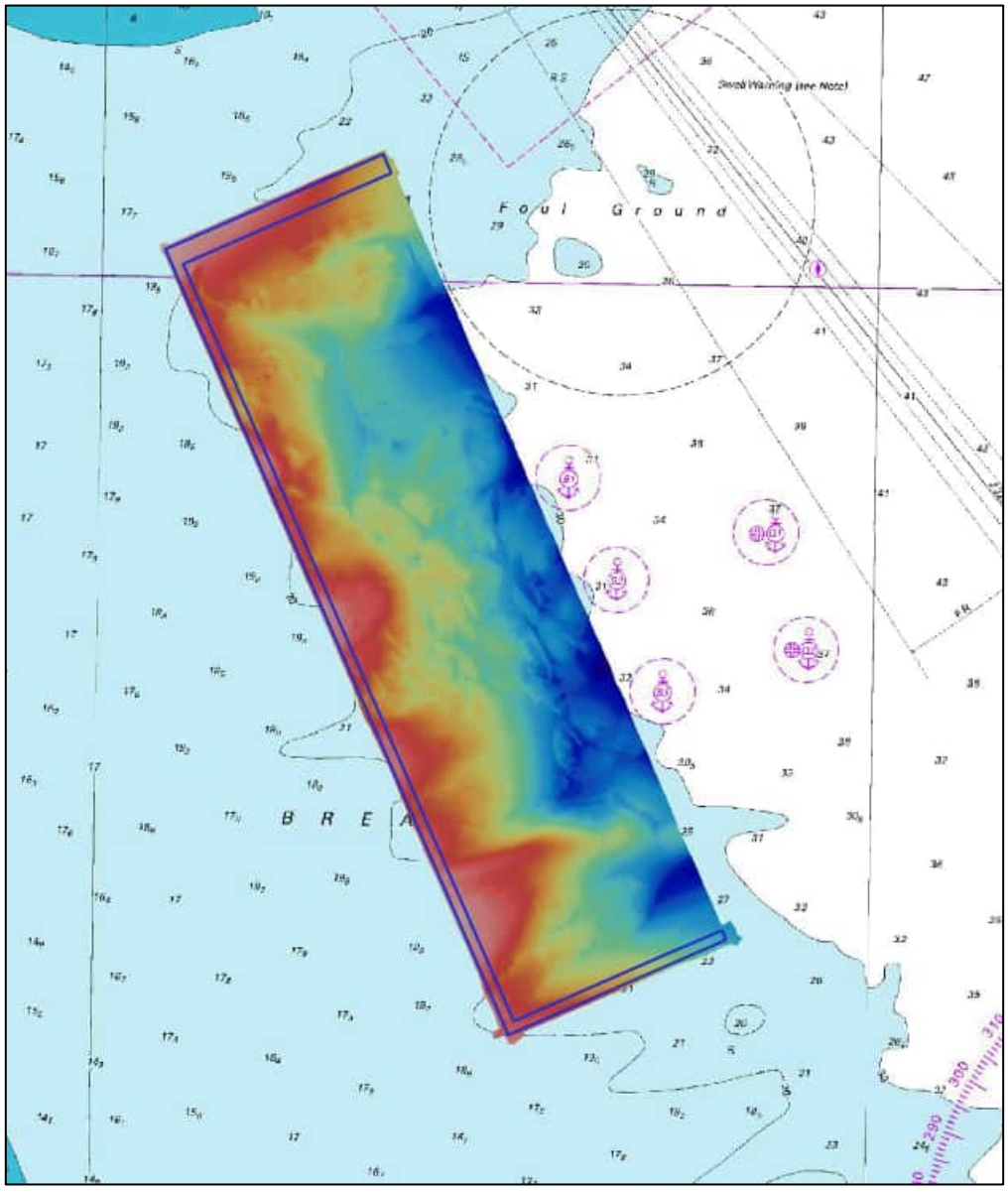


Figure 1: Survey Area

Vessel setup and calibration was conducted in Tauranga between 31 October - 06 November 2024 during mobilisation for LINZ Hydrographic Survey HS79. A copy of the Mobilisation Report for this project can be provided if requested. *TRANQUIL IMAGE* was onsite conducting survey operations between 11 – 13 December 2024. Data post processing and reporting was completed at DML's office in Tauranga between January 13 – February 19, 2025.

The survey coverage achieved is shown in Figure 2.

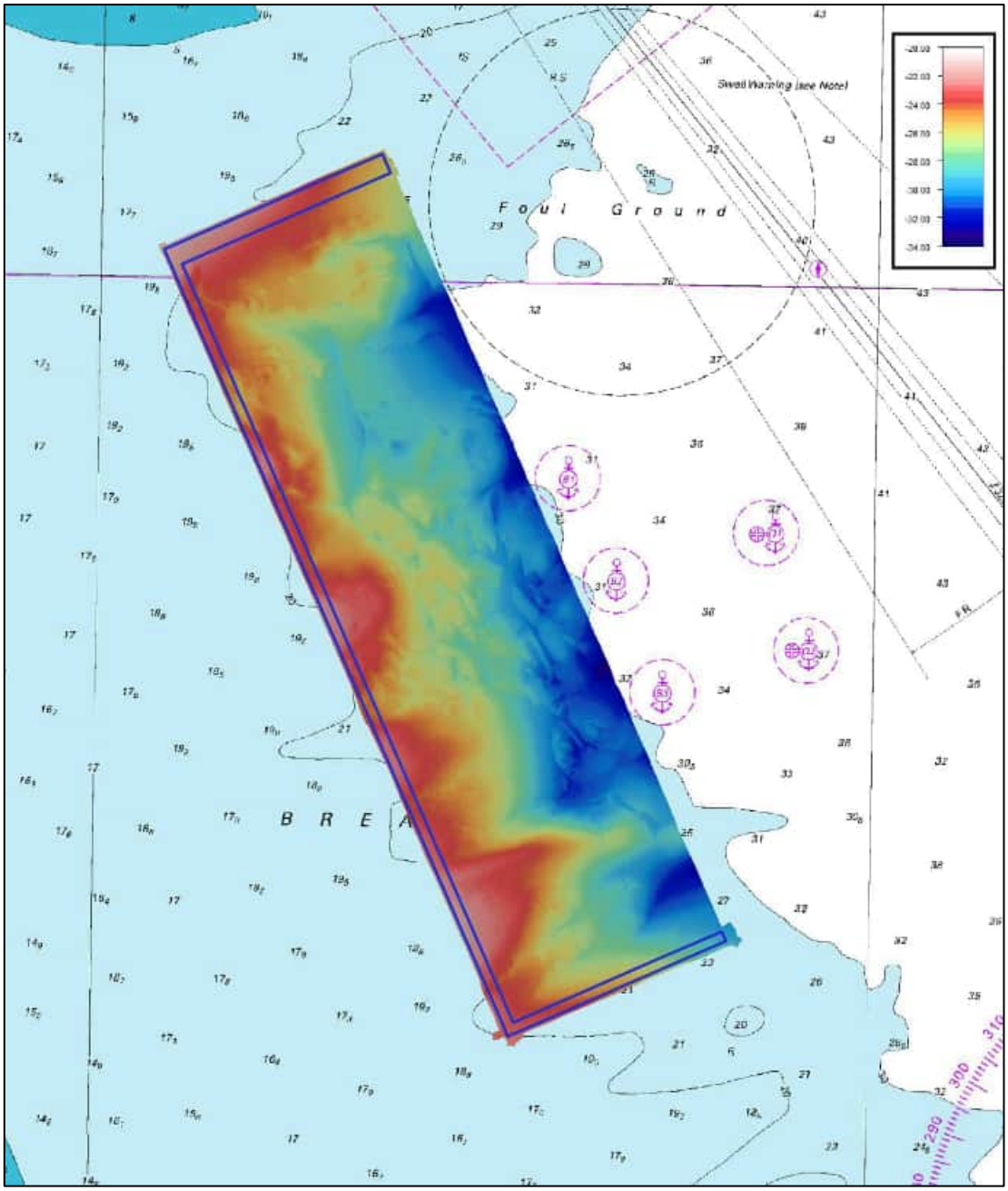


Figure 2: Survey Coverage Bream Bay Application Extension 2024

The Survey was undertaken in accordance with the Maritime New Zealand "Good practice guidelines for Hydrographic Surveys in Ports and Harbours" as well as the hydrographic survey principles and standards outlined in LINZ HYSPEC V 2.0. Weblinks to the two specification guideline docs are provided below.

https://www.maritimenz.govt.nz/commercial/ports-and-harbours/documents/Hydrographic-surveys-guidelines.pdf

https://www.linz.govt.nz/sea/charts/standards-and-technical-specifications-for-our-chart-and-hydrographic-work

2. WEATHER & SEA CONDITIONS

The survey was completed under favourable weather conditions. Light winds and a calm sea with little swell were experienced on arrival at site and throughout the duration of the survey.

The tidal range between high water and low water over the survey period averaged 1.7m.

Weather and sea conditions experienced did not affect the overall quality of the final survey data.

3. SURVEY VESSEL AND EQUIPMENT

This survey was undertaken using the survey vessel *TRANQUIL IMAGE*, a 24m workboat owned by Western Workboats and operated in accordance with Maritime New Zealand Operator Safety System (MOSS).

Figure 3: Western Workboats Survey Vessel – *TRANQUIL IMAGE*

The vessel was fitted with a modern survey suite comprising a high accuracy POS MV Wavemaster II positioning and inertial motion system and high-resolution, Reson SEABAT T50 Multibeam Echosounder (MBES). The Inertial Motion Unit (IMU) and MBES were mounted on an over the side pole mount as shown in Figure 4.

Figure 4: MBES Sonar and Motion unit (left) and over the side mount (right)

All data was logged into the QINSY hydrographic acquisition and navigation software package (v9.7.2).

The survey equipment used is listed in Table 1

Table 1: Hydrographic Survey System Equipment

EQUIPMENT	MAKE / MODEL /TECHNICAL SETTINGS
Vessel GNSS / Motion compensation system	**Applanix POS MV Wavemaster II**
	Integrated Fugro MarineSTAR G4+ real-time Precise Point Positioning (PPP). 0.15m 3D accuracy)
	Inertial aided post processed kinematic (IAPPK) positioning applied during post processing.
	Motion data rate: 100Hz
Multibeam Echo Sounder	**Teledyne RESON SeaBat T50 R Multibeam Echo Sounder**
	Operating Frequency: 300khz
	Operating Depth Range: 2m -500m
	Maximum Swathe Angle: Limited to 120° for this survey
	Beam Forming: 800 beams, 1.5° beam width at 300khz.
	Mode: Equidistant Sounding Spacing
	Roll Stabilisation: Real-time
	Depth Resolution: 6mm
Speed of sound sensor	**AML -3 LGR SVPT (Sound velocity, pressure, temperature sensors)**
	Resolution: 0.001m/s
	Precision: 0.006m/s

4. SURVEY CONTROL

4.1 HORIZONTAL DATUM

The survey was completed on the **NZGD2000 Datum, Transverse Mercator projection** (NZTM2000, EPSG:2193).

4.2 VERTICAL DATUM

Results for the survey are provided as **depths below New Zealand Vertical Datum 2016 (NZVD2016).**

Depths were reduced from the GRS80 ellipsoid to NZVD2016 using the NZGeoid2016 Geoid separation model applied in the Qimera processing software.

NZVD2016 is an approximate Mean Sea Level Datum. Noting that previous surveys in the area have been reduced to Chart Datum, it should be noted that Chart Datum (CD) is approximately 1.746m below NZVD2016. Therefore, a value of 1.74m needs to be deducted from NZVD2016 depths to refer them to Chart Datum. A summary of levels diagram is displayed for the Marsden Point Tide Station in Figure 5.

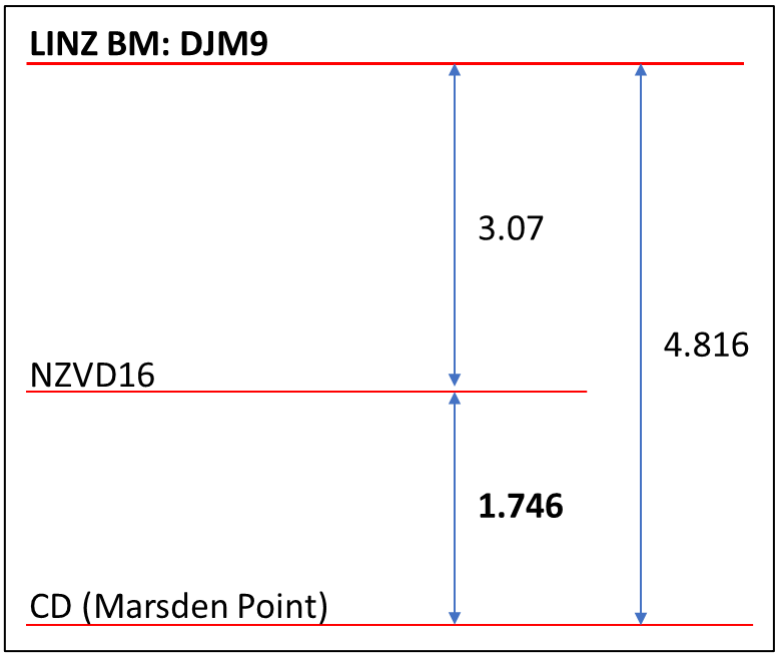


Figure 5: Marsden Point Chart Datum Summary of Levels

4.3 CONNECTION TO DATUM

POSPAC 'Smart Base' Inertial Aided Post Processed Kinematic Positioning (IAPPK), Smoothed Best Estimate of Trajectory (SBET). The coordinates of the LINZ Continuously Operating Reference Stations (CORS) used in the calculation are in shown in Table 2

Table 2: LINZ CORS Station Coordinates

LINZ CORS Station	Latitude (DD MM SS.sssss)	Longitude (DD MM SS.sssss)	Ellipsoid Height (m)
AUCK	S36°36'10.24053"	E174°50'03.78754"	132.691
WARK	S36°26'03.89157"	E174°39'46.00553"	111.282
WHNG	S35°48'13.57790"	E174°18'52.43924"	172.781

5. SURVEY STANDARD

The survey was required to meet the LINZ-1 order of survey standard. Details of LINZ-1 can be found in the LINZ HYSPEC 2.0. LINZ-1 is considered appropriate for the location of the survey area, the operational environment and the required outputs.

6. CONDUCT OF SURVEY

6.1 PRE-DEPLOYMENT CALIBRATIONS

TRANQUIL IMAGE has been permanently mobilised for DML's use since November 2024. Calibrations and vessel checks conducted for the original vessel mobilisation consisted of the following.

- Dimensional Control Survey,
- GAMS/Heading test,
- MBES Patch test,
- Draught checks (Bar check and Lead Line check),
- Settlement and Squat trials,
- Target Detection/Object Box In check,
- Positioning/height check against a known LINZ BM ashore,
- MBES Reference surface was surveyed at DML/Ocean Infinity common reference surface at Motiti Island (Results compared against previous surveys).

6.2 FIELD SURVEY METHODOLOGY

TRANQUIL IMAGE departed Tauranga Harbour at 11:00 10 December 2024, arriving onsite at Pakiri Beach at 22:15 on 10th December. After initial field calibrations and system tests, mainline sounding commenced at 00:15 on 11th December and ran continuously until completion at 14:30 on 12 December.

The survey area was systematically mapped running lines parallel to the general contours where practicable. Real-time MBES coverage was generated in Qinsy data acquisition software and displayed for the helmsman, allowing lines to be run based directly off the previous line's swath edge (maintaining at least 25% overlap between adjacent swaths). Survey vessel speed was maintained at approximately 6.5 – 7.0kts.

Sound velocity profiles were conducted regularly throughout the survey to account for any geographical or temporal variations of the speed of sound through the water column. The profiles only fluctuated by minor amounts of 2 to 3 m/s.

Data quality was observed in real time and rejection criteria for horizontal position data and depth logging were established to cease data logging if data fell below these standards.

6.3 ON SITE VERIFICATION AND ACCURACY CHECKS

A Common reference surface exists at the Southern extent of the Pakiri site, located at 399367mE, 872241mN, measuring approximately 325m x 325m with an average depth of 36m. The reference surface was resurveyed to compare against the November 2023 survey and verification lines were run over the reference surface in a dynamic motion to check for any systematic errors and as a vertical reference check (see Figure 6). The reference surface comparison results are presented in Section 7 below. Although the reference surface is not located near the Bream Bay survey area it provides a check between systems used and confirmation of correct height application.

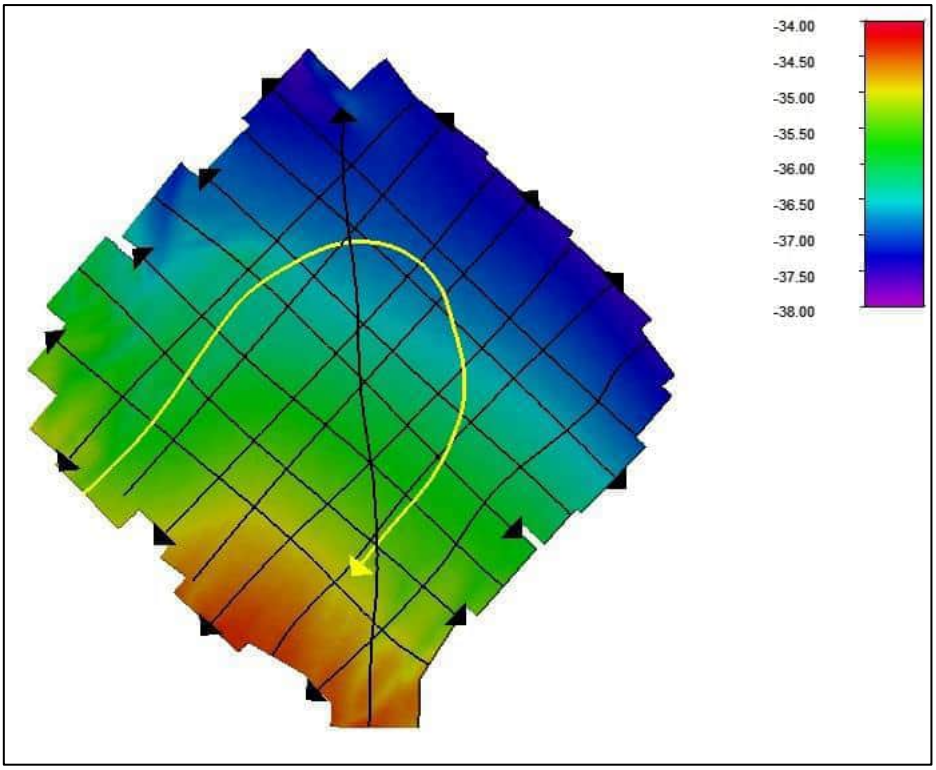


Figure 6: 2024 Reference Surface and Verification Track-lines

A MBES Patch Test was conducted during mobilisation prior to being onsite to determine any angular MBES mounting errors. Multiple sets of reciprocal survey lines were run perpendicular to a prominent feature. Reciprocal lines over the feature were used for pitch calibration, offset lines in the same direction over the feature were utilised for yaw calibration. While onsite, reciprocal lines over flat featureless seabed adjacent to the survey area were utilised for a roll calibration.

A total of 3 MBES crosslines were run perpendicular to the main sounding lines spread evenly across the survey area to provide a check on vertical height application and data integrity. A summary of the crossline statistical analysis is provided in

Table 5. All crosslines passed the test for bathymetric data repeatability within LINZ Special Order limits.

7. DATA POST PROCESSING

Vessel positioning data was post processed by a method known as Inertial Aided Post Processed Kinematic Positioning (IAPPK). The IAPPK processing was completed using Applanix POSPac MMS 9.2 software. The software utilises real time recorded GNSS positioning, inertial motion, and heave measurements and post processes them using finalised satellite orbits and a network of continuously operating GNSS reference stations (CORS).

The CORS stations utilised in the PPK solution for the survey were Whangarei (WHNG), Warkworth (WARK), Auckland (AUCK) and Coromandel (CORM), depicted in Figure 7. Positional accuracies achieved by this method are in the order of 5cm 3D. Total survey uncertainty is discussed further in Section 10.

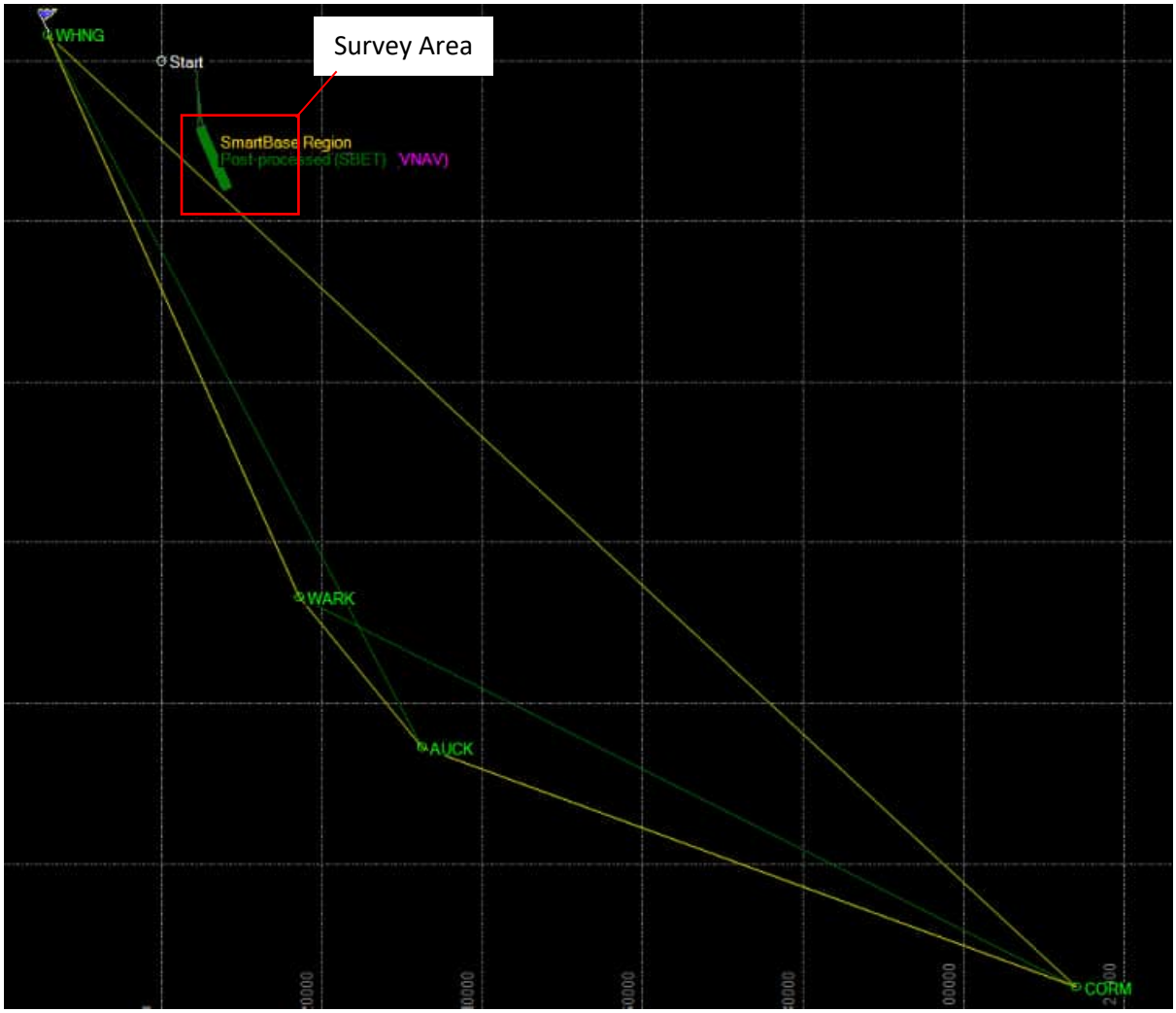


Figure 7: Post Processed Positioning Network

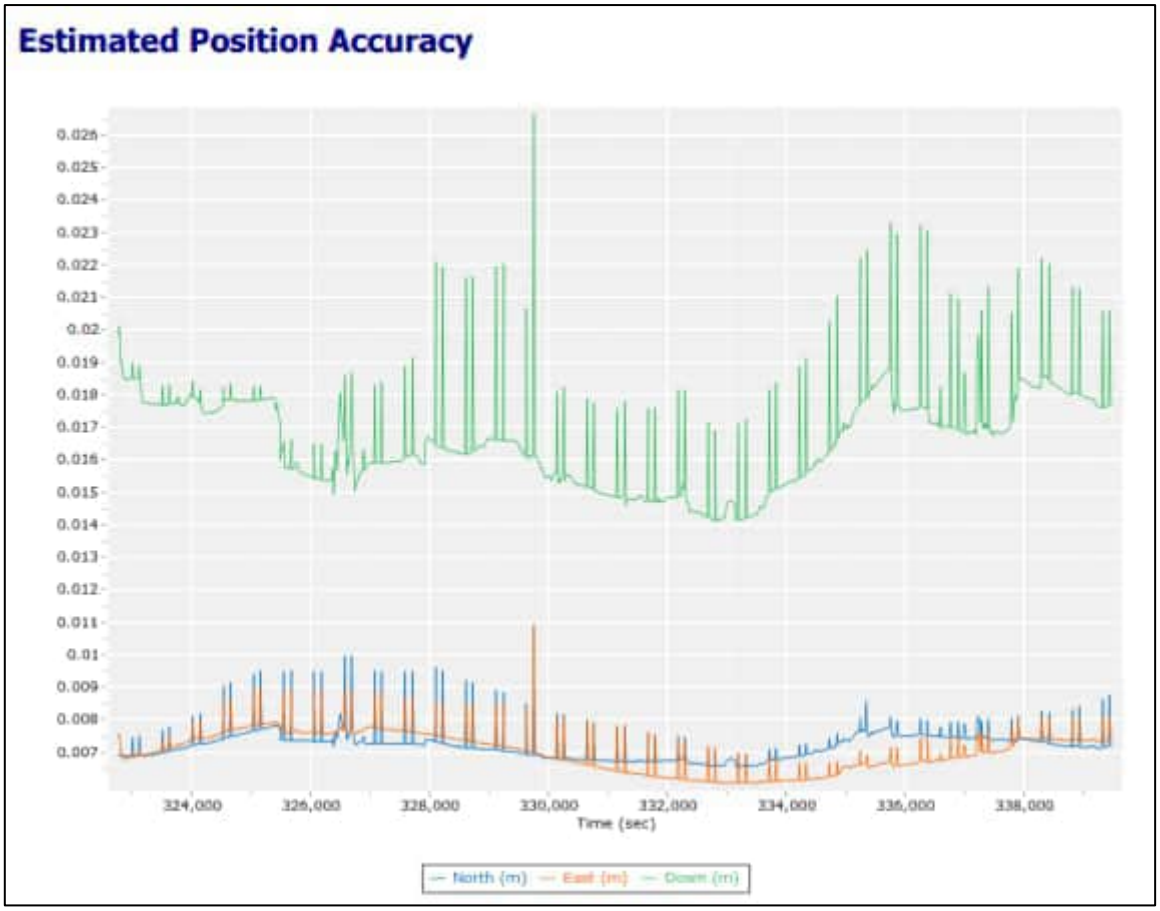


Figure 8: IAPPK Post Processed Positioning Estimated Position Accuracy – Bream Bay

Bathymetric data has been processed and validated using Qimera v2.7.1. The final processed MBES bathymetry dataset has been supplied as a 1m x 1m cell resolution average seafloor surface.

8. QUALITY CHECKS AND ADJUSTMENTS

Once data processing was complete, the bathymetric surface were compared to the previous survey of the area in April 2024. Results of the comparisons show good agreement at the decimetre level.

The reference surface verification lines and crossline results were then examined and all meet specification with excellent standard deviation results at 95% Confidence Interval (2σ Std. Dev.). Results of the reference surface and crossline comparisons are displayed in Table 3 to Table 5 below.

Results are compared to the higher LINZ-Special order of survey (LINZ HYSPEC 2.0) due to the final survey methodology achieving much better than LINZ-1 order final uncertainties.

Table 3: Surface Comparisons - Tranquil Image 2023 vs Tranquil Image 2024

Area	Mean Diff. between Surfaces (m)	Std. Deviation	Max Difference (Range) (m)	LINZ Special Order TVU Error Limit	Error Limit PASS or FAIL
Pakiri Reference Surface Tranquil Image Nov. 2022 vs TI Dec. 2024	0.01	0.03	-0.21 to 0.12	0.37	PASS
Southern Control Area	0.12	0.06	-0.06 to 0.36	0.37	PASS

Tranquil Image Nov. 2023 vs TI Dec. 2024					

Table 4: Reference Surface Verification Line

Line	Reference Surface mean depth	Mean Diff. from main bathy Surface	Std. Dev. (Verification line to Surface)	2σ Std. Dev. (Verification line to Surface)	Difference to Bathy Surface (Range) (m)	LINZ Special Order TVU Error Limit	Error Limit PASS or FAIL
U-turn	-36.14	0.00	0.01	0.05	-0.12 to 0.11	0.37	PASS

Table 5: Crossline Statistics

Line	Bathy Surface mean depth	Mean Diff. from main bathy Surface	Std. Dev. (X-line to Surface)	2σ Std. Dev. (X-line to Surface)	Difference to Bathy Surface - Range	LINZ Special Order TVU Error Limit	Error Limit PASS or FAIL
Xline 1	-22.81	0.00	0.01	0.02	-0.24 to 0.12	0.30	PASS
Xline 2	-25.14	0.00	0.01	0.02	-0.09 to 0.07	0.31	PASS
Xline 3	-23.01	0.00	0.00	0.01	-0.07 to 0.09	0.30	PASS

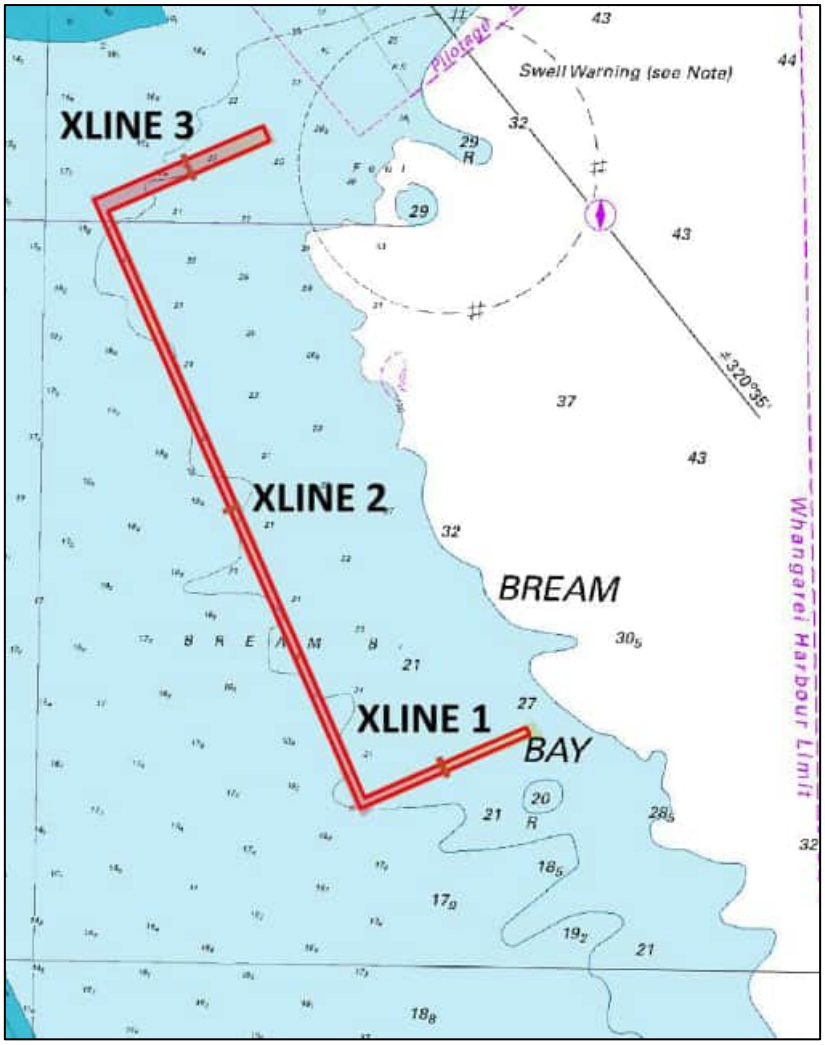


Figure 9: Crossline Locations

9. DIFFICULTIES ENCOUNTERED

The survey was completed without any major interruptions or difficulties.

10.TOTAL PROPAGATED UNCERTAINTY

Results of the A Priori (pre) Horizontal and Vertical Total Propagated Uncertainties (THU, TVU) are provided in Figure 10 and Figure 11.

The final uncertainty of the MBES bathymetry captured for this survey is assessed as 0.15m at the 95% CI. This is considered the worst case for the entire survey area. Final relative uncertainty between previous surveys is presented at Section 8 and is considered to be more precise at between 0.08m and 0.1m at the 95% CI. The uncertainty value was attained by assessing final systematic, random and environmental error sources combined with cross line and reference surface information.

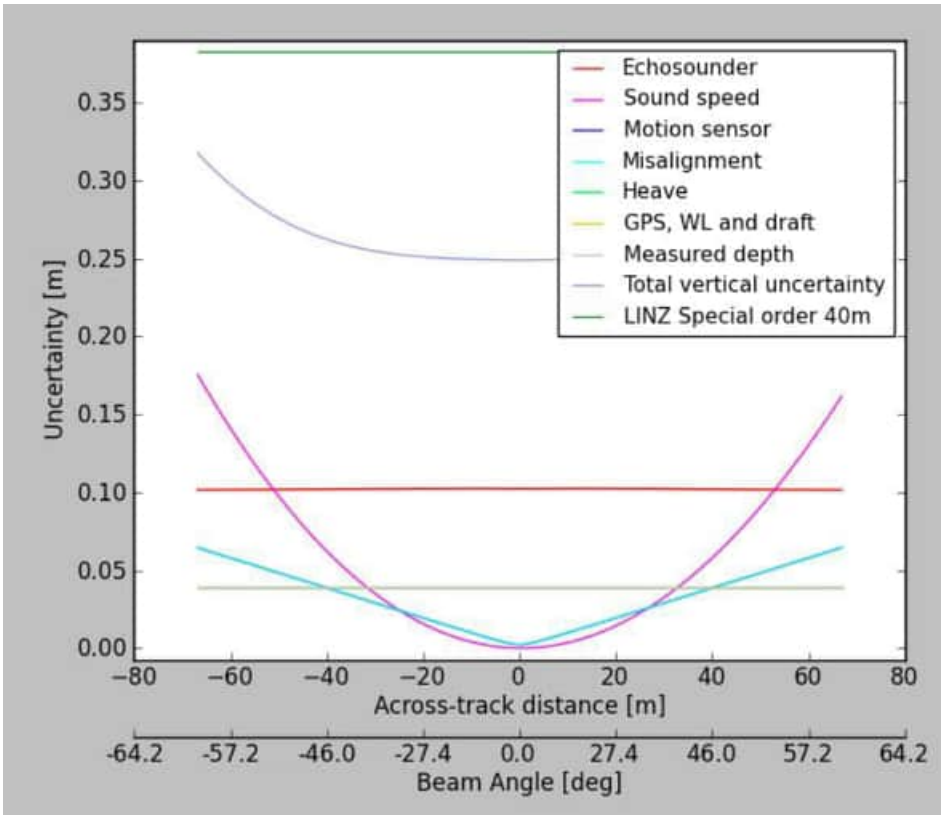


Figure 10: Vertical Uncertainty - A Posteriori TPU

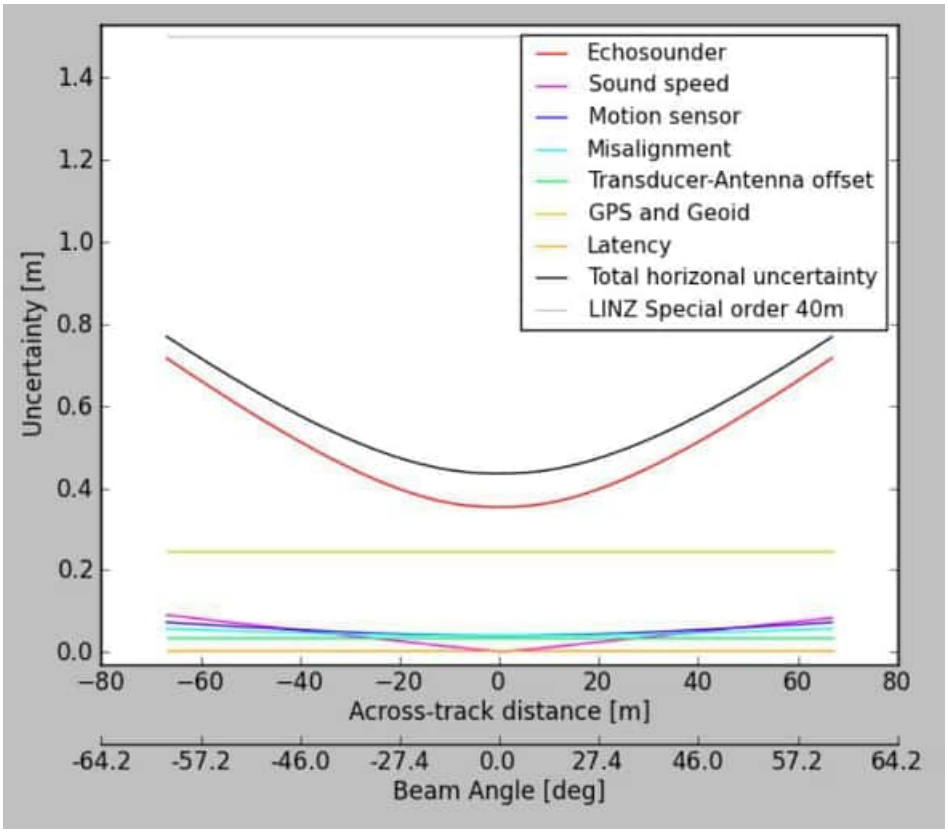


Figure 11: Horizontal Uncertainty - A Posteriori TPU

11.COMMENTS & RESULTS

The MBES bathymetric survey completed all objectives within specification.

As found in previous surveys, the seabed is generally flat with few significant seafloor features. The depth contours gently slope away from the shore.

The backscatter mosaic delivered alongside this report (and shown at Figure 12) depicts the spatial organisation of seafloor areas with common acoustic response. The backscatter mosaic does not provide a direct measurement tool for seabed characteristics, and hence the backscatter cannot directly provide an objective information about the seabed. However, it does provide visual indication of relative scale of change to the backscatter response across a general area. The mosaic can be ground truthed through physical sampling of the seabed (sediment cores or grabs) and assessed visually through camera or video techniques.

The lighter areas in the mosaic (higher backscatter response level) could indicate areas of larger particle grain size, higher density (highly consolidated) or seabed roughness. The darker areas (lower backscatter response) could be particles of a smaller grain size, lower density (loosely consolidated). A real-world example would suggest higher backscatter response from a coarse sand and lower backscatter response from mud.

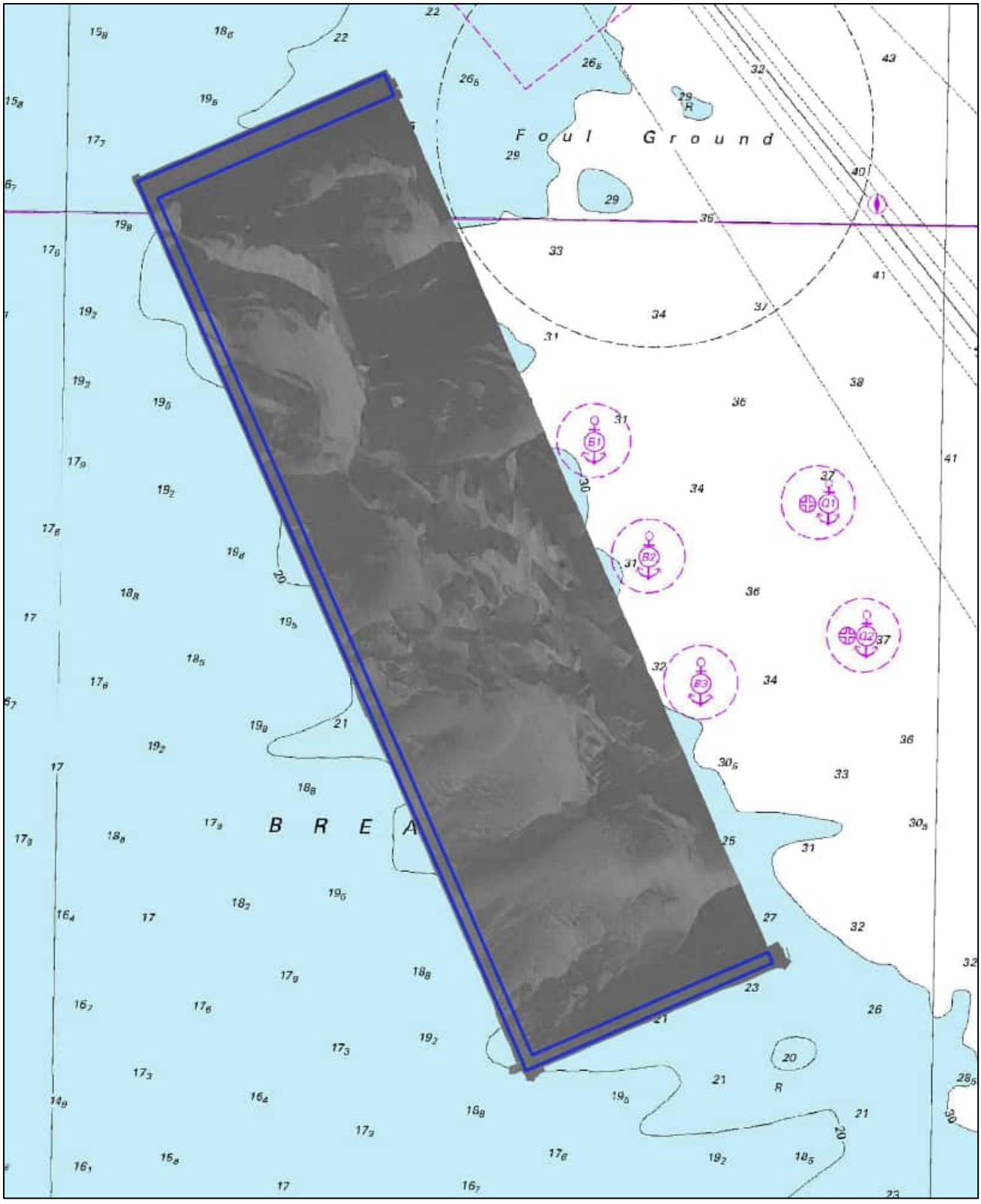


Figure 12: Bream Bay Extension Area Backscatter

12.RETENTION OF DATA

DML will retain copies of the project deliverables, including source data files, on its servers for a period of 12 months from completion of the project. The data will then be archived to a digital medium and retained for 7 years. After the initial 12-month period client requests to access and supply project data will incur a fee.

DML wishes to thank McCallum Bros. Ltd for the opportunity to undertake this project and looks forward to working with McCallum Bros. Ltd again in the future.

For Discovery Marine Ltd

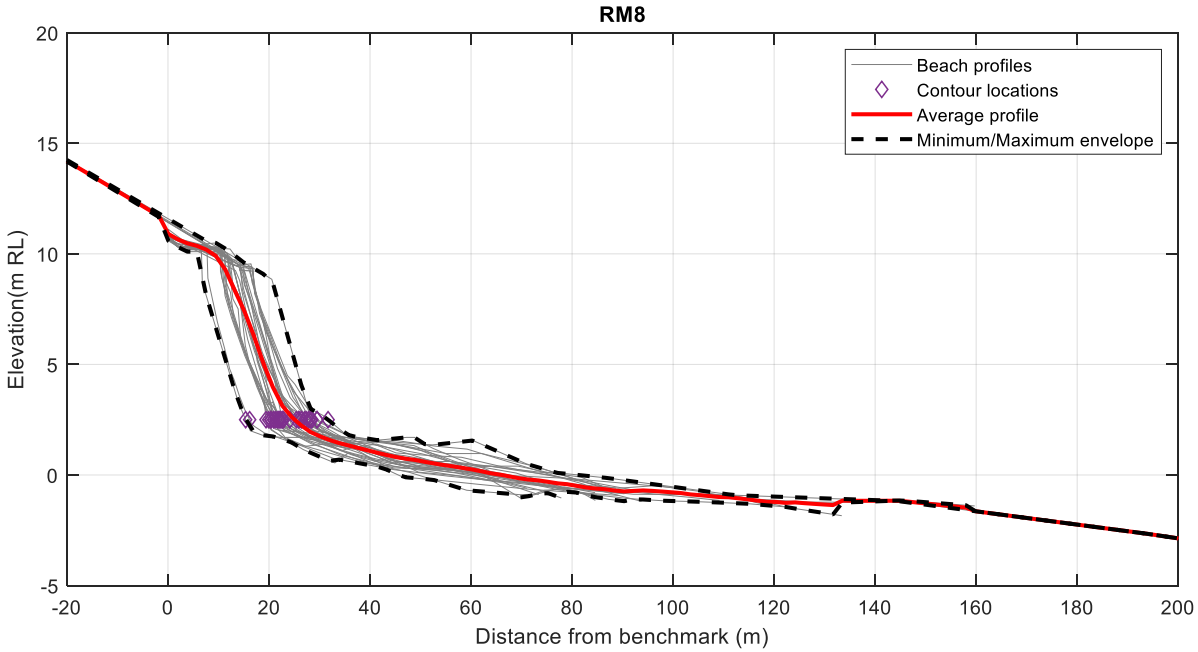
Authored by	[redacted]	Date:20 Feb 2025
	Dillon Shields (CPHS2, MS+SNZ)	
Approved by	[redacted]	Date: 21 Feb 2025
	Declan Stubbing (BSURV, CPHS1)	CEO

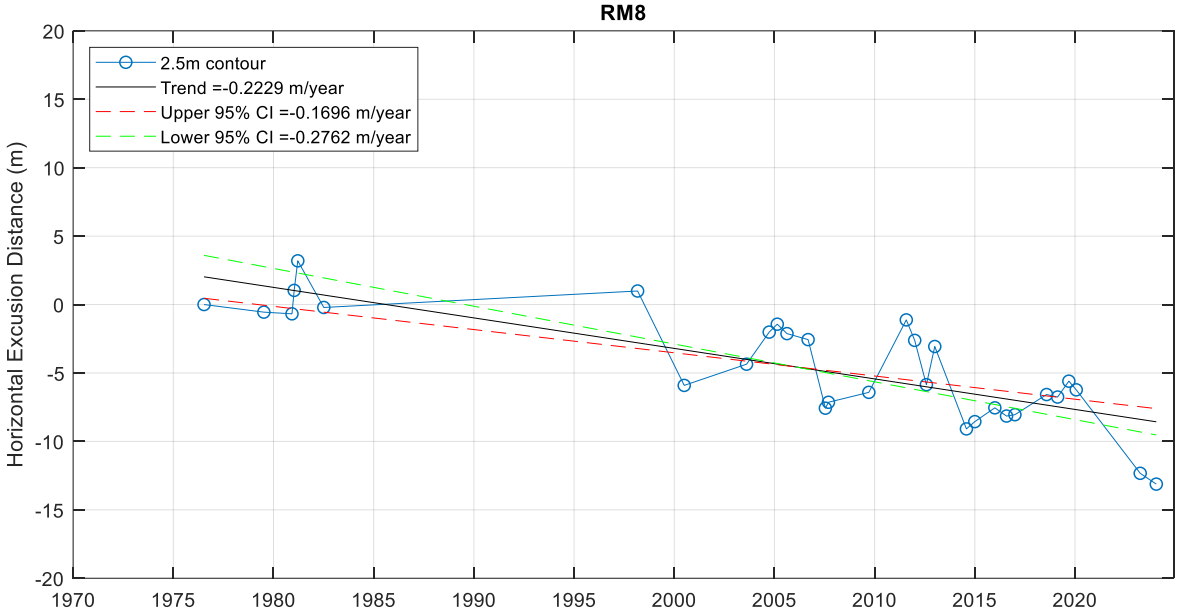
APPENDIX A – METADATA

Survey Company	Discovery Marine Ltd		
Project Name	Bream bay Extension Area		
Project Number	2456		
Location	Bream bay, Northland, New Zealand		
Client	McCallum Bros. Ltd		
Contract Number	-		
Survey Start Date	10/12/2024	Survey End Date	12/12/2024
Surveyor In Charge	DS		
Field Personnel	DS, RN, DH		
Office Personnel	DS, RN, DJS		
Horizontal Datum and Projection Vertical Datum	EDEN2000 NZVD2016		
Sea Level Reduction	N/A	Tide Stations:	N/A
Origin of Coordinates and Levels	PPK Network solution from CORS reference stations WHNG, AUCK, WARK, CORM. Survey referenced utilising ellipsoid to NZVD20216 separation model.		
Survey Vessel	TRANQUIL IMAGE		
Positioning System Sonar System Sonar System Freq.	POSMV + MarineSTAR G4+ real-time PPP. Post processed POSPAC IAPPK Teledyne Reson T50 R MBES 300kHz Fixed Frequency		
Acquisition Software Processing and Delivery Software	Qinsy v9.7.2 POSPac MMS 9.1, Qimera v2.7.1		
Data Collected	Bathymetry		
Coverage Achieved	Full seafloor		
Accuracy Standard Achieved	Yes (LINZ-1, LINZ-Special for TPU)		
Bathymetric Gridded Surface Method	Average surface		
Gridded Surface Resolution	1m x 1m		
Seafloor backscatter file type	GSF, processed to 1m x 1m grid resolution mosaic.		
File Format	GTIFF		
Data Custodian Contact Details	[redacted]		

Appendix C Beach profile data


LEGEND
Profile locations
RM8
RM11
RM13
RM15
RM17
RM22
LOCATION PLAN
A4 SCALE 1:95,000
0 1 2 3 (km)


RM8
Beach profiles
Contour locations
Average profile
Minimum/Maximum envelope
Elevation(m RL)
Distance from benchmark (m)
20
15
10
5
0
-5
-20
0
20
40
60
80
100
120
140
160
180
200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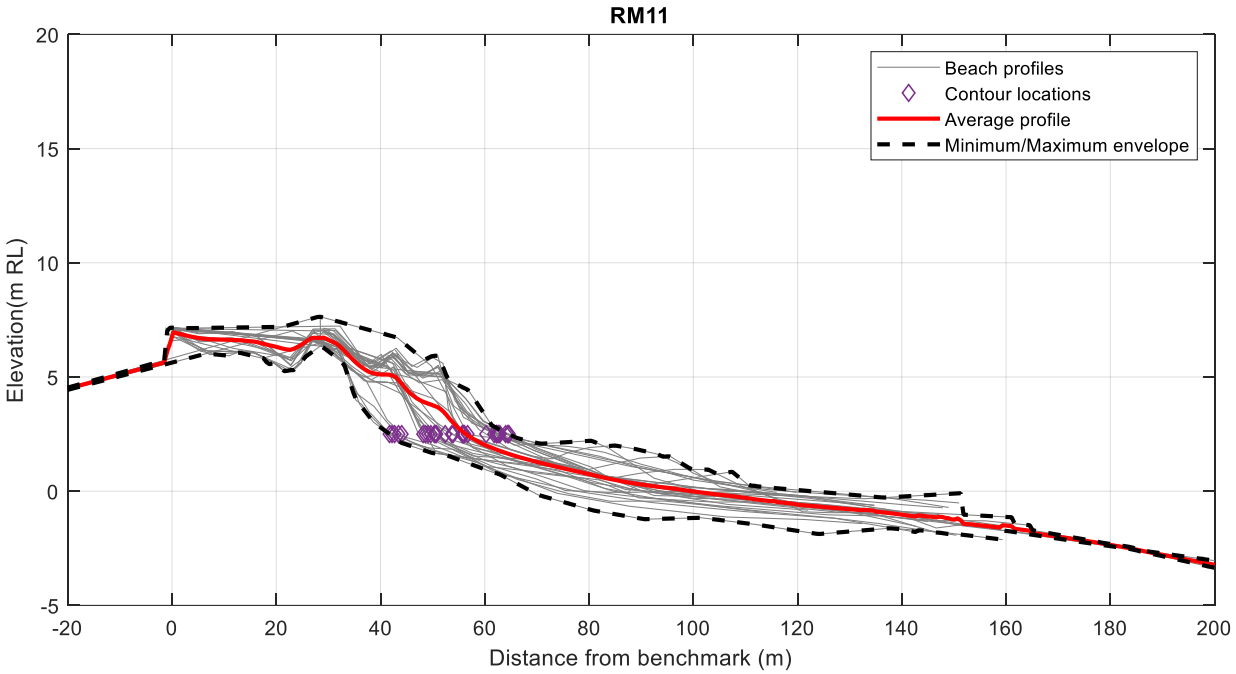
2.5m contour
Trend =-0.2229 m/year
Upper 95% CI =-0.1696 m/year
Lower 95% CI =-0.2762 m/year
Horizontal Excusion Distance (m)
20
15
10
5
0
-5
-10
-15
-20
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020


RM11
Beach profiles
Contour locations
Average profile
Minimum/Maximum envelope
Elevation(m RL)
Distance from benchmark (m)
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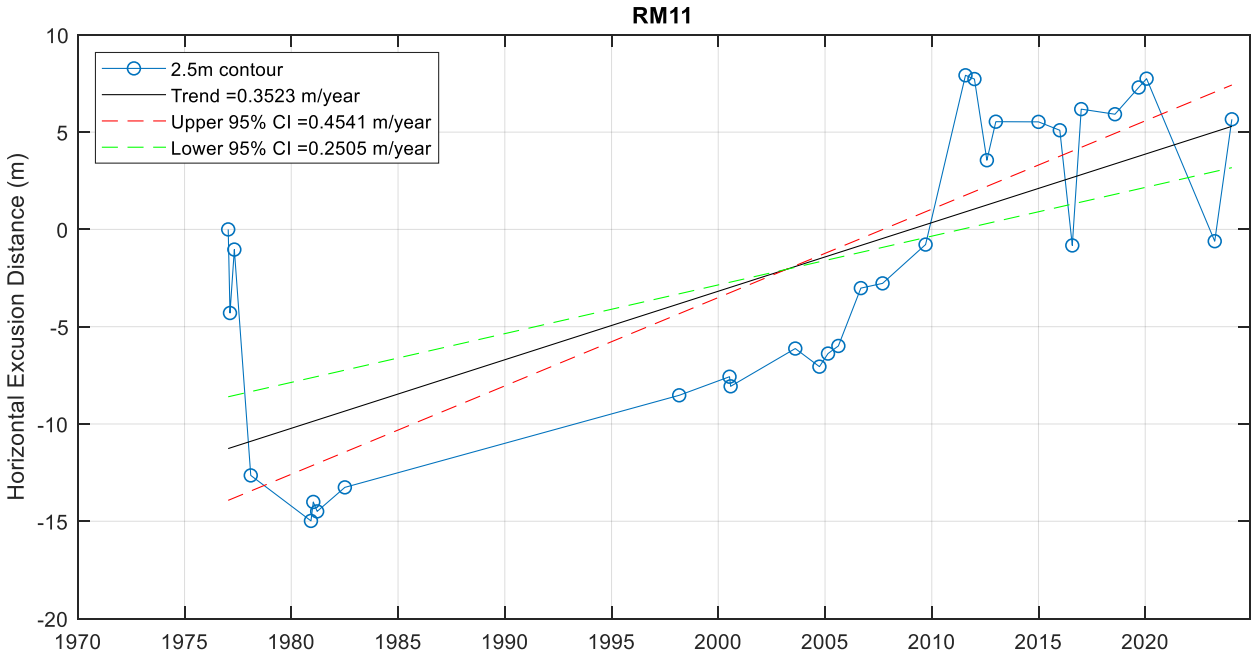
5
0
-5
-20
0
20
40
60
80
100
120
140
160
180
200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Trend =0.3523 m/year
Upper 95% CI =0.4541 m/year
Lower 95% CI =0.2505 m/year
Horizontal Excusion Distance (m)
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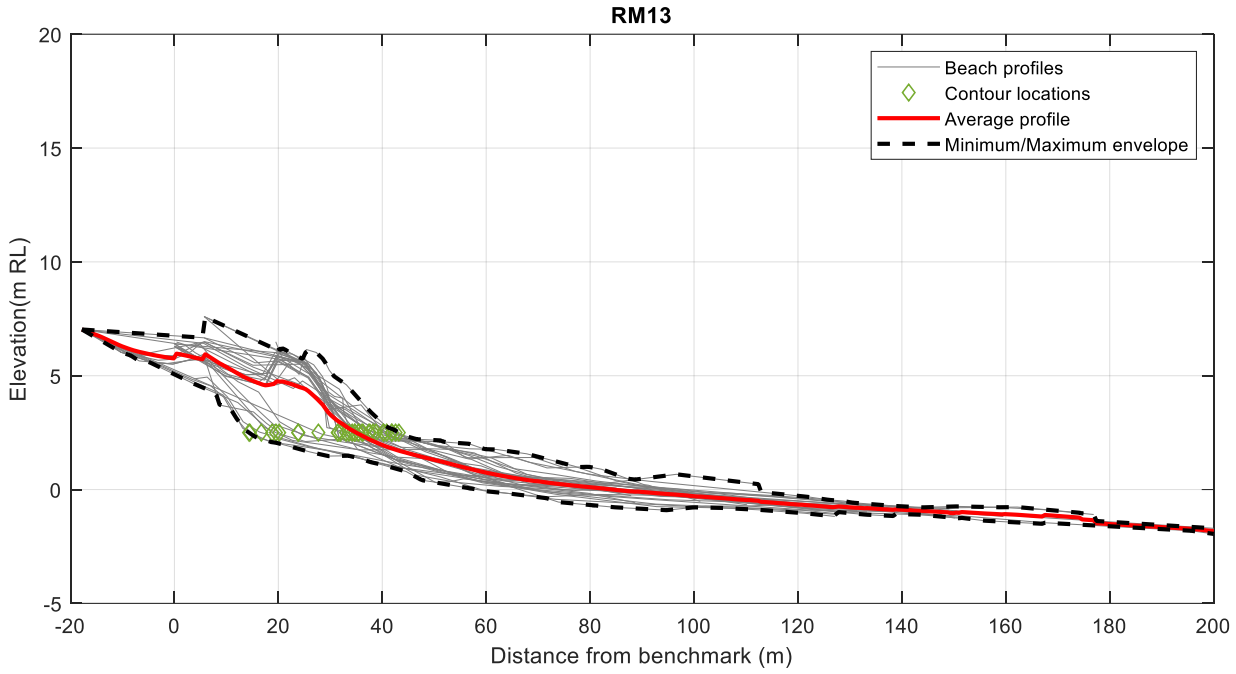
0
-5
-10
-15
-20
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020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Beach profiles
Contour locations
Average profile
Minimum/Maximum envelope
Elevation(m RL)
Distance from benchmark (m)
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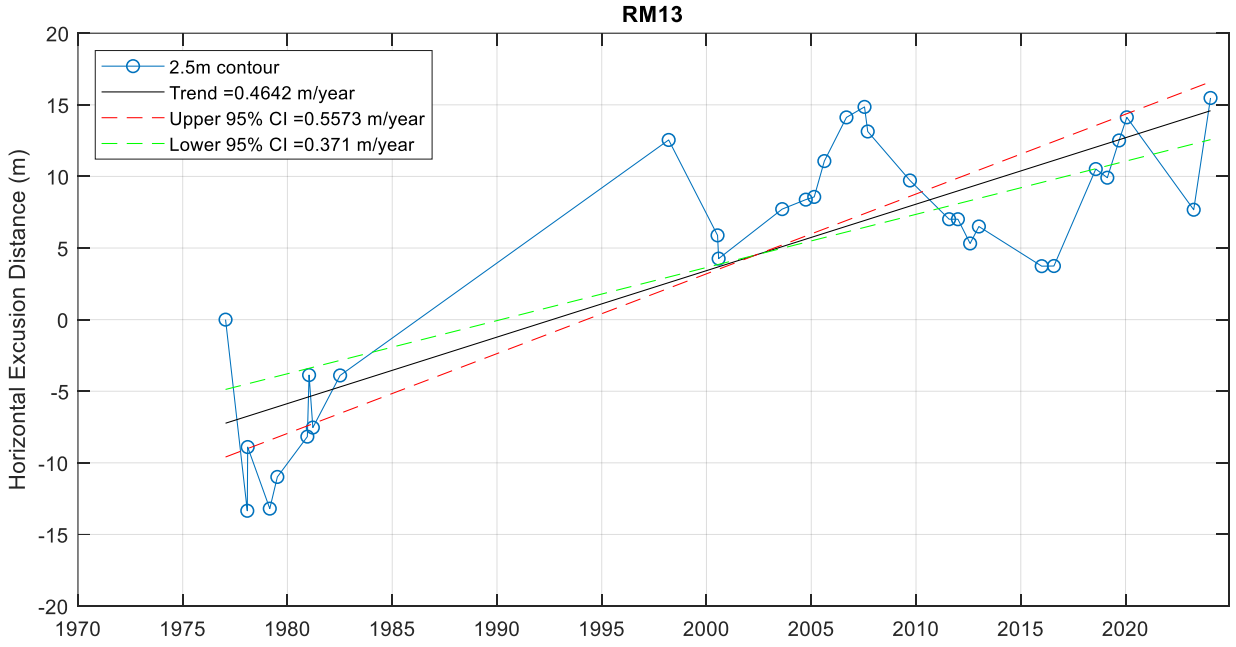
-20
0
20
40
60
80
100
120
140
160
180
200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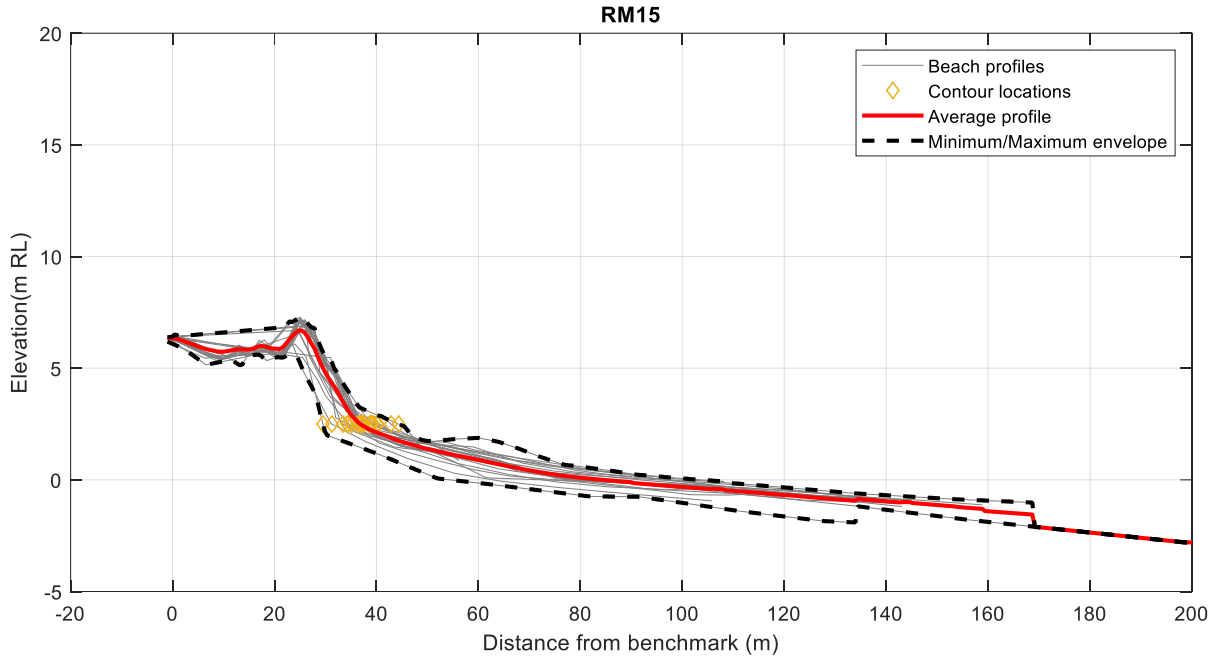
2.5m contour
Trend =0.4642 m/year
Upper 95% CI =0.5573 m/year
Lower 95% CI =0.371 m/year
Horizontal Excusion Distance (m)
20
15
10
5
0
-5
-10
-15
-20
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020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Beach profiles
Contour locations
Average profile
Minimum/Maximum envelope
Elevation(m RL)
Distance from benchmark (m)
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-20
0
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40
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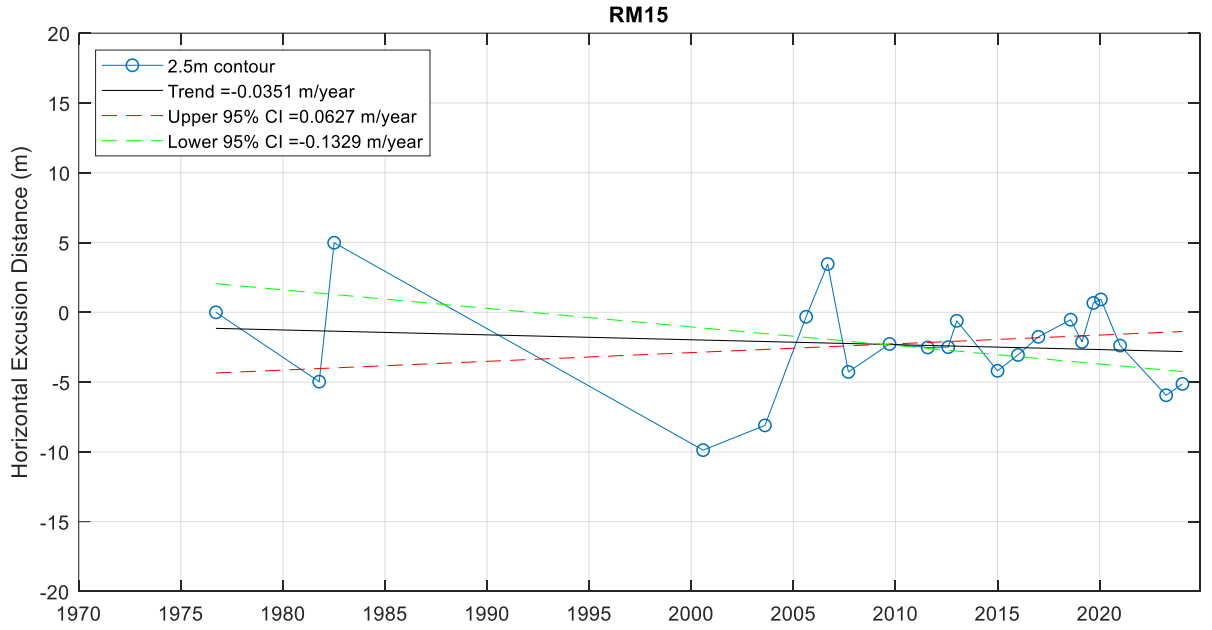
200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Lower 95% CI =-0.1329 m/year
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15
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-15
-20
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1975
1980
1985
1990
1995
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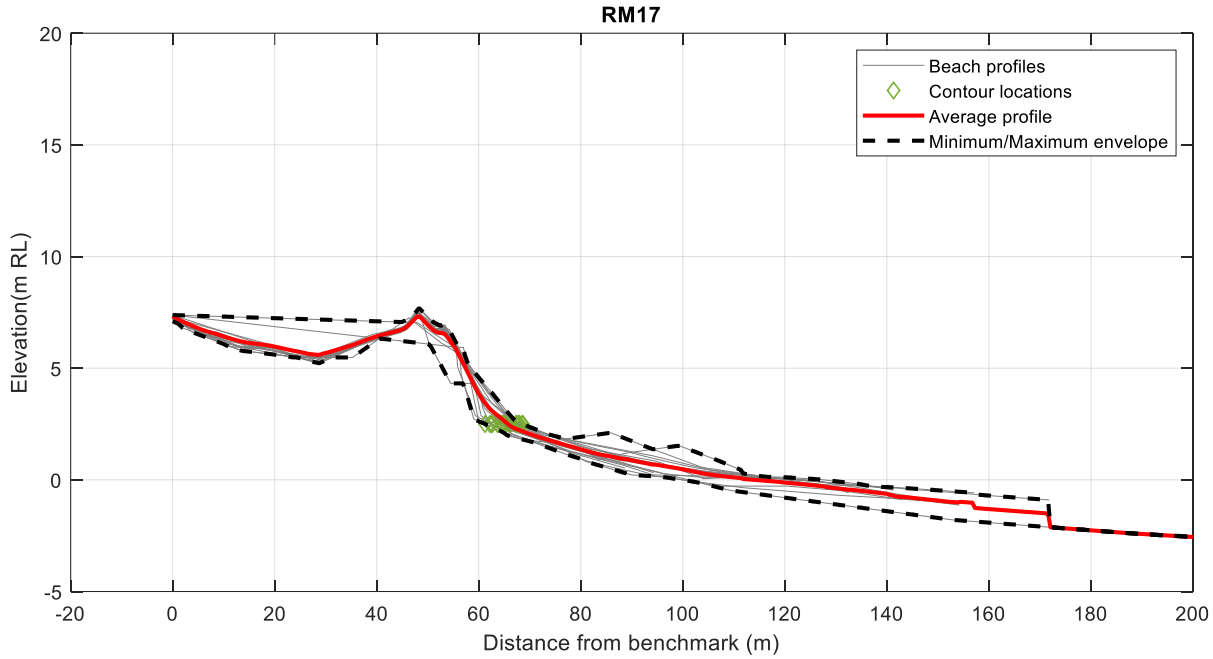
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Beach profiles
Contour locations
Average profile
Minimum/Maximum envelope
Elevation(m RL)
Distance from benchmark (m)
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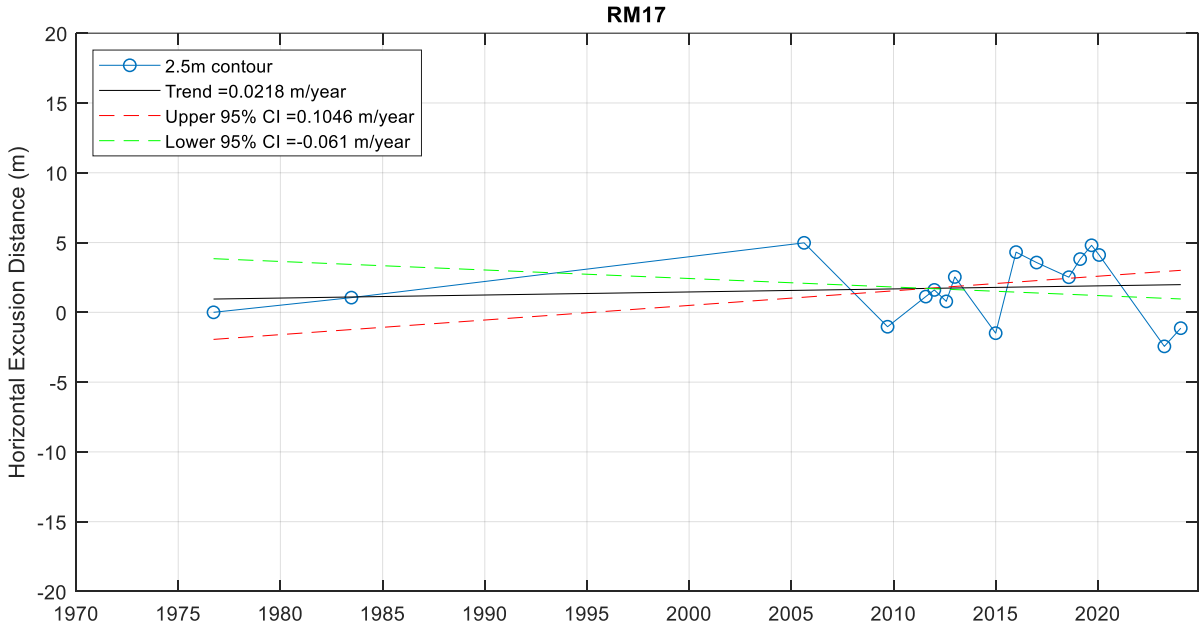
180
200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Lower 95% CI =-0.061 m/year
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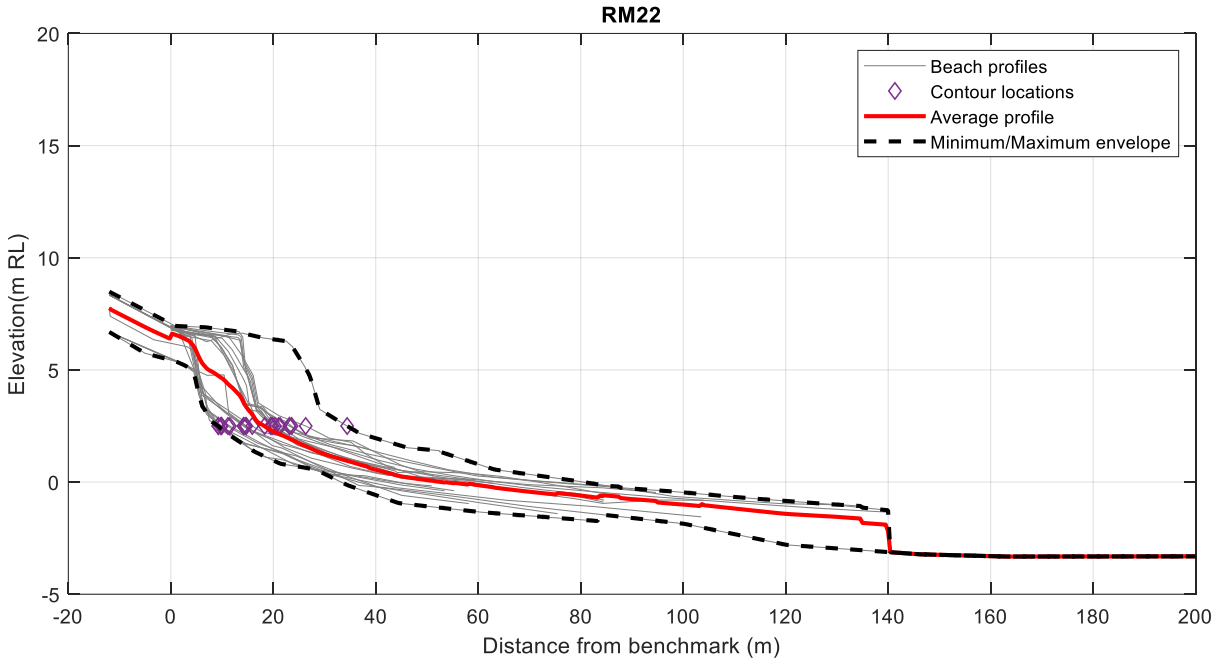
2010
2015
2020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Beach profiles
Contour locations
Average profile
Minimum/Maximum envelope
Elevation(m RL)
Distance from benchmark (m)
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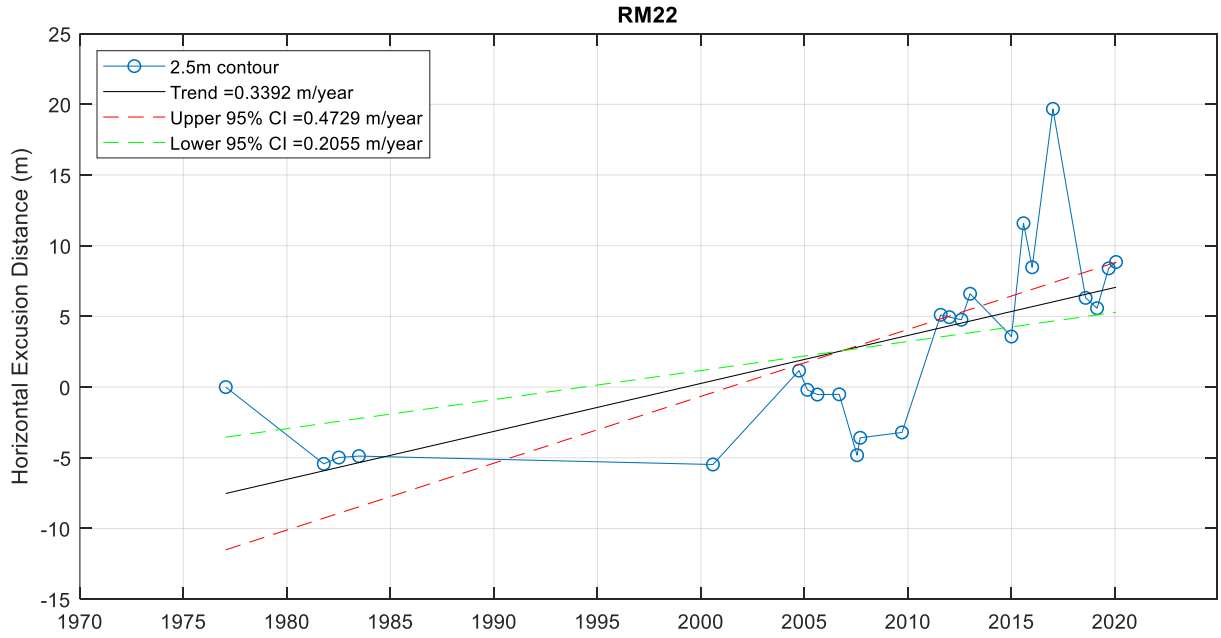
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Upper 95% CI =0.4729 m/year
Lower 95% CI =0.2055 m/year
Horizontal Excusion Distance (m)
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20
15
10
5
0
-5
-10
-15
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020

Appendix D Geotechnical factual report

REPORT

Tonkin+Taylor

Te Ākau Bream Bay Sand Extraction: Geotechnical Factual Report

Prepared for
McCallum Bros Ltd
Prepared by
Tonkin & Taylor Ltd
Date
March 2025
Job Number
1093502 v6

Together we create and sustain a better world
www.tonkintaylor.co.nz

Document control

Title: Te Ākau Bream Bay Sand Extraction: Geotechnical Factual Report					
Date	**Version**	**Description**	**Prepared by:**	**Reviewed by:**	**Authorised by:**
June 24	1	Geotechnical Factual Report for issue	S. Mansell	C. Monk	
Nov 24	2	Geotechnical Factual Report for issue	S. Mansell	C. Monk	G. Nicholson
Mar 25	3	Geotechnical Factual Report Phase 2 for issue	V. Chopra	C. Monk	G. Nicholson
Mar 25	4	Geotechnical Factual Report Phase 2 for issue. Updated title.	V. Chopra	C. Monk	G. Nicholson
Mar 25	5	Geotechnical Factual Report Phase 2 for issue. Includes MBL comments	V. Chopra	C. Monk	G. Nicholson
Mar 25	6	Geotechnical Factual Report Phase 2 for issue. Sand resource interpretation removed	C. Monk	R. Reinen-Hamill	G. Nicholson

Distribution:

McCallum Bros Ltd	1 PDF copy
Tonkin & Taylor Ltd (FILE)	1 PDF copy

Table of contents

1 Overview

McCallum Bros Limited (MBL) is preparing a resource consent application to extract marine sand offshore of Te Ākau Bream Bay, Northland. MBL engaged[1][2] Tonkin & Taylor Ltd (T+T) to observe geotechnical logging/sampling of vibracore samples drilled at Te Ākau Bream Bay in Northland.

The purpose of the vibracore sampling was to undertake exploratory analysis of the subsurface sediment offshore of Te Ākau Bream Bay to gather factual data to better understand the composition and volume of the geological deposit. Phase 1 (April 2024) vibracores targeted the proposed extraction area. Phase 2 (February 2025) targeted areas outside of the proposed extraction area to improve understanding of the total sand resource at Te Ākau Bream Bay (refer Figure 2.2).

This report presents a summary of the field method and data analysis and supersedes an earlier version of the report issued November 2024 as an appendix to the draft Coastal Process Effects Assessment report[3]. The latest version of this report issued March, includes the Phase 2 vibracore investigations undertaken outside of the proposed extraction area at Te Ākau Bream Bay.

1.1 Project description

MBL is proposing to extract marine sand from an area offshore of Te Ākau Bream Bay. The extraction area is around 15.4 km^2 (7 km alongshore and 2.2 km across shore) and located a minimum distance of 4.7 km from the shoreline. Figure 2.2 shows the proposed extraction area in the context of Te Ākau Bream Bay.

The proposed extraction volumes are:

- 150,000 m^3 per annum for the first 3 years.
- Max rate of 15,000 m^3 per month for the first 3 years.
- 250,000 m^3 per annum for the remaining 32 years of the 35-year consent being applied.
- Max rate of 25,000 m^3 per month from year 4 of consent.
- Total max volume over the 35 years of 8,450,000 m^3.

2 Vibracore investigations

2.1 General

The geotechnical scope of work was undertaken across 2 different phases which are summarised in the subsections below.

2.1.1 Phase 1

- Observation of drilling of 24 vibracore investigations on the *Kapua* from 15 to 17 April 2024.
- Processing of the recovered vibracore samples into core boxes.

[1] Tonkin & Taylor Limited (19 March 2024) Fee Proposal. *Letter of Engagement Bream Bay Coastal and Geotechnical Assessment.* Job Ref: 1093502.0000

[2] Tonkin & Taylor Limited (16 December 2024) Variation Order. *Variation Order 02 (VO2) Additional Vibracore Investigations for Bream Bay Sand Extraction Geotechnical Consultancy Services*. Job Ref: 1093502.0000.

[3] Tonkin & Taylor Limited (11 November 2024) Report. *Bream Bay Sand Extraction: Coastal Process Effects Assessment [DRAFT].* Job Ref: 1093502.0000 v0.2.

- Logging of collected vibracore samples in accordance with NZGS Guidance for Field Description of Soil and Rock[4].
- Bagging samples from specific core intervals into plastic bags for geotechnical testing at Waikato University Soils Laboratory, Hamilton, as directed by MBL (see Section 3).
- Preparation of the geotechnical factual report[3] (issued November 2024).

A plan showing the location of the vibracore investigations undertaken in phase 1 is shown on Figure 2.1.

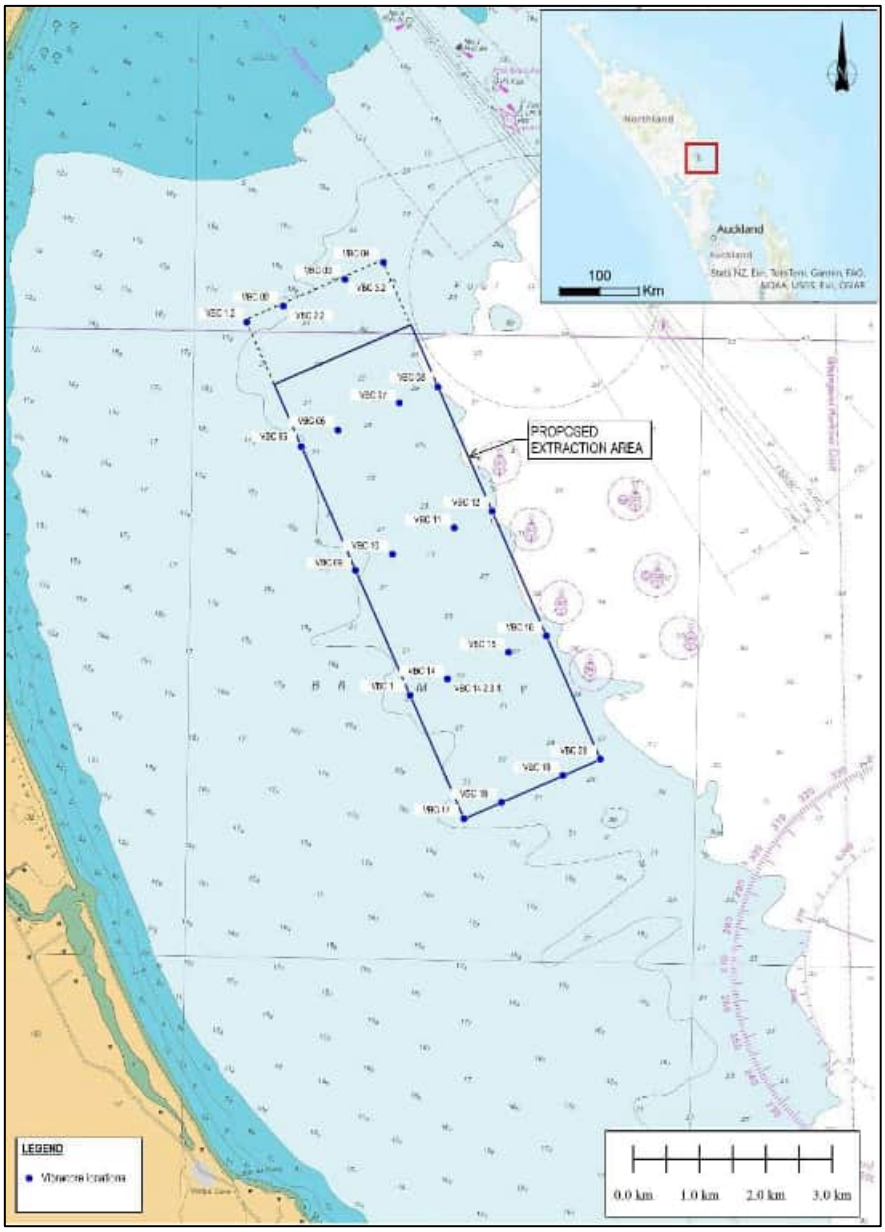

Figure 2.1: The location of the vibracore investigations over the nautical chart[5] for Te Ākau Bream Bay. The black dashed area is a control location and the blue box is the proposed sand extraction area.

[4] NZ Geotechnical Society (December 2005). *Field Description of Soil and Rock. Guideline for the field classification and description of soil and rock for engineering purposes.*

[5] Land Information New Zealand (September 2013). Nautical Chart. *ENC: NZ405219 North Island – East Coast – Approaches to Marsden Point*. Chart Number NZ405219.

2.1.2 Phase 2

- Observation of drilling of 33 vibracore investigations on the Kapua from 11 to 13 February 2025.
- Processing of the recovered vibracore samples into core boxes.
- Logging of collected vibracore samples in accordance with NZGS Guidance for Field Description of Soil and Rock[6].
- Interpretation of the total sand resource at Te Ākau Bream Bay.
- Preparation of a Geotechnical Factual Report for phase 2 (this report).

A plan showing the location of the phase 1 and phase 2 vibracore investigations is shown on Figure 2.1 below.

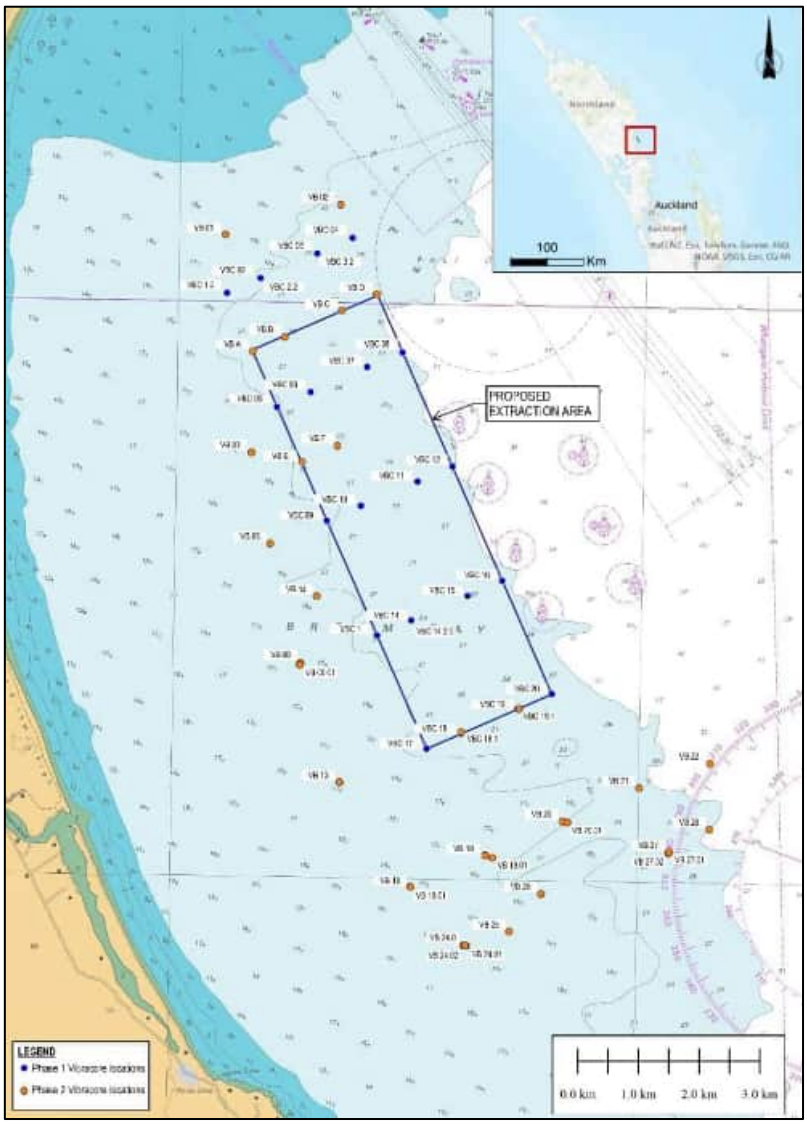

Figure 2.2: The location of the vibracore investigations undertaken in phase 1 and phase 2 over the nautical chart for Te Ākau Bream Bay[5]. The blue box is the proposed sand extraction area.

[6] NZ Geotechnical Society (December 2005). *Field Description of Soil and Rock. Guideline for the field classification and description of soil and rock for engineering purposes.*

2.2 Vibracore drilling methodology

The drilling comprised 57 vibracore borehole investigations across the two phases of work advanced up to 5 m below the sea floor. The investigations were carried out using the MBL vessel, *Kapua* and the vibracore rig was provided and operated by MBL.

The drilling method vibrates a 5 m length aluminium core barrel under self-weight into the seabed using a vibrator rig (Figure 2.3a). The vibracore rig was operated by deployment to the seafloor via a 23 T excavator (Figure 2.3b).

Figure 2.3: A) Preparation of the vibracore for seafloor drilling, note the 5 m aluminium barrel (rod) attached to the vibracore rig and drilling frame. B) A 23 T excavator winching the vibracore rig to the seafloor for drilling operation.

T+T proposed the vibracore locations which MBL used as the basis for the investigation program (Figure 2.1 & 2.2). The coordinates for the investigations were loaded into the navigation system of the *Kapua* and the investigations were undertaken between 15 to 17 April 2024 (phase 1) and 11 to 13 February 2025 (phase 2). The actual investigation locations were recorded using a GPS built-in to the tablet device used for geological logging and are accurate to +/- 10 m.

The aluminium drill rods contained an internal plastic sleeve / liner for sample collection. The vibracore rig advanced the drill rod down through the seabed until the barrel slowed and stopped advancing, likely on a dense sand layer. When the barrel stopped advancing, the drilling head continued rotating for five to ten minutes to make sure the maximum achievable depth was tested. The vibracore recovery depths were limited by the investigation method, which relied on the self-weight of the drill rods. Once the desired depth had been achieved or the barrel stopped progressing, the vibracore rod containing the seabed samples was recovered and laid down on the deck of the *Kapua*. The plastic sleeve containing the sample was withdrawn from the drill rod and cut to size to fit into a core box at which point the sleeve was removed entirely and disposed of.

For some of the vibracore investigations, the plastic sleeve became stuck within the aluminium drill rod, and an angle grinder was used to cut through the rod to release it.

The investigation scope for phase 1 proposed 20 vibracore investigations (VBC 01-VBC 20) however, four investigations were resampled (VBC 1.1, VBC 2.2, VBC 3.2, VBC 14.2) to compensate for low recovery at VBC 01, VBC 02, VBC 03 and VBC 14 respectively, for a total of 24 vibracores in phase 1.

The phase 2 investigation scope proposed 29 vibracore investigations (VB 1-VB 29) outside the sand extraction extent, however a total of 33 vibracore investigations were completed. An inner line of vibracores targeted the outer depth of closure about 4.7 km offshore to delineate the landward extent of the sand resource (Appendix A, Figure 3). A subset of the proposed phase 2 investigations intended to target an area east of the extraction area to test the sand resource further offshore but the cable length of the vibracore rig was a limiting factor in deep water. The locations in deep water east of the extraction area were discarded and replaced with six vibracore investigation locations within the proposed extraction area to supplement the data collected in April 2024.

Of the 33 completed vibracore investigations in phase 2, ten were re-drills where low recovery limited the amount of core sampled. The re-drilled vibracores are VB 09.01, VB 18.01, VB 19.01, VB 20.01, VB 24.01, VB 24.02, VB 27.01, VB 27.02, VBC 18.1, and VBC 19.1. The six vibracores within the extraction area were completed to supplement the phase 1 investigation data and they are VB A, VB B, VB C, VB D, VB E, and VB F.

See Figure 1 and 2 attached in Appendix A for the vibracore locations in phase 1 and 2 respectively.

2.3 Vibracore core recovery

The data from the vibracores is presented in Table 2.2 for phase 1 and 2 and presents a column of the core recovered as a percentage.

Where core was not recovered it was typically at the top or bottom of the vibracore investigation, i.e. not in the middle and the total recovery will be < 100%. Core loss at the base of the rod likely occurred as the catcher was removed and some of the sample was released and lost. The top of the vibracore was prone to partial washout as the sleeve was extracted from the barrel and the excess water rushed out.

In some cases, > 100% core recovery was encountered, and this was likely due to saturation of the sand sample which resulted in the sample expanding in the core box when extracted from the drill rod.

2.4 Geotechnical logging and sampling

The recovered core samples were placed in core boxes, photographed, and logged in accordance with NZGS Guidance[4] by an Engineering Geologist or Geotechnical Engineer from T+T. The boxes were then transported to T+T (Auckland office) for storage, review, and sample collection.

The vibracore logs are attached in Appendix B and include core photographs.

A generalised summary of the seabed conditions logged in the vibracores at Te Ākau Bream Bay is provided in Table 2.1.

Table 2.1: Generalised summary of the seabed investigated at Te Ākau Bream Bay

Transect	1 (VBC 1-4) *control*	2 (VBC 5-8) *extraction*	3 (VB 05-VBC 12) *extraction*	4 (VB 9-VBC 16) *extraction*	5 (VB 13-VBC 20) *extraction*	6 (VB A-D) *extraction*	7 (VB 18-22) *resource area*	8 (VB 24-28) *resource area*
Typical Subsurface Conditions	Fine to medium SAND, trace shells; grey. Loosely packed, moist, poorly graded.	Fine to medium SAND, minor silt, minor shells; grey. Loosely packed, moist, poorly graded.	Fine to coarse SAND, minor silt, trace shells; dark grey. Loosely packed, moist, poorly graded.	Fine to Coarse SAND, minor shells; grey. Loosely packed, moist, poorly graded.	Fine to medium SAND, minor shells; grey. Loosely packed, moist, poorly graded.	Fine to medium SAND, minor shells; grey. Loosely Packed, wet, well graded.	Fine to medium SAND, minor shells; grey. Loosely Packed, wet, well graded.	Fine to medium SAND, trace shells; grey, Loosely Packed, wet, well graded.

*The descriptions are based on a summary of the most common attributes in the samples along each transect.

Table 2.2: Vibracore investigation summary

Phase 1 Investigations							
Vibracore ID	Investigation Date	Longitude[1]	Latitude[1]	Seafloor level m RL (NZVD 2016)	Drilled Depth (m)[2]	Recovered Length (m)[3]	Recovery (%) (Recovered length / drilled depth)
VBC 01	15/04/2024	174.5086715	-35.91553769	-22.17	~2.6	2.3	88
VBC 1.2	17/04/2024	Same as above			~4.7	4.9	106
VBC 02	15/04/2024	174.5145964	-35.91334332	-22.92	~1.5	1.2	80
VBC 2.2	17/04/2024	Same as above			2.6	2.2	85
VBC 03	15/04/2024	174.524614	-35.90963287	-24.3	~ 1.3	0.1	74
VBC 3.2	17/04/2024	Same as above			2.6	1.2	47
VBC 04	16/04/2024	174.5308568	-35.90731982	-26.05	~ 2.1	1.8	66
VBC 05	16/04/2024	174.5178768	-35.93197274	-22.82	~ 1.4	1.1	80
VBC 06	16/04/2024	174.5238348	-35.92973023	-27.00	~ 2	1.6	80
VBC 07	16/04/2024	174.5338165	-35.92597236	-29.40	~ 3.5	3.2	91
VBC 08	16/04/2024	174.5400792	-35.92377735	-31.63	~ 4.4	4.3	96
VBC 09	16/04/2024	174.5270439	-35.9483391	-22.95	~ 3.4	3.1	91
VBC 10	16/04/2024	174.5330892	-35.94613759	-25.3	~ 3.3	3.1	93
VBC 11	16/04/2024	174.5431203	-35.94248367	-28.61	~ 3.2	3	93
VBC 12	16/04/2024	174.5493003	-35.94023197	-27.49	~ 2.1	1.8	83
VBC 13	17/04/2024	174.5362913	-35.9648492	-23.20	2.3	1.8	78
VBC 14	17/04/2024	174.5423802	-35.96260201	-25.74	0.8	1.1	138
VBC 14.2	17/04/2024	Same as above			1.8	1.6	90
VBC 15	16/04/2024	174.5523807	-35.9589102	-31.23	~ 3.8	2.5	66
VBC 16	16/04/2024	174.5585009	-35.95665031	-30.89	~ 1.6	1.3	81
VBC 17	17/04/2024	174.5454499	-35.98115558	-23.18	4.4	3.8	86
VBC 18	17/04/2024	174.5515742	-35.97888682	-24.59	~2	1.6	80
VBC 19	17/04/2024	174.561561	-35.97518697	-27.39	~ 1.2	1	75
VBC 20	17/04/2024	174.5676287	-35.97293833	-29.62	~ 2.6	2.2	84

Phase 2 Investigations							
Vibracore ID	Investigation Date	Longitude[1]	Latitude[1]	Seafloor level m RL (NZVD 2016)	Drilled Depth (m)[2]	Recovered Length (m) [3]	Recovery (%) (Recovered length/drilled depth)
VB 01	11/02/2025	174.5082634	-35.90712778	-21.2	~2.14	2.2	103
VB 02	11/02/2025	174.5181003	-35.90624853	-21.2	~2.7	2.2	81
VB 03	11/02/2025	174.5134671	-35.938621	-22.5	~2.65	1.8	68
VB 05	11/02/2025	174.517012	-35.95179192	-21.5	~2.4	1.8	75
VB 09	11/02/2025	174.5227459	-35.96900922	-20.8	~2.24	1.4	63
VB 09.01	11/02/2025	174.5226327	-35.96926583	-20.8	~3.4	2.4	71
VB 13	11/02/2025	174.5302395	-35.98621425	-20.0	~2.35	2.3	98
VB 14	11/02/2025	174.5374658	-35.98383599	-21.3	~2.5	1.9	76
VB 18	12/02/2025	174.5429189	-36.00118756	-20.6	~3.7	1.7	46
VB 18.01	11/02/2025	174.5430096	-36.00123814	-20.6	~1.5	1.5	100
VB 19	11/02/2025	174.5562239	-35.99645987	-21.4	~1.45	1.5	103
VB 19.01	12/02/2025	174.5574813	-35.99679627	-21.4	~2.3	1.7	74
VB 20	11/02/2025	174.569954	-35.99139462	-23.5	~2.2	1.5	68
VB 20.01	12/02/2025	174.570757	-35.99156741	-23.5	~2	2	100
VB 21	11/02/2025	174.5834983	-35.98639742	-28.3	~1.8	1.8	100
VB 22	12/02/2025	174.5960427	-35.9826985	-34.5	~2.1	1.7	81
VB 24.0	12/02/2025	174.5531122	-36.0096497	-20.6	~2.1	1.4	67
VB 24.01	12/02/2025	174.5525637	-36.00959996	-20.6	~1.8	1.4	78
VB 24.02	12/02/2025	174.5529445	-36.00957909	-20.6	~2.6	2.6	100
VB 25	12/02/2025	174.5613427	-36.00668896	-21.4	~3	2.8	93
VB 26	12/02/2025	174.5693234	-36.0018282	-23.3	~1.8	2.4	133
VB 27	11/02/2025	174.5889042	-35.99573559	-28.0	~1.4	1.4	100
VB 27.01	11/02/2025	174.5888425	-35.99579169	-28.0	~2.25	1.4	62
VB 27.02	12/02/2025	174.5890114	-35.99562964	-28.0	~1.7	1.7	100
VB 28	12/02/2025	174.6007418	-35.99119333	-34.1	~2.9	2	69
VB A	13/02/2025	174.5134082	-35.92395176	-23.3	~2.4	1.6	67
VB B	13/02/2025	174.5190973	-35.921849	-24.59	~3	2.2	73
VB C	13/02/2025	174.5292134	-35.91786616	-28.33	~3	2.5	83
VB D	13/02/2025	174.5355116	-35.91585572	-31.48	~2.4	1.8	75
VB E	13/02/2025	174.5224574	-35.93990537	-22.63	~2.4	1.7	71
VB F	13/02/2025	174.5284873	-35.93741386	-24.86	~2.2	2.2	100
VBC18.1	12/02/2025	174.5515986	-35.97859799	-24.59	~3.8	2.2	58
VBC19.1	12/02/2025	174.5618692	-35.97514042	-27.39	~2.4	1.8	75

Notes:

1. Coordinate projection system is WGS84.
2. Estimated drill depth ~.
3. Water entering the vibracore barrel can stretch recovered core, resulting in recovered length greater than drilled depth.

3 Geotechnical laboratory testing

For the phase 1 investigations only, samples were collected in labelled plastic sample bags from each recovered core at 0.5 m depth. An additional sample was collected at the end of the vibracore if it was ≥ 2 m. In locations where the vibracore was resampled, only the deepest of the two vibracores were sampled. The samples were collected from T+T by MBL and sent to the University of Waikato Soil Laboratory in Hamilton.

The testing scope included:

- 26 Particle Size Distributions (PSD's) (Table 3.1).

The sample test results are attached in Appendix C.

Table 3.1: Vibracore PSD summary table

VBC ID	Sample Depth (m)	Sample Count	Date Submitted to Lab	Test Method
VBC 1.2	0.5	2	31.05.24	PSD
VBC 2.0	0.5	1	31.05.24	PSD
VBC 3.0	0.5	1	31.05.24	PSD
VBC 4.0	0.5	1	31.05.24	PSD
VBC 5.0	0.5	1	31.05.24	PSD
VBC 6.0	0.5	1	31.05.24	PSD
VBC 7.0	0.5	2	31.05.24	PSD
VBC 8.0	0.5	2	31.05.24	PSD
VBC 9.0	0.5	2	31.05.24	PSD
VBC 10.0	0.5	2	31.05.24	PSD
VBC 11.0	0.5	1	31.05.24	PSD
VBC 12.0	0.5	1	31.05.24	PSD
VBC 13.0	0.5	1	31.05.24	PSD
VBC 14.2	0.5	1	31.05.24	PSD
VBC 15.0	0.5	1	31.05.24	PSD
VBC 16.0	0.5	1	31.05.24	PSD
VBC 17.0	0.5	1	31.05.24	PSD
VBC 18.0	0.5	1	31.05.24	PSD
VBC 19.0	0.5	1	31.05.24	PSD
VBC 20.0	0.5	1	31.05.24	PSD
VBC 7.0	3.2	2	31.05.24	PSD
VBC 8.0	4.25	2	31.05.24	PSD
VBC 9.0	3.1	2	31.05.24	PSD
VBC 10	3.1	2	31.05.24	PSD
VBC 1.2	4.9	2	31.05.24	PSD

*The resampled vibracore (VBC 1.1, VBC 2.2, VBC 3.2, VBC 14.2) were tested rather than the original runs (VBC 1, VBC 2, VBC 3, VBC 14) since they were deeper. All vibracore runs were sampled at 0.5 m. Test method: ISO 13320 Particle size analysis – Laser diffraction methods.

4 Applicability

This report has been prepared for the exclusive use of our client McCallum Bros Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:

[redacted]

Chris Monk
Senior Engineering Geologist

Report reviewed by:

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Authorised for Tonkin & Taylor Ltd by:

[redacted]

Glen Nicholson
Project Director

SOMA
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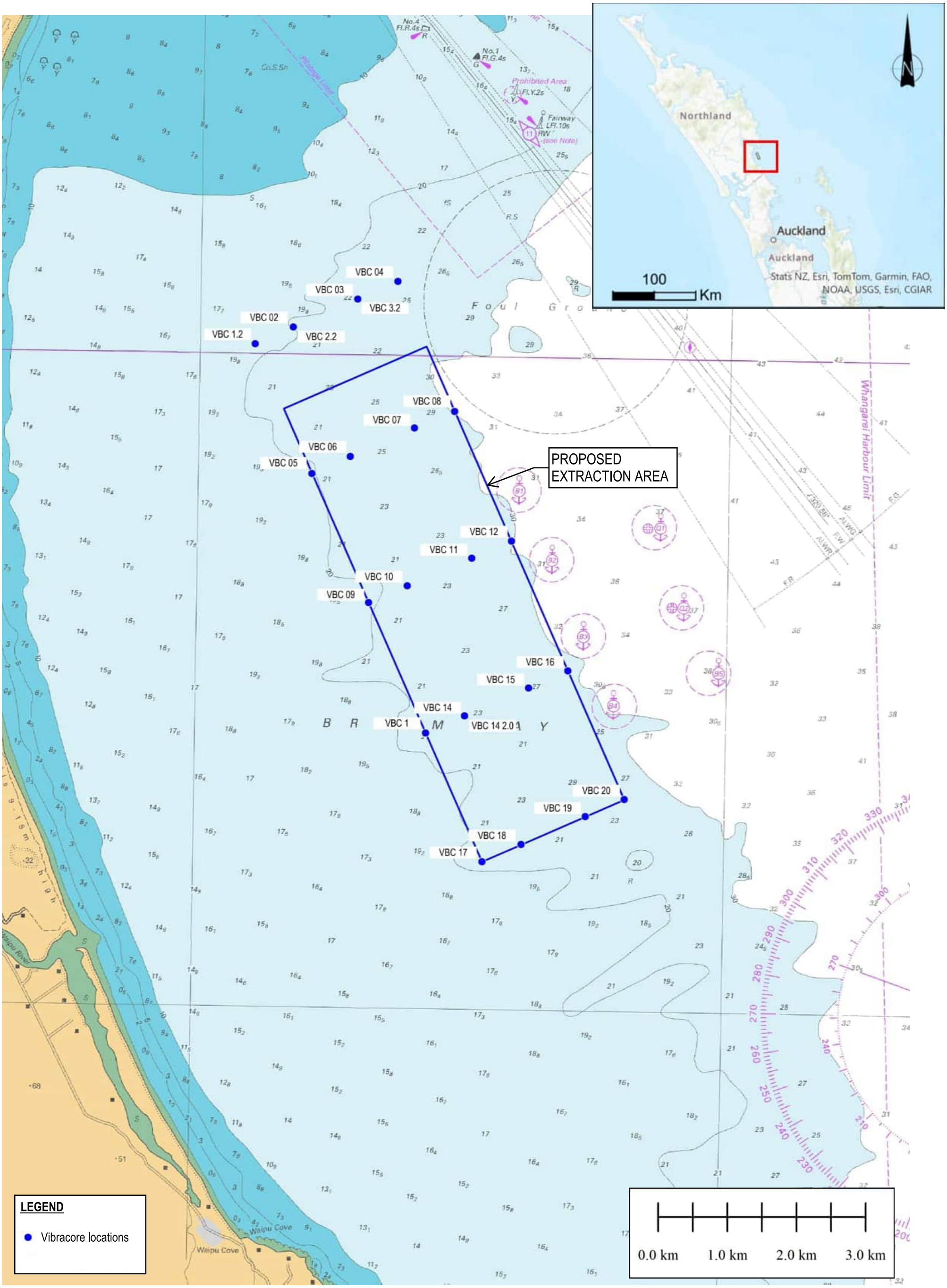
Appendix A Site plans

- **Figure 1: Phase 1 vibracore investigation site plan.**
- **Figure 2: Phase 2 vibracore investigation site plan.**



Notes:

1) The base map is sourced from Land Information New Zealand. ENC: NZ 405219 North Island - East Approaches to Marsden Point.

Tonkin+Taylor

1 Fanshawe St, Auckland CBD, Auckland
www.tonkintaylor.co.nz

DRAWN	SOMA	Feb.25
CHECKED	CBM	Mar. 25
APPROVED	CBM	Mar. 25

SCALE (AT A3 SIZE): 1:50,000

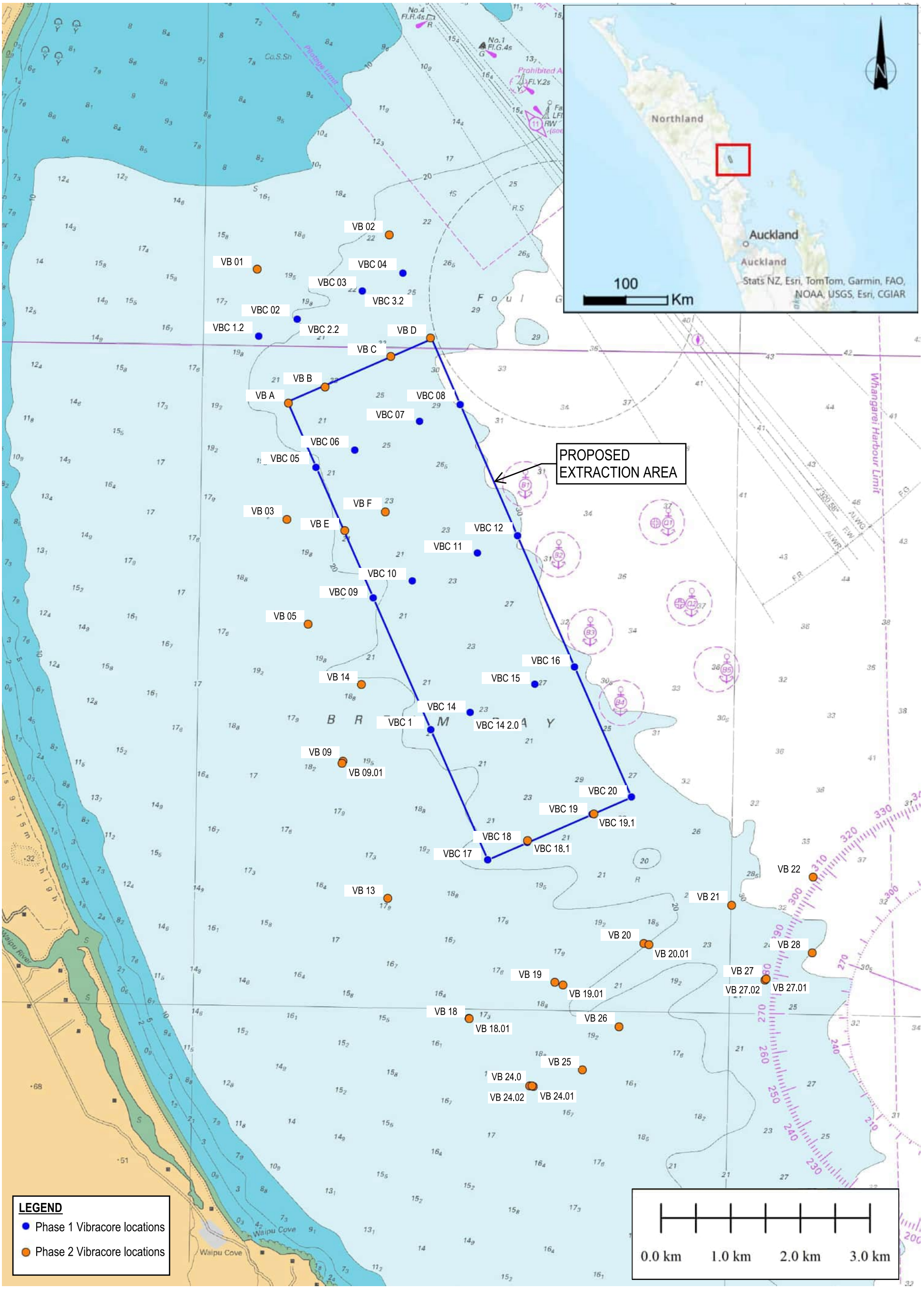
PROJECT No.: 1093502.0000

TITLE:

Te Ākau Bream Bay Phase 1 Vibracore Locations

FIGURE No.: 1

Rev.: 0



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CHECKED	CBM	Mar. 25
APPROVED	CBM	Mar. 25

SCALE (AT A3 SIZE): 1:50,000

PROJECT No.: 1093502.0000

TITLE:

Te Ākau Bream Bay Phase 1 and Phase 2 Vibracore Locations

FIGURE No.: 2

Rev.: 0

Appendix B Vibracore investigation logs

- **T+T Engineering Log Terminology.**
- **Phase 1 vibracore logs.**
- **Phase 2 vibracore logs.**

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Engineering log terminology

General

Soil and rock descriptions follow the "Guidelines for the field classification and description of soil and rock for engineering purposes" by the New Zealand Geotechnical Society (2005). Refer to this document for methods of field determination.

Water

Water level on date shown

Water inflow

Water outflow

Core recovery

Expressed as percentage of the length of the core run recovered.

Drilling method/casing

Common types:

OB	Open barrel
W	Wash
HQ3	HQ triple tube
PQ3	PQ triple tube
HSA	Hollow Stem Auger
WS	Window Sampler
HA	Hand Auger
HFS	High Frequency Sonic Drilling
LFS	Low Frequency Sonic Drilling

Graphic logs

The graphic log shows soil and rock types. The defect log indicates the location, orientation and abundance of defects of all types.

Typical material symbols:


Organic material


Igneous rock


Clay


Mudstone


Silt


Siltstone


Sand


Sandstone


Gravel or Conglomerate


Metamorphic Rock

Tests

- **N=22:**SPT uncorrected blow count for 300 mm
- **75/12:**Undrained shear strength (peak /residual as measured by field vane.

Laboratory test(s) carried out:

PMT	Pressuremeter test
LT	Lugeon test
LV	Laboratory vane
AL	Atterburg limits
UU	Undrained triaxial
PSD	Particle size distribution
c' Ø'	Effective stress
CONS	Consolidation
DS	Direct shear
COMP	Compaction
UCS	Unconfined compression
IS_{50}	Point load

Installation type


Standpipe


Slotted screen


VWP


Bentonite seal


Filter pack

Sample type


SPT


Core


Thin-wall tube


Other


Bulk sample


Core or Sample loss

Soil description

Moisture content

D	Dry, looks and feels dry
M	Moist, no free water on hand when remoulding
W	Wet, free water on hand when remoulding
S	Saturated, free water present on sample

Consistency/undrained shear strength

		S_u(kPa)
VS	Very soft	< 12
S	Soft	12 to 25
F	Firm	25 to 50
St	Stiff	50 to 100
VSt	Very stiff	100 to 200
H	Hard	> 200

Density index

		SPT(N) - uncorrected
VL	Very loose	0 to 4
L	Loose	4 to 10
MD	Medium dense	10 to 30
D	Dense	30 to 50
VD	Very dense	> 50

Proportional terms definition (Coarse soils)

Fraction	**Term**	**% of soil mass**	**Example**
Major	(UPPER CASE)	Major constituent	GRAVEL
Subordinate	(lower case)	> 20	Sandy
Minor	with some...	12 - 20	with some sand
	with minor...	5 - 12	with minor sand
	with trace of... (or slightly)...	< 5	with trace of sand (slightly sandy)

Grain size criteria

Type	**Coarse**								**Fine**	
	Boulders	Cobbles	Gravel			Sand			Silt	Clay
			Coarse	Medium	Fine	Coarse	Medium	Fine		
Size range (mm)			200	60	20	6	2	0.6	0.2	0.06	0.002

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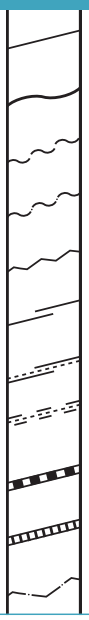
Engineering log terminology

Rock description

Signifcant defects

B	Bedding
J	Joint
Sc	Schistosity
Cl	Cleavage
BZ	Broken zone/crushed zone
F	Fault
Fg	Fault with gouge
SZ	Shear zone
Iz	Infilled seam
XD	Extremely weathered seam
DD	Drilling - induced defect



Weathering

UW	Unweathered
SW	Slightly weathered
MW	Moderately weathered
HW	Highly weathered
CW	Completely weathered
RS	Residual soil

Defect shape

ST	Stepped
UN	Undulating
PL	Planar

Roughness of defect surface

R	Rough
SM	Smooth
SL	Slickensided

Field strength

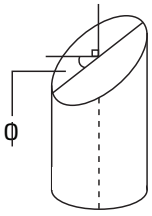
		UCS (MPa)	$I_{S(50)}$ (MPa)
EW	Extremely weak	< 1	N/A
VW	Very weak	1 - 5	N/A
W	Weak	5 - 20	N/A
MS	Moderately strong	20 - 50	1 - 2
S	Strong	50 - 100	2 - 5
VS	Very strong	100 - 250	5 - 10
ES	Extremely strong	> 250	> 10

Defect coding

Type
Angle (perpendicular to core axis)
Infilling description (as per soil description)

J 60˚, PL, SL, T, CV, STIFF GREEN CLAY

- Infilling/coating type
- Aperture
- Roughness
- Shape



Defect Orientation: for vertical unoriented boreholes defect orientation is measured normal to core axis e.g horizontal = 0˚(see diagram). For angled boreholes defect orientation is measured relative to core axis e.g parallel to core axis = 0˚.

Aperture

		Aperture (mm)
T	Tight	nil
VN	Very narrow	0 - 2
N	Narrow	2 - 6
MN	Moderately narrow	6 - 20
MW	Moderately wide	20 - 60
W	Wide	60 - 200
VW	Very wide	> 200

Infillings and coatings

CG	Clay gouge	Joints have openings between opposing faces of intact rock substance in excess of 1 mm filled with clay gouge. Clay is generally described in terms of soil properties.
CV	Clay veneers	Joints contain clay coating whose maximum thickness does not exceed 1 mm. Note: Describe clay in terms of soil properties.
PL	Penetrative limonite	Joint traces are marked in terms of well defined zones of slightly to moderately weathered ferruginised rock-substance within the adjacent rock.
FeSt	Limonite stained	Joint surfaces are stained or coated with limonite, although the rock substance immediately adjacent to the joints is fresh.
CT, SC	Coated	Joints exhibit coatings other than clay or limonite, e.g. Carbonate (CT) or Silica (SC).
CL, CS, CC	Cemented	Joints are cemented with limonite (CL), Silica (CS), or Carbonates (CC).
CN	Clean	Joint surface show no trace of clay, limonite, or other coatings.

Spacing

Term	Spacing
Very wide	> 2 m
Wide	0.6 - 2 m
Moderately wide	200 - 600 mm
Close	60 - 200 mm
Very close	20 - 60 mm
Extremely close	> 20 mm

Excavator penetration

Easy	1
Moderate	2
Difficult	3

RQD: Rock Quality Designation - percentage of core run consisting of sound rock longer than 10 cm.

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 01

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015983 mN 1743872 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -22m
R.L. COLLAR: -22m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 15/04/2024
FINISH DATE: 15/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace shells (1-4mm); dark grey. Loosely packed, moist, uniformly graded. Sand, grey and white and black, quartz.							0.5					*0.50m:* Sample collected for PSD				
	0.10m: Shelly (1-15mm) fine to coarse SAND; dark grey. Loosely packed, moist. Sand, up to 1.2mm, sub-rounded to angular, grey and white and black, quartz.																
	0.60m: Gradational contact																
	0.60m: Fine to medium SAND, minor shells (1-10mm), trace silt; dark grey. Loosely packed, moist, poorly graded. Sand, grey and white and black, quartz.						-23										
	0.80m: Fine to medium SAND, some shells (1-15mm), trace silt; dark grey. Loosely packed, moist, poorly graded. Sand, grey and white and black, quartz.			VC	100			1.0									
	1.03m: Fine SAND, trace shells (1-4mm) and trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, grey and white and black, quartz.																
	1.20m: Fine SAND, trace shells (1-5mm); grey. Loosely packed, moist, uniformly graded. Sand, grey and white, quartz.																
	1.50m: Sharp contact							1.5									
	1.50m: Shelly (1-15mm) fine to coarse SAND, trace gravel; dark grey. Loosely packed, moist. Sand, up to 1.2mm, sub-rounded to angular, grey and white and black, quartz; gravel, fine to coarse, up to 55mm, sub-rounded.																
	1.63m: Sharp contact																
	1.63m: Fine SAND, trace shells (1-4mm) and trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, grey and white and black, quartz.																
	1.80m: Fine SAND; light brownish grey. Loosely packed, moist, uniformly graded. Sand, white and grey and brown, quartz.						-24										Box 0.00-1.80m

COMMENTS:

Hole Depth 2.3m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 01

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015983 mN 1743872 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -22m
R.L. COLLAR: -22m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 15/04/2024
FINISH DATE: 15/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.80m:* Fine SAND; light brownish grey. Loosely packed, moist, uniformly graded. Sand, white and grey and brown, quartz.															
	2.10m: Gradational contact															
	2. 10m: Fine to medium SAND, minor shells (2-40mm); light brownish grey. Loosely packed, moist. Sand, white and grey and brown, quartz.			VC	100											Box 1.80-2.30m
	2.3m: END OF BOREHOLE						-25 (2.5), -26 (3.0, 3.5)					*2.30m:* Sample collected for PSD				

COMMENTS:

Hole Depth 2.3m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015983 mN (NZTM2000) 1743872 mE R.L.: -22m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 15/04/2024 HOLE FINISHED: 15/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.80m

1.80-2.30m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 02

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm	CO-ORDINATES: (NZTM2000) 6024603 mN 1736661 mE	R.L. GROUND: -23m
JOB No.: 1093502.0000		R.L. COLLAR: -23m
LOCATION: Bream Bay	DIRECTION: 90°	DATUM: NZVD2016
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 15/04/2024
FINISH DATE: 15/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells (1-4mm); light brownish grey. Loosely packed, moist, poorly graded. Sand, brown and grey and white, quartz.						-23										
	0.20m: Fine to coarse SAND, minor shells (1-12mm); light brownish grey. Loosely packed, moist. Sand, brown and grey and white, quartz.																
	0.35m: Fine to medium SAND, trace shells (1-4mm); light brownish grey. Loosely packed, moist, poorly graded. Sand, brown and grey and white, quartz.																
	0.50m: Fine to coarse SAND, some shells (1-80mm); brownish grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, brown and grey and white, quartz.			VC	100			0.5					*0.50m:* Sample collected for PSD				
	0.70m: Shelly (1-15mm) fine to medium SAND; brownish grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	0.90m: Fine to medium SAND, trace shells (1-4mm); dark grey. Loosely packed, moist, poorly graded. Sand, brown and grey and white, quartz.						-24	1.0									Box 0.00-1.20m
	1.2m: END OF BOREHOLE							1.5									

COMMENTS:

Hole Depth 1.2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 02**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6024603 mN (NZTM2000) 1736661 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 15/04/2024 HOLE FINISHED: 15/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.20m

BOREHOLE LOG

BOREHOLE No.: VBC 03

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025001 mN 1737572 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -24m
R.L. COLLAR: -24m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 15/04/2024
FINISH DATE: 15/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace shells (2-3mm) and trace silt; dark grey. Loosely packed, wet, uniformly graded. Sand, sub-rounded to sub-angular, white and black and grey, quartz .							0									
	0.28m: Fine to medium SAND, minor shells (3-10mm), trace silt; dark grey. Loosely packed, wet, uniformly graded. Sand, sub-rounded to sub-angular, white and black and grey, quartz.																
	0.41m: Fine to medium SAND, trace shells (2-3mm) and trace silt; dark grey. Loosely packed, wet, uniformly graded. Sand, sub-rounded to sub-angular, white and black and grey, quartz.			VC	100			0.5					*0.50m:* Sample collected for PSD				
	0.62m: Fine SAND, trace shells (2-3mm) and trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, sub-rounded to sub-angular, white and black and grey, quartz.						-25										
	0.97m: END OF BOREHOLE							1.0									Box 0.00-0.97m
								1.5									
							-26										

COMMENTS:

Hole Depth 0.97m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 03**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6025001 mN (NZTM2000) 1737572 mE R.L.: -24m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 15/04/2024 HOLE FINISHED: 15/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-0.97m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 04

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025249 mN 1738139 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -26m
R.L. COLLAR: -26m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, minor shells (3-70mm), trace silt; dark grey. Loosely packed, wet, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																
	0.20m: Fine SAND, trace shells (1-5mm) and trace silt; dark grey. Loosely packed, wet, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																
	0.32m: Fine SAND, minor shells (1-30mm), trace silt; dark grey. Loosely packed, moist to wet, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																
	0.50m: Fine to medium SAND, trace shells (1-3mm); grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, white and grey and black, quartz.			VC	100		-27	0.5					*0.50m:* Sample collected for PSD				
	1.46m: Fine to coarse SAND, minor shells (2-8mm); grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, white and grey and black, quartz.							1.0									
	1.66m: Fine to medium SAND, minor shells (1-3mm); grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, white and grey and black, quartz.							1.5									
	1.76m: Fine to medium SAND, trace shells (1-3mm); grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, white and grey and black, quartz.																Box 0.00-1.80m
	1.8m: END OF BOREHOLE						-28										

COMMENTS:

Hole Depth 1.8m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 04**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6025249 mN (NZTM2000) 1738139 mE R.L.: -26m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.80m

BOREHOLE LOG

BOREHOLE No.: VBC 05

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6022532 mN 1736925 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, minor shells (1-10mm), trace silt; grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, white and grey and black, quartz.						-23	0.5					*0.50m:* Sample collected for PSD				
	0.52m: Fine to medium SAND, minor shells (1-60mm), trace silt; grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and brown and grey and black, quartz.																
	0.70m: Fine to medium SAND, minor shells (1-5mm), trace silt; grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, white and grey and black, quartz.			VC	100			1.0									
	1.06m: Fine SAND, trace shells (1-2mm) and trace silt; grey. Loosely packed, moist, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																Box 0.00-1.12m
	1.12m: END OF BOREHOLE						-24	1.5									

COMMENTS:

Hole Depth 1.12m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 05**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6022532 mN (NZTM2000) 1736925 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.12m

BOREHOLE LOG

BOREHOLE No.: VBC 06

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6022773 mN 1737466 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -27m
R.L. COLLAR: -27m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, minor silt, trace shells (1-5mm); dark grey. Loosely packed, wet, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																
	0.08m: Fine to coarse SAND, some shells (2-30mm), minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, up to 1mm, rounded to sub-angular, white and grey and black, quartz.																
	0.38m: Fine to medium SAND, minor silt, trace shells (1-5mm); dark grey. Loosely packed, wet, poorly graded. Sand, rounded to sub-angular, white and grey and black, quartz.							0.5					*0.50m:* Sample collected for PSD				
	0.60m: Fine SAND, minor silt; dark grey. Loosely packed, wet, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																
	0.80m: Fine and coarse SAND, minor shells (2-5mm) and minor silt; dark grey. Loosely packed, moist, gap graded. Sand, up to 1mm, rounded to angular, white and black and brown, quartz.			VC	100												
	0.86m: Fine to medium SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, white and grey and black, quartz.						-28	1.0									
	1.20m: Fine SAND, minor silt; dark grey. Loosely packed, moist, uniformly graded. Sand, rounded to sub-angular, white and grey and black, quartz.							1.5									Box 0.00-1.60m
	1.6m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.6m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 06**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6022773 mN (NZTM2000) 1737466 mE R.L.: -27m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.60m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 07

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023175 mN 1738374 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -29m
R.L. COLLAR: -29m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells 1-4mm; dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.			VC	100		-30	0.5					*0.00 - 3. 20m* Issue with catcher 160mm xore loss qt end of core as a result				
	0. 14m: Fine SAND; light greyish brown. Loosely packed, moist, poorly graded. Sand, grey and brown and white, quartz.																
	0. 23m: Fine to medium SAND, minor shells 1-7mm; dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	0. 43m: Fine SAND, trace shells 2-4mm; light greyish brown. Loosely packed, moist, uniformly graded. Sand, grey and brown and white, quartz.																
	0. 50m: Fine to medium SAND, minor shells 1-20mm; dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.												*0.50m:* Sample collected for PSD				
	1. 04m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.							1.0									
	1.11m: Sharp contact																
	1. 11m: Fine to coarse SAND, some shelly (2-70), minor gravel; grey. Loosely packed, moist, gap graded. Sand, rounded to angular, white and grey and black, quartz; gravel, up to 25mm, sub-rounded to sub-angular, black.																
	1.45m: Sharp contact																
	1. 45m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.						-31	1.5									
	1. 49m: Fine to coarse SAND, minor shells (1-5mm); dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	1. 56m: Medium to coarse SAND, some shells (1-5mm); dark brownish grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	1.65m: Sharp contact																
	1.69m: Sharp contact																
	1. 65m: Fine SAND; light greyish brown. Loosely packed, moist, uniformly graded. Sand, grey and brown and white, quartz.																
	1.75m: Sharp contact																
	1. 69m: Fine to coarse SAND, some shells (1-5mm); greyish brown. Loosely packed, moist, poorly graded. Sand, white and grey and brown, quartz.																
	1.82m: Sharp contact																
	1. 75m: Fine SAND; light greyish brown. Loosely packed, moist, uniformly graded. Sand, grey and brown and white, quartz, Lense of Trace shells 1-4 mm.																
	1. 82m: Fine to coarse SAND, some shells (1-15mm) and some gravel; dark greyish brown. Very loose, moist, poorly graded.																

COMMENTS: Issue with core catcher. 160 mm core lost from the end of the investigation.

Hole Depth 3.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 07

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023175 mN 1738374 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -29m
R.L. COLLAR: -29m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	Sand, up to 2mm, white and grey and brown, quartz; gravel, up to 10mm, sub-rounded, black.																
	2.10m: Shelly (1-15mm) fine to coarse SAND; light pinkish brown. Loosely packed, moist, gap graded. Sand, white, quartz.																Box 0.00-2.10m
	2.95m: Sharp contact																
	2.95m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	3.00m: Sharp contact																
	3.00m: Shelly (1-5mm) fine to coarse SAND, trace gravel; greyish brown. Loosely packed, moist, poorly graded. Sand, white, quartz; gravel, fine to medium, up to 10mm.																
	3.06m: Sharp contact																
	3.06m: Fine to medium SAND, some shells (1-3mm); greyish brown. Loosely packed, moist, poorly graded. Sand, white and grey and brown, quartz.																
	3.10m: Shelly (1-15mm) fine to coarse SAND; light pinkish brown. Loosely packed, moist, gap graded. Sand, white, quartz.			VC	100		-32	2.5									Box 2.10-3.20m
	3.2m: END OF BOREHOLE						-33	3.0					*3.20m:* Sample collected for PSD				
								3.5									

COMMENTS: Issue with core catcher. 160 mm core lost from the end of the investigation.

Hole Depth 3.2m

Scale 1:10

Rev.: A

TTNZ_20230717 - GeneralLog - 27/02/2025 9:59:15 am - Produced with Core-GS by GeRoc

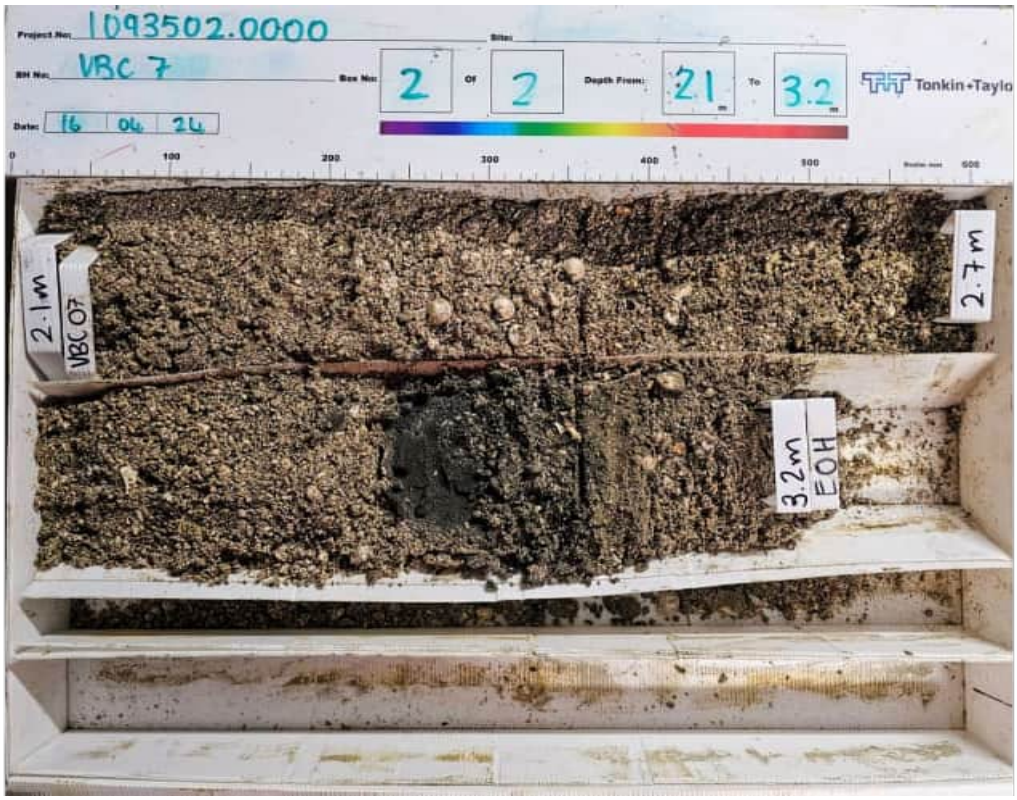
CORE PHOTOS

BOREHOLE No.: **VBC 07**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6023175 mN (NZTM2000) 1738374 mE R.L.: -29m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.10m



2.10-3.20m

BOREHOLE LOG

BOREHOLE No.: VBC 08

SHEET: 1 OF 3

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023410 mN 1738942 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -32m
R.L. COLLAR: -32m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; light brownish grey. Loosely packed, moist, poorly graded. Sand, grey and brown and white, quartz.																
	0.20m: Fine to medium SAND, minor shells (1-20mm); grey. Loosely packed, moist, poorly graded. Sand, grey and brown and white, quartz.			VC	100		-32	0.5					*0.50m:* Sample collected for PSD				
	1.35m: Fine to medium SAND, minor shells (1-70mm) and minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz.						-33	1.0									
	1.65m: Sandy SILT, trace shells (4-20mm); dark grey. Soft to firm, moist, low to medium plasticity. Sand, fine.							1.5									

COMMENTS:

Hole Depth 4.25m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 08

SHEET: 2 OF 3

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023410 mN 1738942 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -32m
R.L. COLLAR: -32m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.65m:* Sandy SILT, trace shells (4-20mm); dark grey. Soft to firm, moist, low to medium plasticity. Sand, fine.																
	2.10m: SILT, trace shells (2-40mm) and trace sand; dark grey. Firm, moist, medium to high plasticity.						-34	2.5									Box 0.00-2.40m
	2.50m: Fine SAND, minor silt; dark grey. Loosely packed, moist, uniformly graded. Sand, grey and black and white, quartz.			VC	100			3.0									
	3.30m: Fine SAND, minor silt; mottled light grey and greyish brown. Loosely packed, moist, uniformly graded. Sand, grey and brown and white, quartz.						-35	3.5									
	3.90m: SAND; mottled and banded light greyish brown and greyish brown. Loosely packed, moist, poorly graded. Sand, brown and white and grey and black, quartz.																

COMMENTS:

Hole Depth 4.25m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 08

SHEET: 3 OF 3

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023410 mN 1738942 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -32m
R.L. COLLAR: -32m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *3.90m:* SAND; mottled and banded light greyish brown and greyish brown. Loosely packed, moist, poorly graded. Sand, brown and white and grey and black, quartz.			VC	100												Box 2.40-4.25m
	4.25m: END OF BOREHOLE						-36	4.5					*4.25m:* Sample collected for PSD				
							-37	5.0									
								5.5									

COMMENTS:

Hole Depth 4.25m

Scale 1:10

Rev.: A

TTNZ_20230717 - GeneralLog - 27/02/2025 9:59:17 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **VBC 08**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6023410 mN (NZTM2000) 1738942 mE R.L.: -32m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.40m

2.40-4.25m

BOREHOLE LOG

BOREHOLE No.: VBC 09

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: 174.527042463772 -35.9483482262374 (WGS84)
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS M W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* PARTIAL CORE LOSS - Suspect loose material washed out.						-23						*0.00 - 3.10m* One main distinct contact at approx 2.3m. Paleosol jottling throughout. Upper 400 is recent Shelly deposits				
	0.10m: Fine to medium SAND, minor silt, trace shells (1-4mm); dark grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, yellow and white and brown and black, quartz.																
	0.20m: Fine to coarse SAND, some shells (1-60mm), minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and brown and black , quartz .																
	0.45m: Fine to coarse SAND, minor silt, trace shells (1-4mm); dark grey, grey mottled. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, white and brown and black, quartz.			VC	97			0.5					*0.50m:* Sample collected for PSD				
							-24	1.0									
	1.67m: Fine SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and brown and black, quartz.							1.5									

COMMENTS:

Hole Depth 3.1m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 09

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: 174.527042463772 -35.9483482262374 (WGS84)
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.67m:* Fine SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and brown and black, quartz.						-25										
	2.21m: With lenses of: Silty fine to medium SAND; dark brown. Very loose, wet, poorly graded.																
	2.24m: Fine SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and brown and black, quartz.																
	2.33m: Silty fine to medium SAND, some gravel; blackish brown. Loosely packed, wet, gap graded. Gravel, fine to medium, sub-rounded to sub-angular, grey.																Box 0.00-2.46m
	2.46m: Sharp contact							2.5									
	2.46m: Silty fine SAND; brown. Loosely packed, moist, poorly graded. Sand, quartz.												*2.46m:* Potential unconformity between holocene deposits (above) and pleistocene deposits (below)				
	2.50m: Silty fine to medium SAND, some gravel; dark brown. Loosely packed, wet, gap graded. Gravel, fine to medium, sub-rounded to sub-angular, slightly to moderately weathered, grey. Gravel lense.			VC	97												
	2.65m: Sharp contact																
	2.65m: Silty fine to coarse SAND; greyish brown. Loosely packed, moist, poorly graded. Sand, quartz.							3.0									Box 2.46-3.10m
							-26										
	3.1m: END OF BOREHOLE							3.5					*3.10m:* Sample collected for PSD				

COMMENTS:

Hole Depth 3.1m

Scale 1:10

Rev.: A

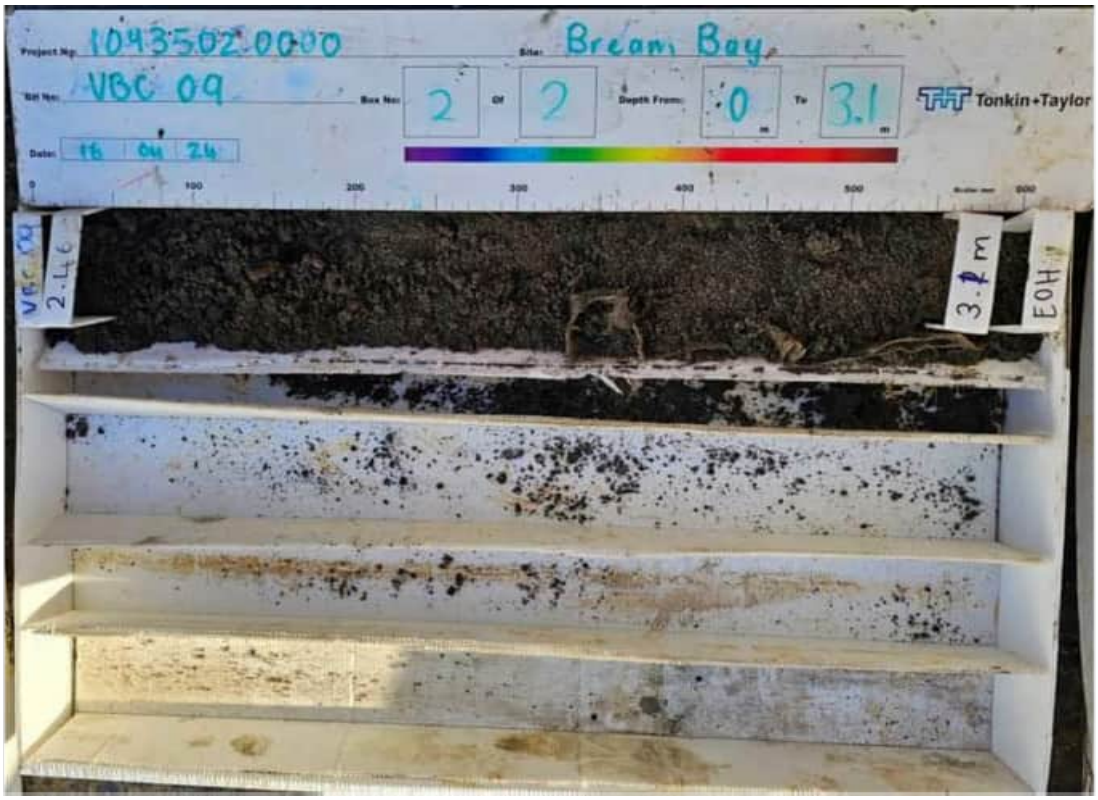
CORE PHOTOS

BOREHOLE No.: **VBC 09**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 174.527042463772 (WGS84) -35.9483482262374 R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.46m



2.46-3.10m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 1.2

SHEET: 1 OF 3

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024368 mN 1736123 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 0m
R.L. COLLAR: -22m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-50mm) fine to coarse SAND; light grey. Loosely packed, moist, poorly graded. Sand, up to 2mm, rounded to angular, white and grey and brown and black, quartz.												*0.00 - 4.90m* Barrel went 3.8m deep. Core recovery ..... 120mm cl at base from catcher				
	0.04m: Sharp contact *0.05m:* Fine to coarse SAND, some shells (1-30mm); light grey. Loosely packed, moist, poorly graded. Sand, up to 2mm, rounded to angular, white and grey and brown and black, quartz.																
	0.14m: Fine to medium SAND; grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz. And 5-20 mm clasts of light grey silt.																
	0.29m: Fine to coarse SAND, some shells 2-20mm and some gravel, trace silt; dark grey. Loosely packed, moist, gap graded. Sand, up to 2mm, rounded to angular, black and grey and white, quartz; gravel, fine to medium, up to 25mm, rounded to sub-angular, black.							0.5									
	0.52m: Fine SAND, minor silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and black and grey.												*0.50m:* Sample collected for PSD				
	0.64m: Fine to medium SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, white and black and grey.																
	0.82m: Fine to medium SAND, trace shells (2-15mm) and trace silt; grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz.																
	0.98m: Fine to coarse SAND, some shells (2-10mm) and some gravel, trace silt; dark grey. Loosely packed, moist, gap graded. Sand, up to 2mm, rounded to angular, black and grey and white, quartz; gravel, fine to medium, up to 25mm, rounded to sub-angular, black.			VC	100		-1	1.0									
	1.19m: Sharp contact *1.19m:* Fine SAND, minor silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and black and grey.																
	1.30m: Gradational contact *1.30m:* Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded.							1.5									
	1.56m: Fine to medium SAND, minor shells (1-20mm), trace silt; grey. Loosely packed, moist, poorly graded.																

COMMENTS:

Hole Depth 4.9m

Scale 1:10

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 1.2

SHEET: 2 OF 3

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024368 mN 1736123 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 0m
R.L. COLLAR: -22m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.56m:* Fine to medium SAND, minor shells (1-20mm), trace silt; grey. Loosely packed, moist, poorly graded.																
	2.26m: Fine to medium SAND, minor shells (1-10mm), trace silt; dark grey. Loosely packed, moist, poorly graded.																
	2.34m: Fine to medium SAND, trace shells (1-2mm); grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz.																
	2.55m: Sharp contact							2.5									
	2.55m: Fine to coarse SAND, trace shells (2-4mm); grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																Box 0.00-2.59m
	2.60m: Fine to coarse SAND, minor shells (1-10mm); dark brownish grey. Loosely packed, moist. Sand, up to 1mm, sub-rounded to angular, black and brown and grey and white, quartz.																
	2.80m: Fine to medium SAND, trace shells (1-3mm); dark grey. Loosely packed, moist. Sand, grey and black, quartz.																
	2.95m: Fine to coarse SAND, some shells (1-60mm); dark brownish grey. Loosely packed, moist. Sand, up to 1mm, sub-rounded to angular, black and brown and grey and white, quartz.			VC	100		-3	3.0									
	3.50m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded. Sand, grey and black, quartz.							3.5									
	3.60m: Sharp contact																
	3.60m: Fine to coarse SAND, some shells (1-40mm); dark brownish grey. Loosely packed, moist. Sand, up to 1mm, sub-rounded to angular, black and brown and grey and white, quartz.																
	3.80m: Sharp contact																
	3.80m: Fine to medium SAND, minor shells (1-5mm); dark brownish grey. Loosely packed, moist. Sand, grey and black and brown, quartz.																

COMMENTS:

Hole Depth 4.9m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 1.2

SHEET: 3 OF 3

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024368 mN 1736123 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 0m
R.L. COLLAR: -22m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	*4.00m:* Fine to coarse SAND, minor shells (1-10mm), trace gravel; dark brownish grey. Loosely packed, moist. Sand, up to 1mm, sub-rounded to angular, black and brown and grey and white, quartz. *4.10m:* Gravel, fine to medium, sub-rounded to sub-angular, black.			VC	100			4.5									Box 2.59-4.90m
	4.10m: Fine to medium SAND, trace shells (1-5mm); dark grey. Loosely packed, moist. Sand, grey and black and white, quartz. *4.30m:* Sharp contact																
	4.30m: Shelly (1-15mm) fine to coarse SAND, trace silt; dark brownish grey. Loosely packed, moist. Sand, sub-rounded to angular, black and brown and grey and white, quartz.																
	4.9m: END OF BOREHOLE						-5	5.0					*4.90m:* Sample collected for PSD				
								5.5									

COMMENTS:

Hole Depth 4.9m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 1.2**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6024368 mN (NZTM2000) 1736123 mE R.L.: 0m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.59m

2.59-4.90m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 10

SHEET: 1 OF 2

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES (NZTM2000): 6020940 mN, 1738273 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR: -25m
DATUM: NZVD2016
SURVEY: Handheld GPS

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to coarse SAND, some silt, trace shells (1-3mm); dark brown. Loosely packed, moist, poorly graded. Sand, up to 1mm, white and black, quartz.			VC	100												
	0.09m: Fine to coarse SAND, some shells (2-30mm), minor gravel; dark greyish brown. Loosely packed, moist, poorly graded. Sand, up to 1mm, white and black, quartz; gravel, fine to medium, up to 15mm, sub-rounded to sub-angular, brown and grey. *0.18m:* Sharp contact																
	0.18m: Medium to coarse SAND, some silt; blackish brown. Loosely packed, moist, poorly graded. Sand, white and black and grey, quartz. *0.38m:* Sharp contact																
	0.38m: Silty fine to coarse SAND; blackish brown . Loosely packed, moist, poorly graded. Sand, up to 1mm, white and black and grey, quartz. *0.57m:* Sharp contact							0.5					*0.50m:* Sample collected for PSD				
	0.57m: Silty fine SAND; blackish brown . Loosely packed, moist, uniformly graded. Sand, quartz. *0.87m:* Gradational contact						-26										
	0.87m: Silty fine to medium SAND; blackish brown . Loosely packed, moist, poorly graded. Sand, quartz.							1.0 / 1.5									
	1.69m: Silty fine to coarse SAND; blackish brown . Loosely packed, moist, poorly graded. Sand, quartz. *1.92m:* Gradational contact						-27										
	1.92m: Silty fine SAND; blackish brown . Loosely packed, moist, uniformly graded. Sand, quartz.																

COMMENTS:

Hole Depth 3.1m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 10

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6020940 mN 1738273 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR: -25m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallumn Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.92m:* Silty fine SAND; blackish brown . Loosely packed, moist, uniformly graded. Sand, quartz.			VC	100		-28	2.5									Box 0.00-2.50m
	2.26m: Gradational contact																
	2. 26m: Silty fine to coarse SAND; blackish brown . Loosely packed, moist, poorly graded. Sand, up to 1mm, white and black and grey, quartz.																
	2.32m: Gradational contact																
	2. 32m: Silty fine SAND; blackish brown . Loosely packed, moist, uniformly graded. Sand, quartz.							3.0									Box 2.50-3.10m
	3.1m: END OF BOREHOLE						-29	3.5					*3.10m:* Sample collected for PSD				

COMMENTS:

Hole Depth 3.1m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 10**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6020940 mN (NZTM2000) 1738273 mE R.L.: -25m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.50m

2.50-3.10m

BOREHOLE LOG

BOREHOLE No.: VBC 11

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021331 mN 1739184 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -29m
R.L. COLLAR: -29m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	0.00m: Fine to coarse SAND, minor shells (2-10mm); dark grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, black and grey and white, quartz.						-29	0									
	0.05m: Fine SAND, trace shells; dark grey. Loosely packed, moist, uniformly graded. Sand, quartz.												*0.09m:* Sharp contact				
	0.09m: Shelly (1-30mm) fine to coarse SAND; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, black and grey and white, quartz.																
	0.27m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded. Sand, quartz.												*0.27m:* Sharp contact				
	0.30m: Shelly (1-15mm) fine to coarse SAND; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, black and grey and white, quartz.												*0.30m:* Sharp contact				
								0.5					*0.50m:* Sample collected for PSD				
	0.54m: Fine to medium SAND, minor shells (1-5mm); dark grey. Loosely packed, moist, poorly graded. Sand, quartz.												*0.54m:* Gradational contact				
	0.60m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, quartz.																
	0.66m: Fine SAND, minor shells (2-12mm); dark grey. Very loose, moist, uniformly graded. Sand, quartz.																
	0.78m: Fine to medium SAND, minor shells (2-35mm); dark grey. Loosely packed, moist, poorly graded. Sand, quartz.																
	0.90m: Fine to coarse SAND, some shells (1-15mm); dark grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.			VC	100			1.0									
	1.04m: Fine to medium SAND, trace shells (1-20mm); dark grey. Loosely packed, moist, poorly graded. Sand, quartz.						-30						*1.04m:* Sharp contact				
								1.5									
	1.52m: Fine to coarse SAND, some shells (1-40mm), trace gravel; grey. Very loose, moist, poorly graded. Sand, rounded to angular, black and grey and white, quartz; gravel, up to 50mm, sub-rounded, black.												*1.52m:* Sharp contact				
	1.63m: Fine to medium SAND, trace shells (1-5mm); blackish grey. Loosely packed, moist, poorly graded. Sand, quartz.												*1.63m:* Sharp contact				
	1.80m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded.																
	1.86m: Fine SAND, trace shells (1-3mm); light greyish brown. Loosely packed, moist, uniformly graded.																

COMMENTS:

Hole Depth 3m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 11

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021331 mN 1739184 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -29m
R.L. COLLAR: -29m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	[CONT] *1.86m:* Fine SAND, trace shells (1-3mm); light greyish brown. Loosely packed, moist, uniformly graded.																
	2.08m: Fine to medium SAND, minor shells (1-3mm); light greyish brown. Loosely packed, moist, poorly graded. Sand, quartz.			VC	100												
	2.13m: Fine to medium SAND, minor shells (2-45mm); grey. Loosely packed, moist, poorly graded. Sand, quartz.																
	2.23m: Fine to medium SAND, minor shells (2-5mm); grey. Loosely packed, moist, poorly graded. Sand, quartz.																
	2.27m: Fine to medium SAND; grey. Loosely packed, moist, poorly graded. Sand, quartz.						-31	2.5									Box 0.00-2.40m
	2.40m: Fine to coarse SAND; dark grey. Loosely packed, moist, poorly graded. Sand, black and grey, quartz.																
	3m: END OF BOREHOLE						-32	3.0 3.5					*3.00m:* Sample collected for PSD				Box 2.40-3.00m

COMMENTS:

Hole Depth 3m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 11**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6021331 mN (NZTM2000) 1739184 mE R.L.: -29m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.40m

2.40-3.00m

BOREHOLE LOG

BOREHOLE No.: VBC 12

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021572 mN 1739745 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -27m
R.L. COLLAR: -27m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, minor shells (1-4mm); yellowish grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and yellow and grey and black, quartz.																
	0.13m: Fine SAND, trace shells (1-7mm); grey. Loosely packed, moist, uniformly graded. Sand, rounded to angular, grey and black, quartz.																
	0.93m: Sharp contact			VC	100		-28	0.5					*0.50m:* Sample collected for PSD				
	0.93m: Fine to coarse SAND, some shells (1-70mm); grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and grey and black, quartz.							1.0									
	1.33m: Gradational contact																
	1.33m: Fine to medium SAND, trace shells (1-5mm); dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, grey and black, quartz.						-29	1.5									Box 0.00-1.75m
	1.75m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.75m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 12**

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6021572 mN (NZTM2000) 1739745 mE R.L.: -27m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.75m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 13

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6018859 mN 1738529 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to coarse SAND, some shells (2-40mm); light grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, black and white and brown and grey, quartz.			VC	100		-24	0.5									Box 0.00-1.80m
	0.20m: Shelly (2-20mm) fine to coarse SAND; light grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, white and grey and black, quartz.																
	0.30m: Sharp contact																
	0.30m: Fine to medium SAND; dark grey. Loosely packed, moist. Sand, grey and white and black, quartz.																
	1.20m: Fine to medium SAND, trace silt; dark grey. Loosely packed, moist. Sand, grey and white and black, quartz.							1.0									
	1.40m: Gradational contact																
	1.40m: Fine to medium SAND, minor silt, trace shells (1-3mm); dark brownish grey. Loosely packed, moist. Sand, grey and white and black, quartz.																
	1.48m: Gradational contact																
	1.48m: Fine to coarse SAND, minor shells (1-15mm) and minor silt; dark blackish brown. Loosely packed, moist. Sand, grey and white and black, quartz.							1.5									
	1.58m: Silty fine SAND; brownish black. Loosely packed, moist, uniformly graded. Sand, grey and white and black, quartz.																
	1.64m: Sharp contact																
	1.64m: Fine to coarse SAND, minor shells (1-15mm) and minor silt; dark blackish brown. Loosely packed, moist. Sand, grey and white and black, quartz.																
	1.68m: Gradational contact																
	1.68m: Fine to coarse SAND, some shells (1-15mm), minor silt; dark blackish brown. Loosely packed, moist. Sand, grey and white and black, quartz. Grades to						-25										
	1.8m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.8m

Scale 1:10

Rev.: A

TTNZ_20230717 - GeneralLog - 27/02/2025 9:59:26 am - Produced with Core-GS by GeRoc v4.0.01

CORE PHOTOS

BOREHOLE No.: **VBC 13**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6018859 mN (NZTM2000) 1738529 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.80m

BOREHOLE LOG

BOREHOLE No.: VBC 14

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019100 mN 1739082 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -26m
R.L. COLLAR: -26m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to coarse SAND, minor shells (1-15mm); light brownish grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, brown and white and black, quartz.						-26	0									
	0.15m: Gradational contact																
	0.15m: Fine to coarse SAND, minor shells (1-40mm), trace gravel; grey. Loosely packed, moist, poorly graded. Sand, up to 2mm, rounded to angular, white and black and grey, quartz; gravel, up to 5mm, sub-rounded, dark grey.																
	0.36m: Sharp contact																
	0.36m: Fine to medium SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, up to 1mm, grey and black and white, quartz.			VC	100			0.5					*0.50m:* Sample collected for PSD				
	0.63m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, black and grey and white.																
	1.1m: END OF BOREHOLE						-27	1.0									Box 0.00-1.10m
								1.5									

COMMENTS:

Hole Depth 1.1m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 14**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6019100 mN (NZTM2000) 1739082 mE R.L.: -26m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.10m

BOREHOLE LOG

BOREHOLE No.: VBC 14 2.0

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019100 mN 1739082 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 0m
R.L. COLLAR: -26m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to coarse SAND, some shells (2-40mm); grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and grey and black, quartz.			VC	100		-1	0.5					*0.50m:* Sample collected for PSD				
	0.23m: Sharp contact																
	0.23m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded. Sand, rounded to angular, white and grey and black, quartz.							1.0									
								1.5									Box 0.00-1.62m
	1.62m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.62m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 14 2.0**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6019100 mN (NZTM2000) 1739082 mE R.L.: 0m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.62m

BOREHOLE LOG

BOREHOLE No.: VBC 15

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019495 mN 1739990 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -31m
R.L. COLLAR: -31m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-rounded, white and black and brown, quartz.																
	0.04m: Fine to medium SAND; greyish brown. Loosely packed, moist, poorly graded. Sand, rounded to sub-rounded, white and black and brown, quartz.																
	0.11m: Fine to coarse SAND, trace shells (1-5mm); grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-rounded, white and black and brown, quartz.																
	0.26m: Fine to coarse SAND, some shells (2-60mm) and some gravel, trace silt; grey. Loosely packed, moist, gap graded. Sand, rounded to angular, black and white and grey, quartz; gravel, fine to coarse, up to 50mm, rounded to sub-rounded, black and brown.																
	0.46m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, rounded to sub-rounded, white and black and brown, quartz.			VC	100		-32	0.5					*0.50m:* Sample collected for PSD				
							-33	1.0									
								1.5									

COMMENTS:

Hole Depth 2.52m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 15

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019495 mN 1739990 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -31m
R.L. COLLAR: -31m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *0.46m:* Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, rounded to sub-rounded, white and black and brown, quartz.			VC	100			2.5									Box 0.00-2.52m
	2.52m: END OF BOREHOLE						-34	3.0					*2.52m:* Sample collected for PSD				
								3.5									
							-35										

COMMENTS:

Hole Depth 2.52m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 15**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6019495 mN (NZTM2000) 1739990 mE R.L.: -31m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.52m

BOREHOLE LOG

BOREHOLE No.: VBC 16

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019771 mN 1740548 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -31m
R.L. COLLAR: -31m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 16/04/2024
FINISH DATE: 16/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW VW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	0.00m: Fine to coarse SAND; light brownish grey. Loosely packed, moist, poorly graded. Sand, up to 1mm, sub-rounded to angular, grey and black, quartz.						-31										
	0.15m: Fine to coarse SAND, trace shellls (1-4mm); brownish grey. Poorly graded. Sand, up to 1mm, sub-rounded to angular, black and grey, quartz.							0.5					*0.50m:* Sample collected for PSD				
	0.55m: Fine to coarse SAND, minor shells (1-70mm); dark grey. Loosely packed, moist, poorly graded. Sand, up to 1mm, quartz.			VC	100												
	0.75m: Fine to medium SAND, trace shells (1-10mm); dark grey. Loosely packed, moist, poorly graded. Sand, sub-rounded to sub-angular, quartz.						-32	1.0									Box 0.00-1.30m
	1.3m: END OF BOREHOLE							1.5									

COMMENTS:

Hole Depth 1.3m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 16**

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6019771 mN (NZTM2000) 1740548 mE R.L.: -31m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 16/04/2024 HOLE FINISHED: 16/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.30m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 17

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017038 mN 1739326 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.																
	0.12m: Fine to medium SAND, trace shells (1-4mm); greyish brown. Loosely packed, moist, poorly graded. Sand, white and brown and black.																
	0.20m: Shelly (1-15mm) fine to medium SAND; greyish brown. Loosely packed, moist, gap graded. Sand, white and brown and black.																
	0.32m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz. Light Grey sand filled bioturbation.																
	0.46m: Fine SAND, some silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.							0.5					*0.50m:* Sample collected for PSD				
	0.55m: Silty fine SAND, some clay; dark grey brown. Loosely packed, moist.																
	0.62m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and black and grey.																
	0.82m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and black and grey.						-24										
	0.89m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and black and grey.			VC	100			1.0									
	1.21m: Fine to coarse SAND; grey. Loosely packed, moist, poorly graded. Sand, rounded to sub-angular, white and black and grey.																
	1.33m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and black and grey.							1.5									
							-25										

COMMENTS:

Hole Depth 3.78m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 17

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm	CO-ORDINATES: (NZTM2000) 6017038 mN 1739326 mE	R.L. GROUND: -23m
JOB No.: 1093502.0000		R.L. COLLAR: -23m
LOCATION: Bream Bay	DIRECTION: 90°	DATUM: NZVD2016
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.33m:* Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and black and grey.			VC	100		-26	2.5									Box 0.0-2.08m
	2.08m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded. Sand, white and black and grey.																
	2.39m: Sharp contact																
	2.39m: Fine to coarse SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, up to 1.5mm, sub-rounded to sub-angular, white and black and grey.																
	2.69m: Sharp contact																
	2.69m: Fine to medium SAND; dark grey. Loosely packed, moist, poorly graded. Sand, white and black and grey.																
	2.98m: Gradational contact							3.0									
	2.98m: Fine to coarse SAND, minor silt; dark grey. Loosely packed, moist, poorly graded. Sand, up to 1.5mm, sub-rounded to sub-angular, white and black and grey.																
	3.11m: Gradational contact																
	3.11m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded.																
	3.32m: Shelly (2-50mm) fine to coarse SAND, minor silt; light grey. Loosely packed, moist, well graded. Sand, up to 2mm, rounded to angular, grey and white and black, quartz.							3.5									Box 2.08-3.78m
	3.78m: END OF BOREHOLE						-27						*3.78m:* Sample collected for PSD				

COMMENTS:

Hole Depth 3.78m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 17**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6017038 mN (NZTM2000) 1739326 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.08m

2.08-3.78m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 18

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017280 mN 1739882 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR: -25m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, minor shells (2-70mm); grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.						-25	0.5					*0.50m:* Sample collected for PSD				
	0.67m: Fine to medium SAND, trace shells (2-20mm); grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz, Trace shells 2-20 mm.			VC	100												
	0.89m: Fine to medium SAND, some shells (2-80mm); grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.							1.0									
	1.02m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.						-26										
	1.45m: Fine SAND, minor silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.							1.5									Box 0.00-1.60m
	1.57m: Fine SAND, trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.																
	1.6m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.6m

Scale 1:10

Rev.: A

TTNZ_20230717 - GeneralLog - 27/02/2025 9:59:35 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **VBC 18**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6017280 mN (NZTM2000) 1739882 mE R.L.: -25m DATUM: NZVD2016	DRILL TYPE: Vibracore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.60m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 19

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017676 mN 1740789 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -27m
R.L. COLLAR: -27m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace shells (1-4mm); yellowish grey. Loosely packed, moist, uniformly graded. Sand, up to 2mm, grey and black and brown and white, quartz.																
	0.10m: Fine to medium SAND, minor shells (1-80mm); grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz.																
	0.30m: Fine to medium SAND, trace shells (1-5mm); grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz.			VC	100		-28	0.5					*0.50m:* Sample collected for PSD				
	0.60m: Fine to medium SAND, minor shells (3-60mm); grey. Loosely packed, moist, poorly graded. Sand, grey and black and white, quartz.																
	0.76m: Fine SAND, trace silt; grey. Loosely packed, moist, uniformly graded. Sand, grey and black and white, quartz.																Box 0.00-0.90m
	0.9m: END OF BOREHOLE						-29	1.0 1.5									

COMMENTS:

Hole Depth 0.9m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 19**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6017676 mN (NZTM2000) 1740789 mE R.L.: -27m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-0.90m

BOREHOLE LOG

BOREHOLE No.: VBC 2.2

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024603 mN 1736661 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace shells (1-3mm); grey mixed with yellowish grey. Loosely packed, moist, uniformly graded. Sand, white and brown and grey, quartz						-23										
	0.12m: Fine to medium SAND, trace shells (1-30mm); grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	0.21m: Fine to medium SAND, some shells (2-80mm); grey. Loosely packed, moist, poorly graded. Sand, white and grey and black, quartz.																
	0.37m: Fine SAND, trace shells (1-5mm); dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.							0.5					*0.50m:* Sample collected for PSD				
	0.90m: Sharp contact																
	0.90m: Shelly (1-25mm) fine to coarse SAND; dark grey. Loosely packed, moist, poorly graded. Sand, up to 2mm, rounded to sub-angular, white and grey and black, quartz.			VC	100		-24	1.0									
	1.20m: Sharp contact																
	1.20m: Fine SAND, minor shells (2-10mm); dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.																
	1.40m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.							1.5									
	1.60m: Fine SAND, minor shells (2-30mm); dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.																
	1.80m: Fine SAND, trace shells (2-10mm); dark grey. Loosely packed, moist, uniformly graded. Sand, white and grey and black, quartz.																
	2.00m: Sharp contact																

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 2.2

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024603 mN 1736661 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR: -23m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*2.00m:* Shelly (1-25mm) fine to coarse SAND; dark grey. Loosely packed, moist, poorly graded. Sand, up to 2mm, rounded to sub-angular, white and grey and black, quartz.			VC	100		-25										Box 0.00-2.20m
	2.2m: END OF BOREHOLE						-26	2.5 3.0 3.5					*2.20m:* Sample collected for PSD				

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 2.2**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6024603 mN (NZTM2000) 1736661 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.20m

BOREHOLE LOG

BOREHOLE No.: VBC 20

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017917 mN 1741340 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -30m
R.L. COLLAR: -30m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; light brownish grey. Loosely packed, moist. Sand, grey and white and brown, quartz.						-30	0.5					*0.50m:* Sample collected for PSD				
	0.15m: Sharp contact																
	0.15m: Silty fine SAND, minor clay; dark grey. Loosely packed, moist, uniformly graded. Sand, quartz; silt, Low plasticity .																
	0.20m: Shelly (1-10mm) fine to medium SAND; light brownish grey. Loosely packed, moist. Sand, grey and white and brown, quartz.																
	0.27m: Sharp contact																
	0.27m: Shelly (2-70mm) fine to coarse SAND; brownish grey. Loosely packed, moist. Sand, grey and white and brown, quartz.																
	0.65m: Sharp contact																
	0.65m: Fine to medium SAND, trace shells (2-8mm); grey. Loosely packed, moist. Sand, grey and white and black, quartz.																
	0.83m: Fine to medium SAND, some shells (2-30mm); grey. Loosely packed, moist. Sand, sub-rounded to sub-angular, grey and white and black, quartz.																
	1.00m: Sharp contact																
	1.00m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded. Sand, grey and white and black, quartz.			VC	100		-31	1.0									
	1.30m: Fine to coarse SAND; grey. Loosely packed, moist, poorly graded. Sand, grey and white and black, quartz. Normal grading .							1.5									
	1.80m: Fine to medium SAND, trace gravel; dark grey. Loosely packed, moist, poorly graded. Sand, grey and white and black, quartz; gravel, up to 9mm, sub-angular, black.																

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 20

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017917 mN 1741340 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -30m
R.L. COLLAR: -30m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.80m:* Fine to medium SAND, trace gravel; dark grey. Loosely packed, moist, poorly graded. Sand, grey and white and black, quartz; gravel, up to 9mm, sub-angular, black.			VC	100												Box 0.00-2.20m
	2.08m: Fine to coarse SAND, trace gravel; dark grey. Loosely packed, moist, poorly graded. Sand, grey and white and black, quartz, Trace shells 2-5 mm; gravel, up to 4mm, sub-rounded to sub-angular, black.																
	2.2m: END OF BOREHOLE						-32	2.5					*2.20m:* Sample collected for PSD				
							-33	3.0									
								3.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

TTNZ_20230717 - GeneralLog - 27/02/2025 9:59:42 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **VBC 20**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6017917 mN (NZTM2000) 1741340 mE R.L.: -30m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.20m

BOREHOLE LOG

BOREHOLE No.: VBC 3.2

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025001 mN 1737572 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -24m
R.L. COLLAR: -24m
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 17/04/2024
FINISH DATE: 17/04/2024
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells (1-5mm); yellowish grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and black and brown, quartz.						0.5									
	0.15m: Fine to medium SAND, trace shells (1-5mm); grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and black and brown, quartz.															
	0.57m: Fine to medium SAND, some shells (1-70mm); dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and black and grey, quartz.			VC	100		-25					*0.50m:* Sample collected for PSD				
	0.68m: Fine to medium SAND, trace shells (1-4mm) and trace silt; dark grey. Loosely packed, moist, poorly graded. Sand, rounded to angular, white and black and grey, quartz.															
	0.78m: Fine SAND, trace shells (1-4mm) and trace silt; dark grey. Loosely packed, moist, uniformly graded. Sand, rounded to angular, white and black and grey, quartz.						1.0									
	1.22m: END OF BOREHOLE						1.5									Box 0.00-1.22m
							-26									

COMMENTS:

Hole Depth 1.22m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 3.2**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6025001 mN (NZTM2000) 1737572 mE R.L.: -24m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 17/04/2024 HOLE FINISHED: 17/04/2024 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.22m

BOREHOLE LOG

BOREHOLE No.: VB 01

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025302 mN 1736100 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; greyish brown. Loosely packed, wet, well graded.							0.5									
	0.40m: Shelly (1-30mm) fine to medium SAND; greyish brown. Loosely packed, wet, well graded. Sand, quartz.						-22	1.0									
	0.80m: Shelly (1-30mm) fine to medium SAND; greyish brown. Loosely packed, wet, well graded.							1.5									
	1.35m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-23										
	1.60m: Shelly (1-30mm) fine to medium SAND; brown . Loosely packed, wet, well graded. Sand, quartz.																
	1.70m: Shelly (1-30mm) fine to medium SAND; greenish grey. Loosely packed, wet, well graded. Sand, quartz.																

COMMENTS:

Hole Depth 2.14m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 01

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025302 mN 1736100 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.70m:* Shelly (1-30mm) fine to medium SAND; greenish grey. Loosely packed, wet, well graded. Sand, quartz.																
	2.10m: Fine SAND; greenish grey. Loosely packed, wet, well graded. Sand, quartz.																Box 0.00-2.14m
	2.14m: END OF BOREHOLE						-24	2.5									
								3.0									
								3.5									
							-25										

COMMENTS:

Hole Depth 2.14m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6025302 mN (NZTM2000) 1736100 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.14m

BOREHOLE LOG

BOREHOLE No.: VB 02

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025784 mN 1737949 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	0.00m: NO RECOVERY - likely washed out.							0.5									
Kariotahi Group	*0.50m:* Shelly (1-30mm) fine to medium SAND; brownish grey. Loosely packed, wet, well graded. Sand, quartz.						-22										
	0.76m: Shelly (1-15mm) fine to medium SAND. Loosely packed, wet. Sand, quartz.							1.0									
	0.95m: Shelly (1-30mm) fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	1.50m: Fine to medium SAND, trace shells (1-15mm); grey. Loosely packed, wet, well graded. Sand, quartz.						-23	1.5									

COMMENTS: Core was not recovered from the drilled interval 0 to 0.50 m. The core sample likely slipped through the core catcher.

Hole Depth 2.7m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 02

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6025784 mN 1737949 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.50m:* Fine to medium SAND, trace shells (1-15mm); grey. Loosely packed, wet, well graded. Sand, quartz.						2.5									
	2.60m: CLAY, minor shells; black. Soft to firm, wet, high plasticity.															Box 0.00-2.70m
	2.7m: END OF BOREHOLE						-24 3.0 3.5 -25									

COMMENTS: Core was not recovered from the drilled interval 0 to 0.50 m. The core sample likely slipped through the core catcher.

Hole Depth 2.7m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 02**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6025784 mN (NZTM2000) 1737949 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.70m

BOREHOLE LOG

BOREHOLE No.: VB 03

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021801 mN 1736516 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace shells(1-5mm); brownish grey. Loosely packed, wet. Sand, quartz.						-23	0.5									
	0.35m: Shelly (1-5mm) fine to medium SAND; brownish grey. Loosely packed, wet. Sand, quartz.																
	0.40m: Fine SAND; brownish grey. Loosely packed, wet. Sand, quartz.																
	0.60m: Fine to medium SAND; brownish grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.70m: Fine SAND; grey. Loosely packed, wet, well graded. Sand, quartz.							1.0									
	0.90m: Shelly (1-30mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.																
	1.10m: Fine SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-24	1.5									
	1.80m: NO RECOVERY - likely washed out.																

COMMENTS: Core was not recovered from the drilled interval 1.80 to 2.65 m. The core sample likely slipped through the core catcher.

Hole Depth 2.65m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 03

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021801 mN 1736516 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	[CONT] *1.80m:* NO RECOVERY - likely washed out.						-25	2.5									Box 0.00-2.65m
	2.65m: END OF BOREHOLE						-26	3.0 3.5									

COMMENTS: Core was not recovered from the drilled interval 1.80 to 2.65 m. The core sample likely slipped through the core catcher.

Hole Depth 2.65m

Scale 1:10

Rev.: A

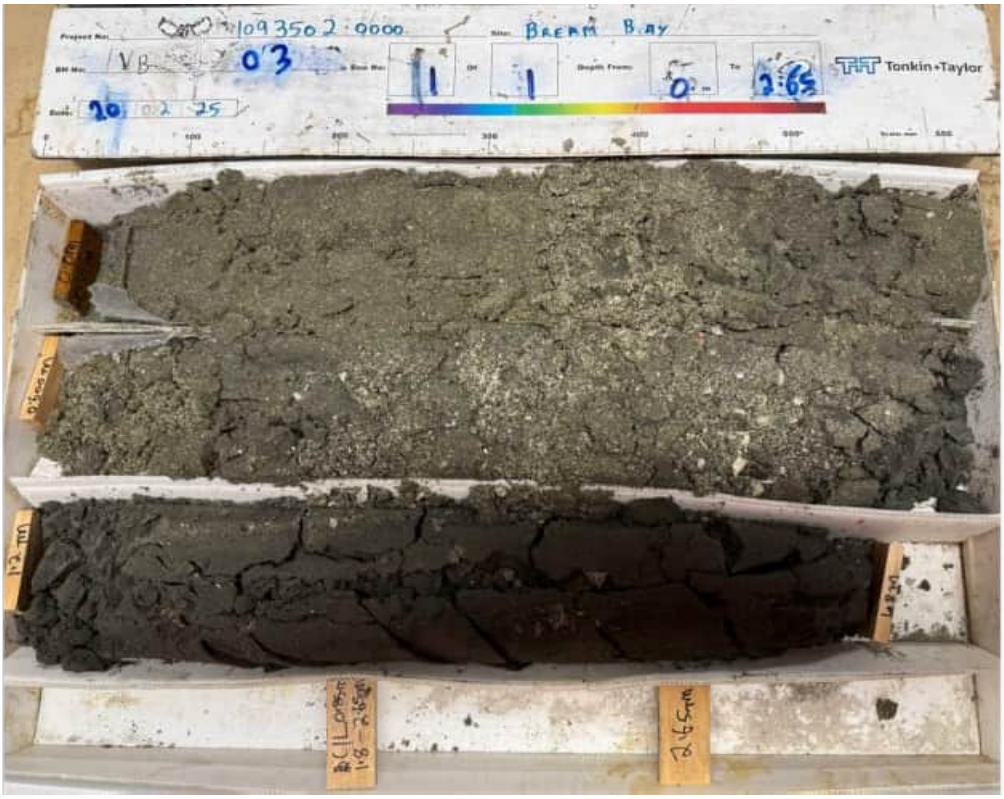
TTNZ_20240902 - GeneralLog - 27/02/2025 9:58:24 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **VB 03**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6021801 mN (NZTM2000) 1736516 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM



0.00-2.65m

BOREHOLE LOG

BOREHOLE No.: VB 05

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6020335 mN 1736813 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-30mm) fine to medium SAND; greyish brown. Loosely packed, wet, well graded.							0.5									
	0.40m: Fine to medium SAND; brownish grey. Loosely packed, wet, well graded.						-22										
	0.60m: Shelly (1-30mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.							1.0									
	0.98m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.							1.5									
	1.60m: Fine SAND; brown. Loosely packed, wet, well graded.						-23										
	1.65m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	1.80m: NO RECOVERY - likely washed out.																

COMMENTS: Core was not recovered from the drilled interval 1.80 to 2.40 m. The core sample likely slipped through the core catcher.

Hole Depth 2.4m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 05

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6020335 mN 1736813 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	[CONT] *1.80m:* NO RECOVERY - likely washed out.																Box 0.00-2.40m
	2.4m: END OF BOREHOLE						-24 -25	2.5 3.0 3.5									

COMMENTS: Core was not recovered from the drilled interval 1.80 to 2.40 m. The core sample likely slipped through the core catcher.

Hole Depth 2.4m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 05**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6020335 mN (NZTM2000) 1736813 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.40m

BOREHOLE LOG

BOREHOLE No.: VB 09

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6018417 mN 1737300 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-15mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.						-21										
	0.30m: Fine to medium SAND; brownish grey. Loosely packed, wet, well graded.							0.5									
	0.65m: Fine to medium SAND; brownish grey. Loosely packed, wet. Sand, quartz.						-22	1.0									
	1.40m: NO RECOVERY - likely washed out.							1.5									

COMMENTS: Core was not recovered from the drilled interval 1.40 to 2.24 m. The core sample likely slipped through the core catcher.

Hole Depth 2.24m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 09

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6018417 mN 1737300 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	[CONT] *1.40m:* NO RECOVERY - likely washed out.						-23										Box 0.00-2.24m
	2.24m: END OF BOREHOLE							2.5 3.0 -24 3.5									

COMMENTS: Core was not recovered from the drilled interval 1.40 to 2.24 m. The core sample likely slipped through the core catcher.

Hole Depth 2.24m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 09**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6018417 mN (NZTM2000) 1737300 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.24m

BOREHOLE LOG

BOREHOLE No.: VB 09.01

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6018389 mN 1737290 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND; brown. Loosely packed, wet, well graded.						-21										
	0.07m: Shelly (1-30mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded.							0.5									
	0.41m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-22	1.0									
	1.75m: Fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.							1.5									

COMMENTS:

Hole Depth 2.4m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 09.01

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6018389 mN 1737290 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.75m:* Fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.																
	2.05m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-23										
	2.35m: Fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.																Box 0.00-2.40m
	2.4m: END OF BOREHOLE						-24	2.5 3.0 3.5									

COMMENTS:

Hole Depth 2.4m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 09.01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6018389 mN (NZTM2000) 1737290 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.40m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 13

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6016498 mN 1737928 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -20m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-15mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.							0.5									
	0.18m: Shelly (1-15mm) fine to medium SAND; grey speckled white. Loosely packed, wet, well graded. Sand, quartz.																
	0.43m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.			VC	100		-21	1.0									
	1.30 - 1.50m Trace shells(1-30mm).							1.5									
								2									

COMMENTS:

Hole Depth 2.35m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 13

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6016498 mN 1737928 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -20m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *0.43m:* Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.			VC	100											Box 0.00-2.35m
	2.35m: END OF BOREHOLE						-23 (2.5, 3.0, 3.5)									

COMMENTS:

Hole Depth 2.35m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 13**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6016498 mN (NZTM2000) 1737928 mE R.L.: -20m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.35m

BOREHOLE LOG

BOREHOLE No.: VB 14

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019489 mN 1737558 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, some shells (1-15mm); greyish brown. Loosely packed, wet, well graded.																
	0.15m: Fine to medium SAND; brown. Loosely packed, wet, well graded.																
	0.35m: Shelly (1-15mm) fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.52m: Shelly (1-30mm) fine to medium SAND; greyish white brown. Loosely packed, wet, poorly graded.							0.5									
	0.65m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.			VC	76		-22	1.0									
	1.90m: NO RECOVERY - likely washed out.						-23	1.5									

COMMENTS: Core was not recovered from the drilled interval 1.90 to 2.50 m. The core sample likely slipped through the core catcher.

Hole Depth 2.5m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 14

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6019489 mN 1737558 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW EW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.90m:* NO RECOVERY - likely washed out.			VC	76												Box 0.00-2.50m
	2.5m: END OF BOREHOLE						-24 -25	2.5 3.0 3.5									

COMMENTS: Core was not recovered from the drilled interval 1.90 to 2.50 m. The core sample likely slipped through the core catcher.

Hole Depth 2.5m

Scale 1:10

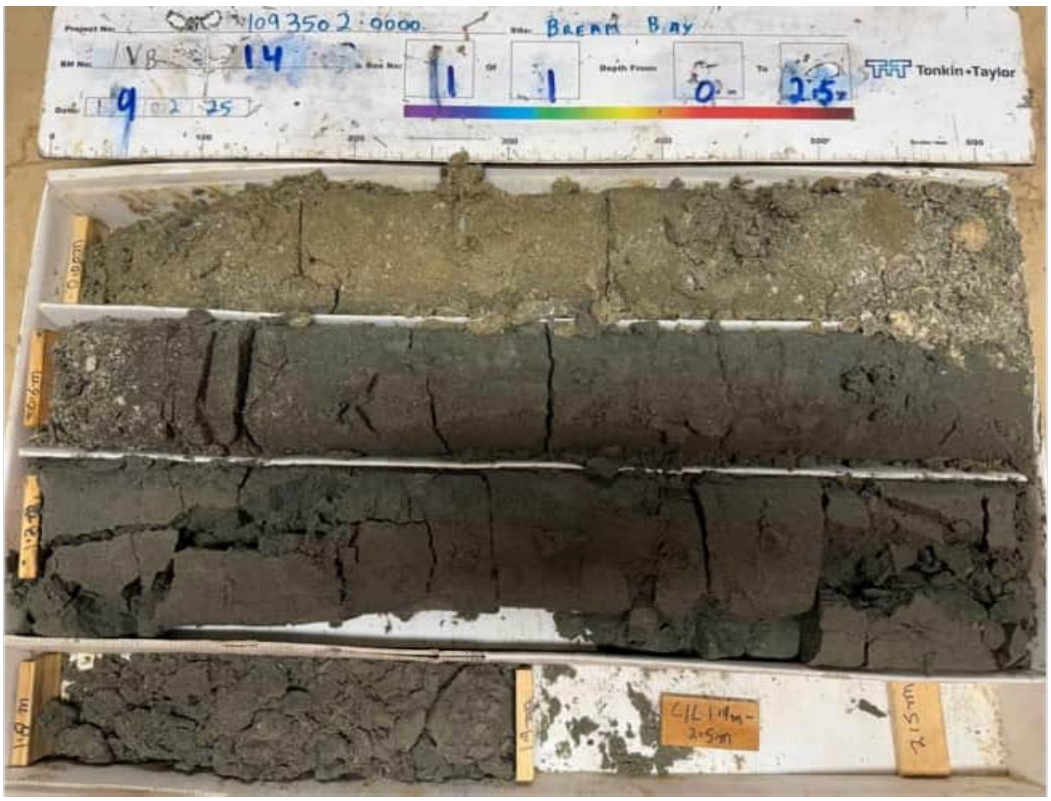
Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 14**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6019489 mN (NZTM2000) 1737558 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM



0.00-2.50m

BOREHOLE LOG

BOREHOLE No.: VB 18

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6014819 mN 1739063 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-21	0.5									
	0.13m: Fine to medium SAND; greyish brown. Loosely packed, wet, well graded.																
	0.20m: Shelly (1-15mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.80m: Shelly (1-30mm) fine to medium SAND; greyish brown. Loosely packed, wet, well graded.							1.0									
	1.00m: Shelly (1-15mm) fine to medium SAND; brownish grey. Loosely packed, wet, well graded.																
	1.20m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-22	1.5									Box 0.00-1.70m
	1.7m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.7m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 18**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6014819 mN (NZTM2000) 1739063 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.70m

BOREHOLE LOG

BOREHOLE No.: VB 18.01

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm	CO-ORDINATES: (NZTM2000) 6014813 mN 1739071 mE	R.L. GROUND: -21m
JOB No.: 1093502.0000		R.L. COLLAR:
LOCATION: Bream Bay	DIRECTION: 90°	DATUM: NZVD2016
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; brown. Loosely packed, wet, well graded.																
	0.30m: Shelly (1-30mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded.						-21	0.5									
	0.70m: Shelly (1-15mm) fine to medium SAND. Loosely packed, wet. Sand, quartz.			VC	100			1.0									
	1.35m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-22	1.5									Box 0.00-1.50m
	1.5m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.5m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 18.01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6014813 mN (NZTM2000) 1739071 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.50m

BOREHOLE LOG

BOREHOLE No.: VB 19

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015324 mN 1740270 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-30mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.						-22	0.5									
	0.35m: Fine to medium SAND, some shells(1-10mm); brown. Loosely packed, wet, well graded.																
	0.40m: Shelly (1-5mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.							1.0									
	1.20m: Fine to medium SAND, some shells(1-15mm); whitish brown. Loosely packed, wet, well graded.							1.5									Box 0.00-1.50m
	1.5m: END OF BOREHOLE						-23										

COMMENTS:

Hole Depth 1.5m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 19**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015324 mN (NZTM2000) 1740270 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.50m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 19.01

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015285 mN 1740383 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells(1-5mm); whitish grey. Loosely packed, wet, well graded.																
	0.20m: Shelly (1-30mm) fine to medium SAND; greyish brown speckled white. Loosely packed, wet, well graded.			VC	0		-22	0.5									
	0.95m: Shelly (1-30mm) fine to medium SAND; brownish grey speckled white. Loosely packed, wet, well graded.							1.0									
	1.50m: Shelly (1-15mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.						-23	1.5									Box 0.00-1.70m
	1.7m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.7m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 19.01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015285 mN (NZTM2000) 1740383 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.70m

BOREHOLE LOG

BOREHOLE No.: VB 20

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015866 mN 1741517 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -24m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-15mm) fine to medium SAND; greyish brown. Loosely packed, wet, well graded. Sand, quartz.																
	0.15m: Fine to medium SAND, minor shells; light brown. Loosely packed, wet, well graded.																
	0.35m: Shelly (1-15mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded. Sand, quartz.																
	0.50m: Shelly (1-30mm) fine to medium SAND; whitish grey. Loosely packed, wet. Sand, quartz.						-24	0.5									
	0.75m: Shelly (1-15mm) fine to medium SAND. Loosely packed, wet.			VC	100												
	1.05m: Fine to medium SAND, minor shells(1-5mm); grey. Loosely packed, wet, well graded. Sand, quartz.							1.0									
	1.5m: END OF BOREHOLE						-25	1.5									Box 0.00-1.50m

COMMENTS:

Hole Depth 1.5m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 20**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015866 mN (NZTM2000) 1741517 mE R.L.: -24m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.50m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 20.01

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015846 mN 1741589 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -24m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; greyish brown. Loosely packed, wet, well graded.																
	0.15m: Shelly (1-15mm) fine to medium SAND; greyish brown speckled white. Loosely packed, wet, well graded.						-24	0.5									
	0.56m: Fine to medium SAND, minor shells(1-5mm); grey spekled white. Loosely packed, wet, well graded. Sand, quartz.			VC	100			1.0									
Awhitu Group	*1.35m:* Fine to medium SAND, minor silt; greenish grey. Loosely packed, wet, well graded.																
	1.43m: Silty fine SAND; orange brown. Loosely packed, wet, well graded.						-25	1.5									
	2m: END OF BOREHOLE																Box 0.00-2.00m

COMMENTS:

Hole Depth 2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 20.01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015846 mN (NZTM2000) 1741589 mE R.L.: -24m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.00m

BOREHOLE LOG

BOREHOLE No.: VB 21

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6016401 mN 1742747 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -28m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to coarse SAND, minor shells (3-12mm); light brownish grey mixed with dark grey. Loosely packed, moist, uniformly graded.															
	0.35m: Fine to medium SAND, trace shells (2-10mm); light brownish grey mixed with dark grey. Loosely packed, moist, poorly graded.						0.5									
	0.70m: Fine to coarse SAND, minor shells (3-8mm); light brownish grey mixed with dark grey. Loosely packed, moist, uniformly graded.						-29									
	0.90m: Fine to medium SAND, trace shells (2-8mm); light brownish grey. Loosely packed, moist, poorly graded.			VC	100		1.0									
							1.5									Box 0.00-1.70m
	1.7m: END OF BOREHOLE						-30									

COMMENTS:

Hole Depth 1.7m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 21**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6016401 mN (NZTM2000) 1742747 mE R.L.: -28m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.70m

BOREHOLE LOG

BOREHOLE No.: VB 22

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6016793 mN 1743885 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -34m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* NOT RECOVERED							0.5									
	0.10m: Fine to medium SAND, trace shells (3-12mm); grey. Loosely packed, moist, poorly graded.			VC	95		-35	1.0									
	1.40m: Fine to coarse SAND, some shells (5-20mm), minor gravel; grey. Loosely packed, moist, well graded; gravel, fine to medium, maximum 10 mm diameter, rounded to sub-rounded, black.						-36	1.5									
	1.70m: Fine SAND; dark grey. Loosely packed, moist, uniformly graded.																

COMMENTS: Core was not recovered from the drilled interval 0 to 0.10 m. The core sample likely slipped through the core catcher.

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 22

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6016793 mN 1743885 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -34m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.70m:* Fine SAND; dark grey. Loosely packed, moist, uniformly graded.			VC	95												Box 0.00-2.20m
	2.2m: END OF BOREHOLE						-37 -38	2.5 3.0 3.5									

COMMENTS: Core was not recovered from the drilled interval 0 to 0.10 m. The core sample likely slipped through the core catcher.

Hole Depth 2.2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 22**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6016793 mN (NZTM2000) 1743885 mE R.L.: -34m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.20m

BOREHOLE LOG

BOREHOLE No.: VB 24.0

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6013866 mN 1739967 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; greyish brown. Loosely packed, wet, well graded. Sand, quartz.						-21	0.5									
	0.12m: Fine to medium SAND; brown. Loosely packed, wet, well graded.																
	0.22m: Shelly (1-30mm) fine to medium SAND; greyish bown speckled white. Loosely packed, wet, well graded.																
	0.80m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.							1.0									Box 0.00-1.40m
	1.4m: END OF BOREHOLE						-22	1.5									

COMMENTS:

Hole Depth 1.4m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 24.0**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6013866 mN (NZTM2000) 1739967 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.40m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 24.01

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6013872 mN 1739917 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells (3-10mm); light brownish grey. Loosely packed, moist, poorly graded.						-21	0.5									
	0.30m: Fine to medium SAND, some shells (2-30mm); light brownish grey. Loosely packed, moist, poorly graded.																
	0.60m: Fine to medium SAND, trace shells (3-10mm), trace gravel; grey. Loosely packed, moist, uniformly graded; gravel, fine to medium, maximum 10 mm diameter, rounded to sub-rounded, black. *0.68 - 0.70m* Sharp lower contact																
	0.70m: SAND, minor silt and some clay; dark grey. Very soft, moist, medium to high plasticity; sand, fine,																
	0.75m: Fine SAND, some silt, trace shells (3-10mm); brownish grey streaked with light brownish grey. Loosely packed, moist, uniformly graded. *0.75 - 0.76m* Sharp upper contact			VC	100			1.0					*1.00 - 1.05m* Dark brown, silty SAND lense				
							-22	1.5					*1.40 - 1.60m* Possible Bioturbation				
	1.65m: Silty SAND; grey. Loosely packed, moist; sand, fine to medium.																Box 0.00-1.80m
	1.8m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.8m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 24.01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6013872 mN (NZTM2000) 1739917 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.80m

BOREHOLE LOG

BOREHOLE No.: VB 24.02

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6013874 mN 1739952 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* NO RECOVERY - likely washed out.																
	0.10m: Fine SAND; brown. Loosely packed, wet, well graded. Sand, quartz.																
	0.39m: Shelly (1-30mm) fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-21	0.5									
	0.60m: Fine to medium SAND, some shells; whitish grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.95m: Fine SAND; grey. Loosely packed, wet, well graded. Sand, quartz.			VC	96			1.0									
	1.70m: Silty fine SAND, some clay; greenish black. Loosely packed, wet, low plasticity, dilatant slow. Sand, quartz.						-22	1.5									

Rock Weathering: UW, SW, MW, HW, CW, RS
Rock Strength: VS+, S, MS, W, VW, EW
Water Level / Fluid Loss (%): 25, 50, 75
Fracture Spacing (mm): 2000, 600, 200, 60, 20

COMMENTS: Core was not recovered from the drilled interval 0 to 0.10 m. The core sample likely slipped through the core catcher.

Hole Depth 2.6m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 24.02

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6013874 mN 1739952 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.70m:* Silty fine SAND, some clay; greenish black. Loosely packed, wet, low plasticity, dilatant slow. Sand, quartz.			VC	96		-23	2.5									Box 0.00-2.40m Box 2.40-2.60m
	2.6m: END OF BOREHOLE						-24	3.0 3.5									

COMMENTS: Core was not recovered from the drilled interval 0 to 0.10 m. The core sample likely slipped through the core catcher.

Hole Depth 2.6m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 24.02**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6013874 mN (NZTM2000) 1739952 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.40m

2.40-2.60m

BOREHOLE LOG

BOREHOLE No.: VB 25

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm	CO-ORDINATES: (NZTM2000) 6014095 mN 1740654 mE	R.L. GROUND: -21m
JOB No.: 1093502.0000		R.L. COLLAR:
LOCATION: Bream Bay	DIRECTION: 90°	DATUM: NZVD2016
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shelly(1-5mm); brown. Loosely packed, wet, well graded.							0.5									
	0.21m: Shelly (1-15mm) fine to medium SAND; brown. Loosely packed, wet, well graded.						-22										
	0.60m: Fine to medium SAND, some shells(1-15mm); grey. Loosely packed, wet, well graded. Sand, quartz.							1.0									
	0.70m: Shelly (1-30mm) fine to medium SAND; brown. Loosely packed, wet, well graded.																
	1.20m: Shelly (1-15mm) fine to medium SAND; brownish grey. Loosely packed, wet, well graded. Sand, quartz.							1.5									
	1.45m: Shelly (1-15mm) fine to medium SAND; grey. Loosely packed, wet, well graded.						-23										

COMMENTS:

Hole Depth 3m

Scale 1:10

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 25

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6014095 mN 1740654 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -21m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.45m:* Shelly (1-15mm) fine to medium SAND; grey. Loosely packed, wet, well graded.																
	2.03m: Fine to medium SAND, trace gravel; grey speckled white. Loosely packed, wet, well graded. Sand, quartz; gravel, fine to medium, angular, white.																
	2.40m: Fine to medium SAND, trace shells(1-30mm); grey. Loosely packed, wet, well graded.						-24	2.5									Box 0.00-2.40m
								3.0									Box 2.40-3.00m
	3m: END OF BOREHOLE						-25	3.5									

COMMENTS:

Hole Depth 3m

Scale 1:10

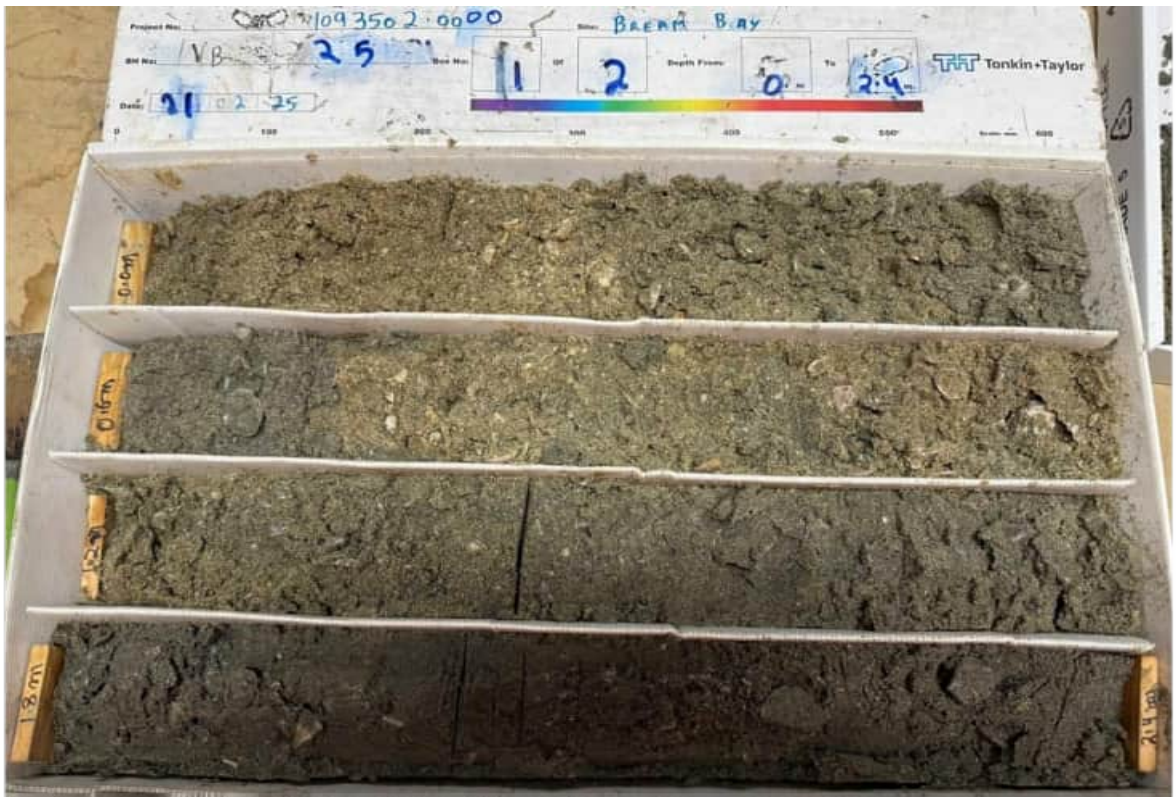
Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 25**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6014095 mN (NZTM2000) 1740654 mE R.L.: -21m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM



0.00-2.40m

2.40-3.00m

BOREHOLE LOG

BOREHOLE No.: VB 26

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6014697 mN 1741168 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
	0.00m: PARTIAL CORE LOSS - suspect running sand washed out.															
Kariotahi Group	*0.10m:* Fine to medium SAND, trace shells (2-5mm); light brownish grey. Loosely packed, moist, poorly graded.															
	0.30m: Fine to medium SAND, some shells (5-25mm) ; light brownish grey. Loosely packed, moist, poorly graded.															
	0.44m: Fine to medium SAND, minor shells (5-40mm); light grey. Loosely packed, moist, poorly graded.															
	0.90m: Fine to medium SAND, trace shells (2-10mm); grey. Loosely packed, moist, poorly graded.			VC	96		-24 (0.5, 1.0)									
	1.70m: Fine to coarse SAND, minor shells (2-15mm); grey. Loosely packed, moist, well graded.						-25 (1.5)									

COMMENTS: Core was not recovered from the drilled interval 0 to 0.10 m. The core sample likely slipped through the core catcher.

Hole Depth 2.4m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 26

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6014697 mN 1741168 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.70m:* Fine to coarse SAND, minor shells (2-15mm); grey. Loosely packed, moist, well graded.			V/C	96											Box 0.00-2.40m
	2.4m: END OF BOREHOLE						-26 (2.5) (3.0) (3.5) -27									

COMMENTS: Core was not recovered from the drilled interval 0 to 0.10 m. The core sample likely slipped through the core catcher.

Hole Depth 2.4m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 26**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6014697 mN (NZTM2000) 1741168 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-2.40m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 27

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015357 mN 1743218 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -28m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW VW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (2-30mm) fine to coarse SAND, some gravel; light brownish grey. Loosely packed, moist, gap graded; gravel, fine to medium, maximum 15 mm diameter, sub-rounded, black.															
	0.20m: Fine to medium SAND, some shells (5-10mm), trace gravel; grey. Loosely packed, gravel, fine, maximum 10 mm diameter, rounded to sub-rounded.															
	0.34m: Fine SAND, minor shells (3-10mm), trace gravel; grey. Loosely packed, moist; gravel, fine, maximum 5 mm diameter, rounded to sub-rounded, black.						0.5									
	0.60m: Fine to coarse SAND, minor shells (2-15mm); light brownish grey. Loosely packed, moist; sand, quartz, gravel, fine, maximum 5 mm diameter, rounded to sub-rounded, black.			V/C	100		-29 1.0									Box 0.00-1.40m
	1.4m: END OF BOREHOLE						1.5									

COMMENTS:

Hole Depth 1.4m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 27**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015357 mN (NZTM2000) 1743218 mE R.L.: -28m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.40m

BOREHOLE LOG

BOREHOLE No.: VB 27.01

SHEET: 1 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015351 mN 1743212 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -28m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-5mm) fine to medium SAND; brown. Loosely packed, wet, well graded.							0.5									
	0.15m: Shelly (1-30mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.						-29	1.0									
	0.90m: Shelly (1-30mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.							1.5									
	1.40m: NO RECOVERY - likely washed out.																

COMMENTS: Core was not recovered from the drilled interval 1.40 to 2.20 m. The core sample likely slipped through the core catcher.

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB 27.01

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015351 mN 1743212 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -28m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 11/02/2025
FINISH DATE: 11/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.40m:* NO RECOVERY - likely washed out.																Box 0.00-2.20m
	2.2m: END OF BOREHOLE						-31	2.5 3.0 3.5									

COMMENTS: Core was not recovered from the drilled interval 1.40 to 2.20 m. The core sample likely slipped through the core catcher.

Hole Depth 2.2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 27.01**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015351 mN (NZTM2000) 1743212 mE R.L.: -28m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 11/02/2025 HOLE FINISHED: 11/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.20m

BOREHOLE LOG

BOREHOLE No.: VB 27.02

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015369 mN 1743227 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -28m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* NO RECOVERY - likely washed out																
	0.18m: Shelly (1-15mm) gravelly fine to coarse SAND; whitish brown. Loosely packed, wet, well graded. Gravel, fine, rounded.							0.5									
	0.75m: Fine SAND; grey. Loosely packed, wet, well graded.			VC	89		-29	1.0									
	1.10m: Shelly (1-15mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded.							1.5									
	1.55m: Fine to medium SAND; grey. Loosely packed, wet, well graded.																Box 0.00-1.70m
	1.7m: END OF BOREHOLE																

COMMENTS: Core was not recovered from the drilled interval 0.10 to 0.18 m. The core sample likely slipped through the core catcher.

Hole Depth 1.7m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 27.02**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015369 mN (NZTM2000) 1743227 mE R.L.: -28m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.70m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB 28

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6015736 mN 1743874 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -34m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2041
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND, trace shells(1-5mm); grey. Loosely packed, wet, well graded. Sand, quartz.							0.5									
	0.20m: Fine to medium SAND; brownish grey. Loosely packed, wet, well graded.																
	0.30m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.80m: Shelly (1-5mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.			VC	90		-35	1.0									
	1.20m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.							1.5									
	1.70m: Shelly (1-15mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.																
	1.80m: NO RECOVERY - likely washed out.						-36										Box 0.00-2.00m
	2m: END OF BOREHOLE																

COMMENTS: Core was not recovered from the drilled interval 1.80 to 2.00 m. The core sample likely slipped through the core catcher.

Hole Depth 2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB 28**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6015736 mN (NZTM2000) 1743874 mE R.L.: -34m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2041 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.00m

BOREHOLE LOG

BOREHOLE No.: VB A

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023428 mN 1736536 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells(1-5mm); grey. Loosely packed, wet, well graded. Sand, quartz																
	0.24m: Shelly (1-5mm) fine to medium SAND; brownish grey. Loosely packed, wet, well graded. Sand, quartz.							0.5									
	0.54m: Shelly (1-15mm) fine SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-24										
	0.60m: Fine SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.80m: Shelly (1-15mm) fine to medium SAND; grey speckled white. Loosely packed, wet, well graded. Sand, quartz.							1.0									
	1.00m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	1.20m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.							1.5									
	1.50m: Fine to medium SAND, minor shells(1-5mm); grey. Loosely packed, wet, well graded. Sand, quartz.																Box 0.00-1.65m
	1.65m: END OF BOREHOLE						-25										

COMMENTS:

Hole Depth 1.65m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB A**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6023428 mN (NZTM2000) 1736536 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 13/02/2025 HOLE FINISHED: 13/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.65m

BOREHOLE LOG

BOREHOLE No.: VB B

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023654 mN 1737053 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-5mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.						-25	0.5									
	0.21m: Fine to medium SAND; brown. Loosely packed, wet, well graded.																
	0.40m: Shelly (1-15mm) fine to medium SAND. Loosely packed, wet. Sand, quartz.																
	0.80m: Shelly (1-30mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded. Sand, quartz.							1.0									
	1.20m: Fine to medium SAND; blackish grey speckled white. Loosely packed, wet, well graded. Sand, quartz.						-26	1.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB B

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6023654 mN 1737053 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.20m:* Fine to medium SAND; blackish grey speckled white. Loosely packed, wet, well graded. Sand, quartz.																
	2.05m: Fine SAND; greenish grey. Loosely packed, wet, well graded. Sand, quartz.																Box 0.00-2.20m
	2.2m: END OF BOREHOLE						-27	2.5									
							-28	3.0									
								3.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB B**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6023654 mN (NZTM2000) 1737053 mE R.L.: -25m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 13/02/2025 HOLE FINISHED: 13/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.20m

BOREHOLE LOG

BOREHOLE No.: VB C

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm	CO-ORDINATES: (NZTM2000) 6024081 mN 1737972 mE	R.L. GROUND: -28m
JOB No.: 1093502.0000		R.L. COLLAR:
LOCATION: Bream Bay	DIRECTION: 90°	DATUM: NZVD2016
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells(1-5mm); brownish light grey. Wet, well graded. Sand, quartz.																
	0.23m: Fine to medium SAND, some silt, trace shells(1-5mm); grey. Wet, well graded. Sand, quartz.							0.5									
	0.74m: Shelly (1-15mm) fine to medium SAND; grey. Wet, well graded. Sand, quartz.						-29										
	0.89m: Shelly (1-15mm) fine to medium SAND, some silt; dark brown. Wet, well graded.							1.0									
	1.03m: Fine to medium SAND, trace shells; dark brown. Wet, well graded.			VC	100												
	1.53m: Shelly (1-30mm) fine to medium SAND; dark brown. Wet, well graded.							1.5									
	1.80m: Fine to medium SAND, minor silt; dark brown. Wet, well graded.						-30										

COMMENTS:

Hole Depth 2.5m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB C

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024081 mN 1737972 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -28m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m) / Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*2.00m:* Shelly (1-15mm) fine to medium SAND; blackish dark brown. Wet, well graded.			VC	100											
	2.20m: Fine to medium SAND, trace shells; dark brown. Wet, well graded.															
	2.35m: Shelly (1-15mm) fine to medium SAND; dark brown. Wet, well graded						2.5									Box 0.00-2.40m; Box 2.40-2.50m
	2.5m: END OF BOREHOLE						-31 3.0 3.5 -32									

COMMENTS:

Hole Depth 2.5m

Scale 1:10

Rev.: A

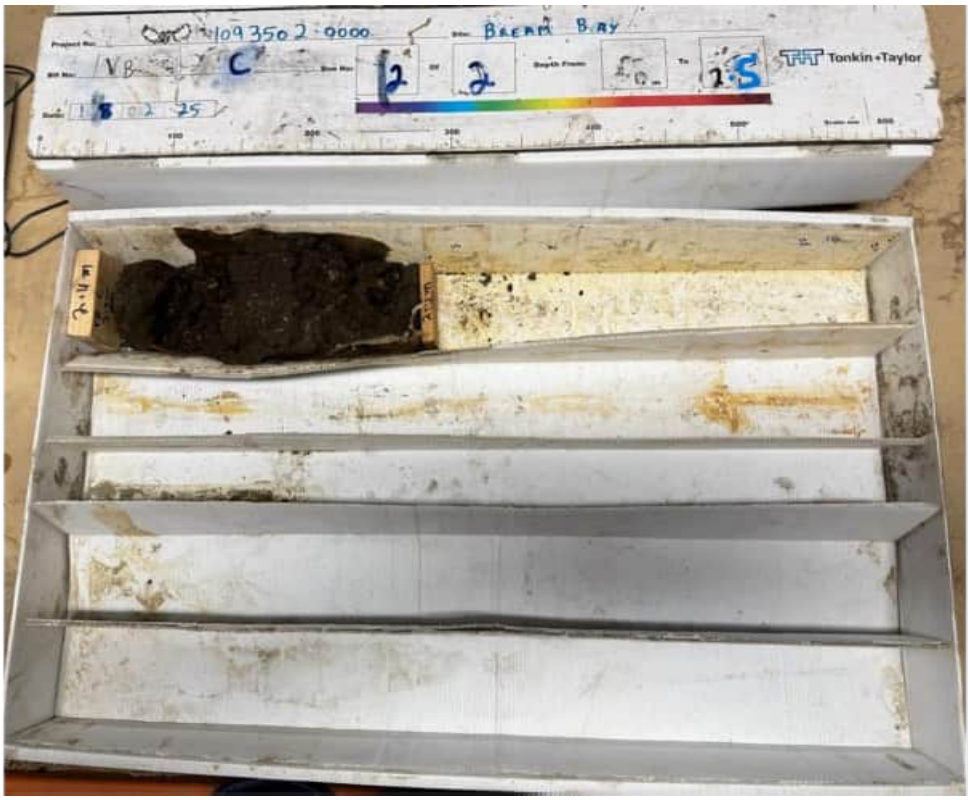
CORE PHOTOS

BOREHOLE No.: **VB C**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6024081 mN (NZTM2000) 1737972 mE R.L.: -28m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 13/02/2025 HOLE FINISHED: 13/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.40m



2.40-2.50m

BOREHOLE LOG

BOREHOLE No.: VB D

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6024340 mN 1738528 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -31m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.17m: Fine to medium SAND, minor shells(1-10mm); greyish brown. Loosely packed, wet, well graded. Sand, quartz.																
	0.31m: Shelly (1-5mm) fine to medium SAND, some silt; grey speckled white. Loosely packed, wet. Sand, quartz.						-32	0.5									
	0.60m: Fine to medium SAND; grey speckled white. Loosely packed, wet, well graded. Sand, quartz.																
	0.85m: Fine to medium SAND, some shells (1-5mm); whitish grey. Loosely packed, wet. Sand, quartz.			VC	100			1.0									
	1.20m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-33	1.5									
	1.70m: Shelly (1-5mm) fine to medium SAND; whitish grey. Loosely packed, wet, well graded.																Box 0.00-1.80m
	1.8m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.8m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB D**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6024340 mN (NZTM2000) 1738528 mE R.L.: -31m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 13/02/2025 HOLE FINISHED: 13/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.80m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB E

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021645 mN 1737325 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -23m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Shelly (1-15mm) fine to medium SAND; whitish brown. Loosely packed, wet, well graded.						-23	0.5									
	0.21m: Fine SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-24	1.0									Box 0.00-1.70m
	1.7m: END OF BOREHOLE							1.5									

COMMENTS:

Hole Depth 1.7m

Scale 1:10

Rev.: A

TTNZ_20240902 - GeneralLog - 27/02/2025 9:59:04 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **VB E**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6021645 mN (NZTM2000) 1737325 mE R.L.: -23m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 13/02/2025 HOLE FINISHED: 13/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-1.70m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VB F

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021908 mN 1737893 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine SAND; brownish grey. Loosely packed, wet, well graded. Sand, quartz.						-25										
	0.17m: Fine to medium SAND, minor shells(1-15mm); brownish grey. Loosely packed, wet, well graded. Sand, quartz.							0.5									
	0.52m: Shelly (1-15mm) fine to medium SAND; brownish grey speckled white. Loosely packed, wet. Sand, quartz.																
	0.97m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-26	1.0									
	1.20m: Shelly (1-15mm) fine to medium SAND; grey speckled white. Loosely packed, wet, well graded. Sand, quartz.																
	1.33m: Fine to medium SAND; grey. Loosely packed, wet, well graded.							1.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VB F

SHEET: 2 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6021908 mN 1737893 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 13/02/2025
FINISH DATE: 13/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.33m:* Fine to medium SAND; grey. Loosely packed, wet, well graded.						-27										Box 0.00-2.20m
	2.2m: END OF BOREHOLE						-28	2.5 3.0 3.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

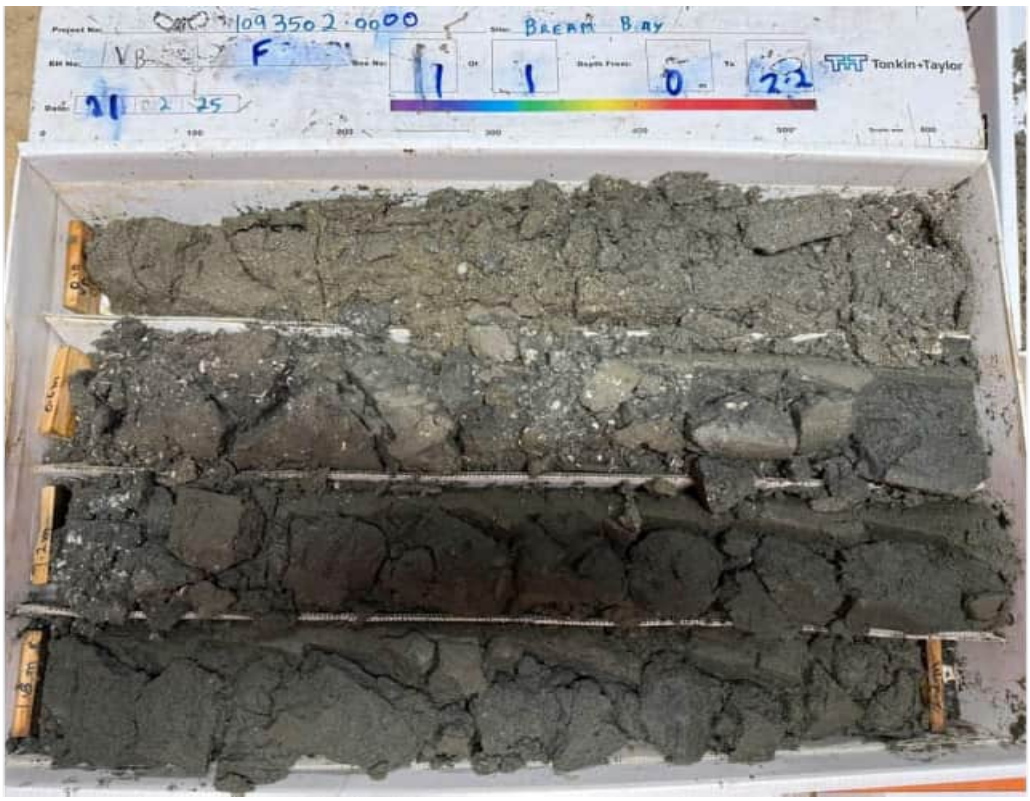
Rev.: A

CORE PHOTOS

BOREHOLE No.: **VB F**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6021908 mN (NZTM2000) 1737893 mE R.L.: -25m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 13/02/2025 HOLE FINISHED: 13/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM



0.00-2.20m

BOREHOLE LOG

BOREHOLE No.: VBC 18.1

SHEET: 1 OF 2

PROJECT: COAST: Bream Sand Dredging Assessm	CO-ORDINATES: (NZTM2000) 6017307 mN 1739885 mE	R.L. GROUND: -25m
JOB No.: 1093502.0000		R.L. COLLAR:
LOCATION: Bream Bay	DIRECTION: 90°	DATUM: NZVD2016
	ANGLE FROM HORIZ.: -90°	SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (HW SW MW HW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-25	0.5									
	0.16m: Fine to medium SAND; brownish grey. Loosely packed, wet, well graded. Sand, quartz.																
	0.26m: Shelly (1-30mm) fine to medium SAND. Loosely packed, wet. Sand, quartz.							1.0									
	1.10m: Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.						-26	1.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: VBC 18.1

SHEET: 2 OF 2

Tonkin+Taylor

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017307 mN 1739885 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -25m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: VIDC
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	[CONT] *1.10m:* Fine to medium SAND; grey. Loosely packed, wet, well graded. Sand, quartz.																Box 0.00-2.20m
	2.2m: END OF BOREHOLE						-27 -28	2.5 3.0 3.5									

COMMENTS:

Hole Depth 2.2m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 18.1**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6017307 mN (NZTM2000) 1739885 mE R.L.: -25m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: VIDC CHECKED: CBM

0.00-2.20m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: VBC 19.1

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessm
JOB No.: 1093502.0000
LOCATION: Bream Bay

CO-ORDINATES: (NZTM2000) 6017681 mN 1740817 mE
DIRECTION: 90°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: -27m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Handheld GPS

DRILLED BY: McCallum Bros
LOGGED BY: SOMA
CHECKED: CBM
START DATE: 12/02/2025
FINISH DATE: 12/02/2025
CONTRACTOR: McCallum Bros

GEOLOGICAL UNIT	MATERIAL DESCRIPTION (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering (UW SW MW HW CW DW RS)	Rock Strength (VS+ S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK MASS DISCONTINUITIES: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Water Level / Fluid Loss (%) (25 50 75)	Casing	Installation	Core Box No
Kariotahi Group	*0.00m:* Fine to medium SAND, trace shells (2-5mm); greyish brown. Loosely packed, moist, uniformly graded.			VC	100		-28	0.5									
	0.30m: Fine SAND, minor shells (2-10mm); grey. Loosely packed, moist, uniformly graded.																
	0.45m: Fine SAND, trace shells (2-10mm); grey. Loosely packed, moist, uniformly graded.							1.0									
	1.30m: Fine SAND, minor shells (2-20mm); grey. Loosely packed, moist, uniformly graded.						-29	1.5									
	1.38m: Fine SAND; grey. Loosely packed, moist, uniformly graded.																
	1.64m: Fine to medium SAND, trace shells (2-5mm) minor gravel; grey. Loosely packed, moist, uniformly graded; gravel, fine to medium, maximum 10 mm diameter, sub-rounded, black.																Box 0.00-1.80m
	1.72m: Fine to medium SAND, trace gravel; light grey banded with grey. Loosely packed, moist, uniformly graded; gravel, fine to medium, maximum 10 mm diameter, sub-rounded, black.																
	1.8m: END OF BOREHOLE																

COMMENTS:

Hole Depth 1.8m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **VBC 19.1**

SHEET: 1 OF 1

PROJECT: COAST: Bream Sand Dredging Assessment	LOCATION: Bream Bay	JOB No.: 1093502.0000
CO-ORDINATES: 6017681 mN (NZTM2000) 1740817 mE R.L.: -27m DATUM: NZVD2016	DRILL TYPE: Vibrocore METHOD: Vibrocore	HOLE STARTED: 12/02/2025 HOLE FINISHED: 12/02/2025 DRILLED BY: McCallum Bros LOGGED BY: SOMA CHECKED: CBM

0.00-1.80m

Appendix C PSD test results

Appendix C PSD test results

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 1.2 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/1
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 1:20:39 PM
Measurement Date Time	30/05/2024 1:20:39 PM
Result Source	Edited

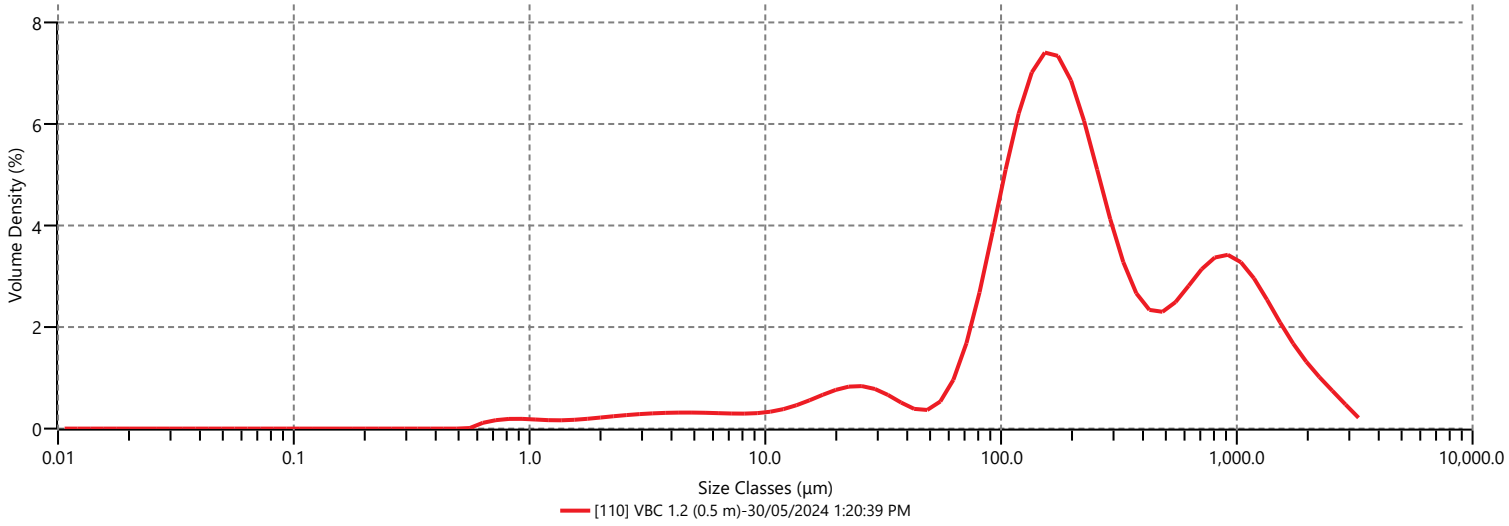
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.38 %
Laser Obscuration	9.69 %

Result

Concentration	0.0494 %
Span	5.572
Uniformity	1.598
Specific Surface Area	64.21 m^2/kg
D [3,2]	35.9 µm
D [4,3]	429 µm
Dv (10)	39.0 µm
Dv (50)	201 µm
Dv (90)	1160 µm
Dv (95)	1570 µm
Volume Below (3) µm	2.06 %
Volume Below (6) µm	3.46 %
Volume Below (20) µm	6.77 %
Volume Below (31) µm	9.10 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	3.97	88.0	15.99	350	67.54	1410	93.48
0.0600	0.00	15.6	5.68	105	21.01	420	70.60	1680	95.83
0.120	0.00	31.0	9.10	125	27.67	500	73.21	2000	97.54
0.240	0.00	37.0	9.82	149	35.77	590	75.87	2380	98.79
0.490	0.00	44.0	10.32	177	44.11	710	79.41	2830	99.56
0.980	0.55	53.0	10.78	210	51.95	840	83.03	3360	99.94
2.00	1.38	63.0	11.55	250	58.63	1000	86.91		
3.90	2.58	74.0	13.01	300	64.08	1190	90.50		

Analysis - Under

Malvern Instruments

Measurement Details

Sample Name	VBC 2.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/2
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 1:29:35 PM
Measurement Date Time	30/05/2024 1:29:35 PM
Result Source	Edited

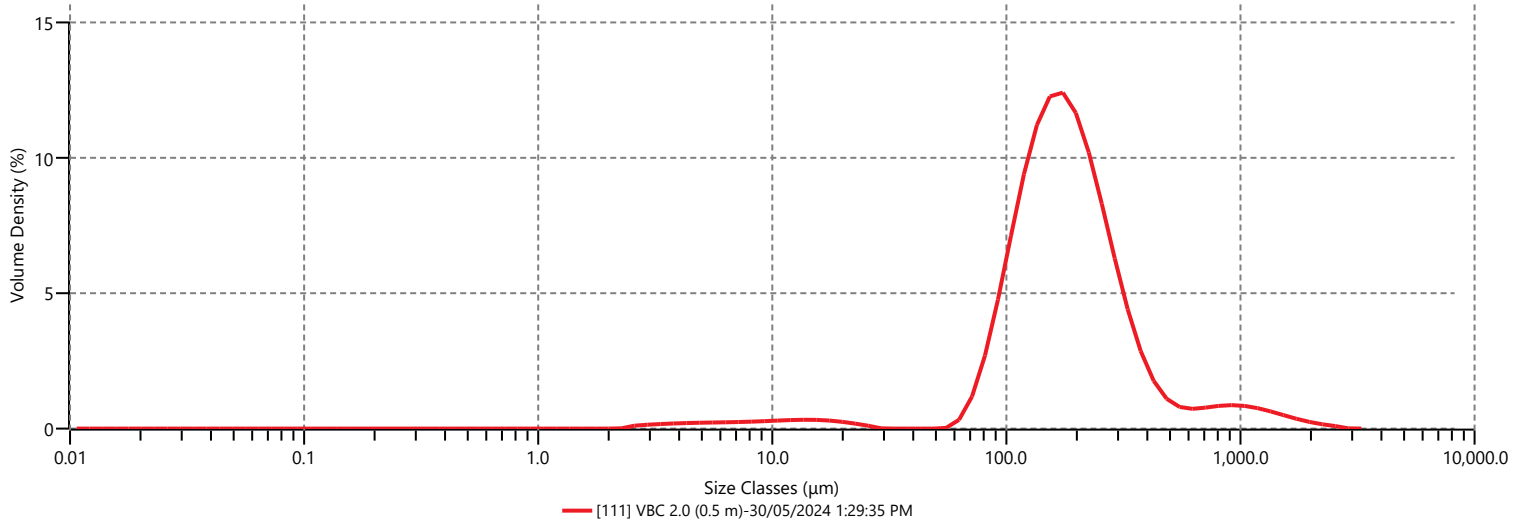
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.41 %
Laser Obscuration	11.11 %

Result

Concentration	0.1397 %
Span	1.580
Uniformity	0.673
Specific Surface Area	24.69 m^2/kg
D [3,2]	93.4 µm
D [4,3]	238 µm
Dv (10)	95.0 µm
Dv (50)	175 µm
Dv (90)	371 µm
Dv (95)	675 µm
Volume Below (3) µm	0.18 %
Volume Below (6) µm	1.08 %
Volume Below (20) µm	3.31 %
Volume Below (31) µm	3.65 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	1.49	88.0	7.62	350	88.85	1410	98.80
0.0600	0.00	15.6	2.84	105	14.14	420	91.91	1680	99.36
0.120	0.00	31.0	3.65	125	23.98	500	93.46	2000	99.71
0.240	0.00	37.0	3.65	149	37.00	590	94.36	2380	99.92
0.490	0.00	44.0	3.65	177	50.95	710	95.25	2830	100.00
0.980	0.00	53.0	3.65	210	64.28	840	96.15	3360	100.00
2.00	0.00	63.0	3.78	250	75.45	1000	97.13		
3.90	0.47	74.0	4.63	300	84.07	1190	98.05		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 3.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/3
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 1:37:29 PM
Measurement Date Time	30/05/2024 1:37:29 PM
Result Source	Edited

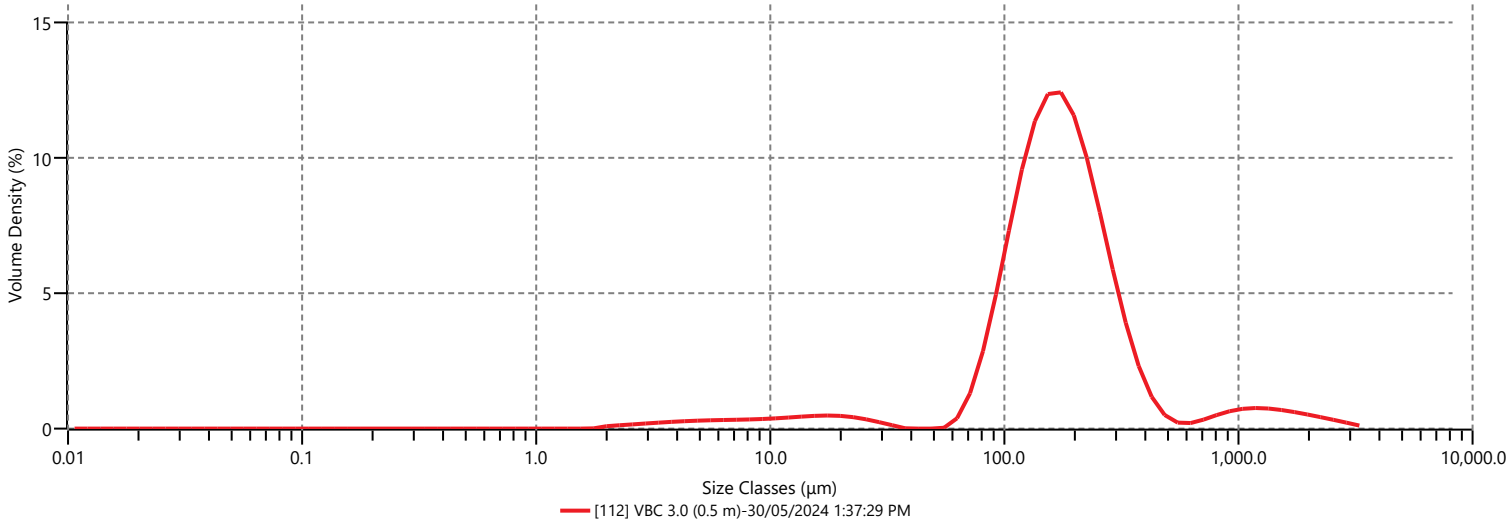
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.42 %
Laser Obscuration	14.66 %

Result

Concentration	0.1479 %
Span	1.495
Uniformity	0.802
Specific Surface Area	31.24 m^2/kg
D [3,2]	73.9 µm
D [4,3]	247 µm
Dv (10)	87.6 µm
Dv (50)	168 µm
Dv (90)	339 µm
Dv (95)	816 µm
Volume Below (3) µm	0.42 %
Volume Below (6) µm	1.62 %
Volume Below (20) µm	4.74 %
Volume Below (31) µm	5.75 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	2.17	88.0	10.14	350	90.80	1410	97.50
0.0600	0.00	15.6	3.96	105	16.89	420	93.18	1680	98.28
0.120	0.00	31.0	5.75	125	26.94	500	94.06	2000	98.93
0.240	0.00	37.0	5.87	149	40.11	590	94.33	2380	99.44
0.490	0.00	44.0	5.87	177	54.13	710	94.62	2830	99.78
0.980	0.00	53.0	5.87	210	67.39	840	95.10	3360	99.97
2.00	0.04	63.0	6.02	250	78.31	1000	95.82		
3.90	0.80	74.0	6.97	300	86.49	1190	96.67		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 4.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/4
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 1:45:24 PM
Measurement Date Time	30/05/2024 1:45:24 PM
Result Source	Edited

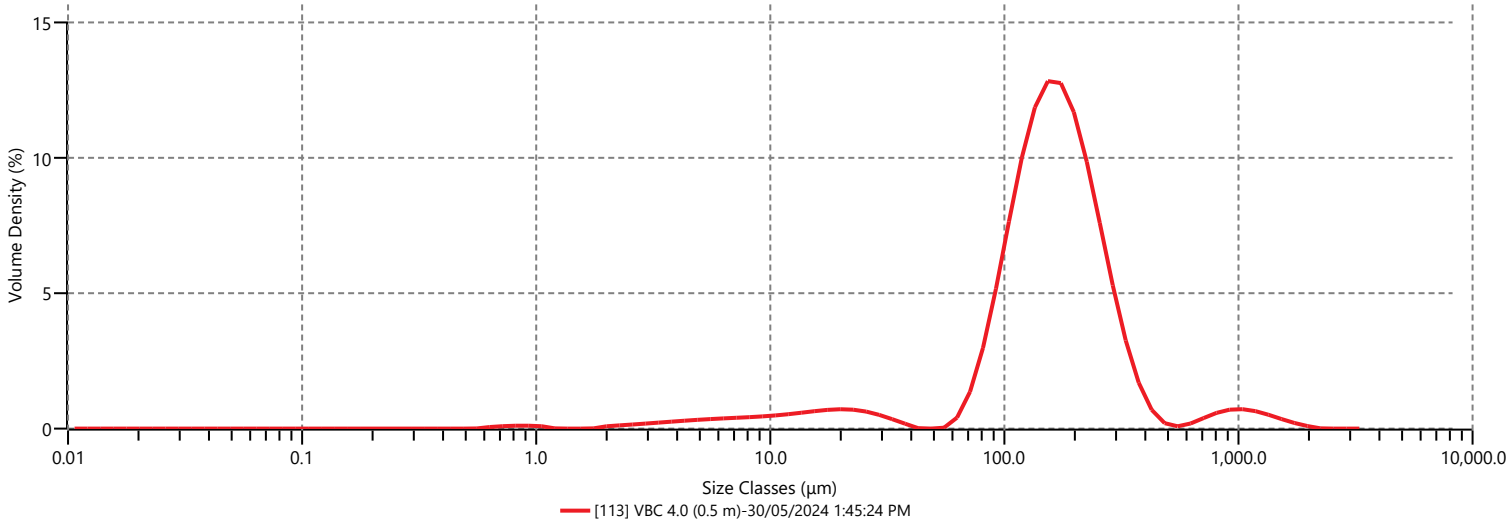
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.40 %
Laser Obscuration	15.07 %

Result

Concentration	0.1101 %
Span	1.375
Uniformity	0.594
Specific Surface Area	45.39 m^2/kg
D [3,2]	50.8 µm
D [4,3]	198 µm
Dv (10)	76.6 µm
Dv (50)	160 µm
Dv (90)	296 µm
Dv (95)	378 µm
Volume Below (3) µm	0.79 %
Volume Below (6) µm	2.08 %
Volume Below (20) µm	6.20 %
Volume Below (31) µm	8.00 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	2.75	88.0	12.92	350	94.12	1410	99.41
0.0600	0.00	15.6	5.08	105	19.96	420	95.80	1680	99.79
0.120	0.00	31.0	8.00	125	30.48	500	96.24	2000	99.97
0.240	0.00	37.0	8.35	149	44.23	590	96.34	2380	100.00
0.490	0.00	44.0	8.45	177	58.72	710	96.64	2830	100.00
0.980	0.30	53.0	8.45	210	72.19	840	97.21	3360	100.00
2.00	0.42	63.0	8.61	250	82.88	1000	98.00		
3.90	1.18	74.0	9.61	300	90.46	1190	98.79		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 5.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/5
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 1:53:54 PM
Measurement Date Time	30/05/2024 1:53:54 PM
Result Source	Edited

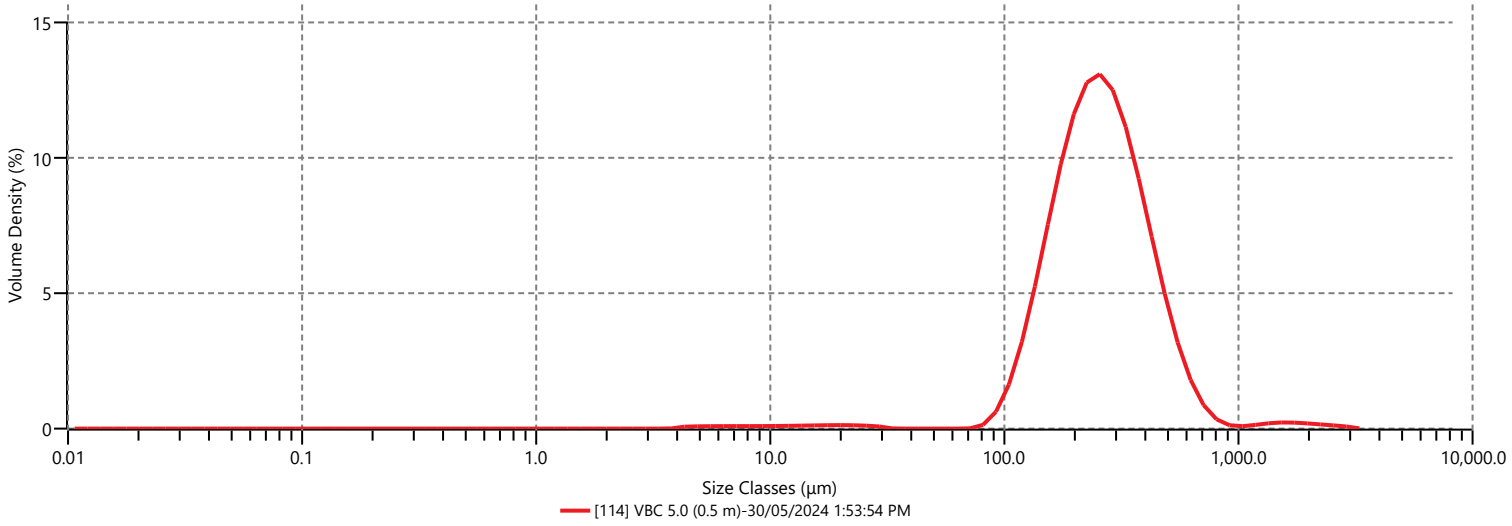
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.36 %
Laser Obscuration	14.32 %

Result

Concentration	0.3601 %
Span	1.252
Uniformity	0.445
Specific Surface Area	12.70 m^2/kg
D [3,2]	182 µm
D [4,3]	294 µm
Dv (10)	143 µm
Dv (50)	254 µm
Dv (90)	460 µm
Dv (95)	550 µm
Volume Below (3) µm	0.00 %
Volume Below (6) µm	0.22 %
Volume Below (20) µm	1.03 %
Volume Below (31) µm	1.34 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	0.37	88.0	1.51	350	75.58	1410	99.15
0.0600	0.00	15.6	0.83	105	2.62	420	85.94	1680	99.40
0.120	0.00	31.0	1.34	125	5.60	500	92.67	2000	99.64
0.240	0.00	37.0	1.34	149	11.95	590	96.38	2380	99.83
0.490	0.00	44.0	1.34	177	21.61	710	98.12	2830	99.95
0.980	0.00	53.0	1.34	210	34.05	840	98.68	3360	100.00
2.00	0.00	63.0	1.34	250	48.74	1000	98.83		
3.90	0.00	74.0	1.34	300	64.04	1190	98.95		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 6.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/6
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 2:02:41 PM
Measurement Date Time	30/05/2024 2:02:41 PM
Result Source	Edited

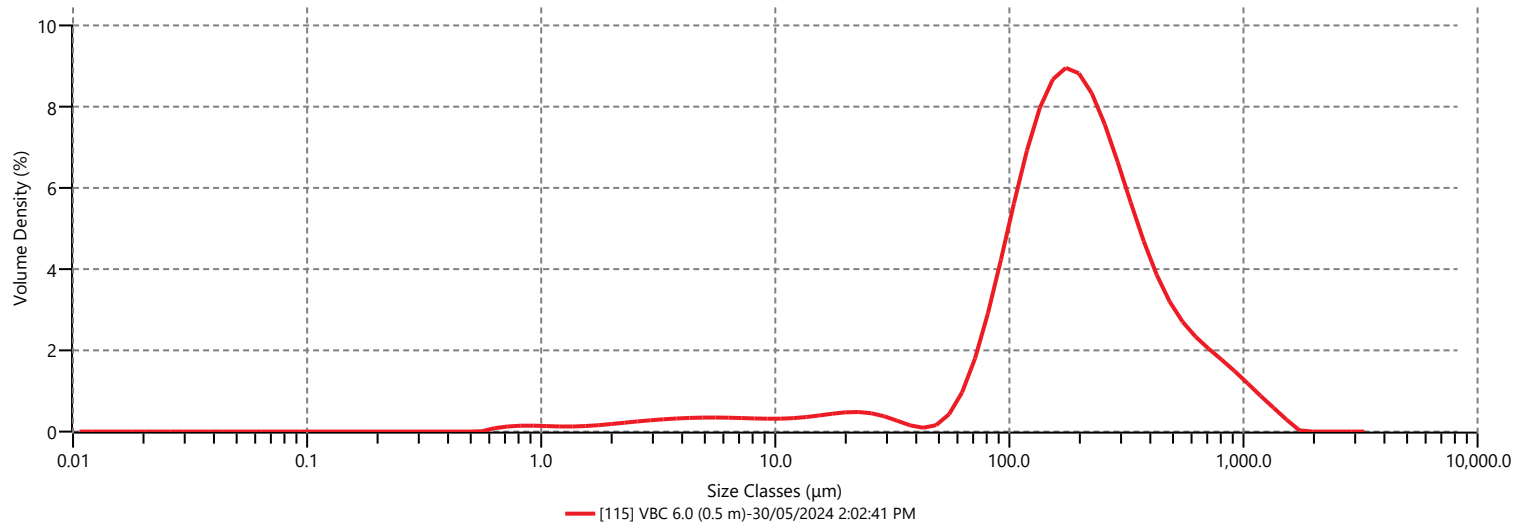
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.20 %
Laser Obscuration	9.73 %

Result

Concentration	0.0558 %
Span	2.482
Uniformity	0.778
Specific Surface Area	56.59 m^2/kg
D [3,2]	40.8 µm
D [4,3]	261 µm
Dv (10)	73.3 µm
Dv (50)	191 µm
Dv (90)	548 µm
Dv (95)	769 µm
Volume Below (3) µm	1.70 %
Volume Below (6) µm	3.19 %
Volume Below (20) µm	6.00 %
Volume Below (31) µm	7.28 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	3.76	88.0	13.36	350	78.99	1410	99.69
0.0600	0.00	15.6	5.29	105	18.86	420	84.32	1680	100.00
0.120	0.00	31.0	7.28	125	26.25	500	88.28	2000	100.00
0.240	0.00	37.0	7.56	149	35.50	590	91.27	2380	100.00
0.490	0.00	44.0	7.69	177	45.44	710	93.97	2830	100.00
0.980	0.42	53.0	7.88	210	55.37	840	96.02	3360	100.00
2.00	1.07	63.0	8.58	250	64.68	1000	97.72		
3.90	2.23	74.0	10.12	300	73.11	1190	98.93		

Analysis - Under

Malvern Instruments

Malvern

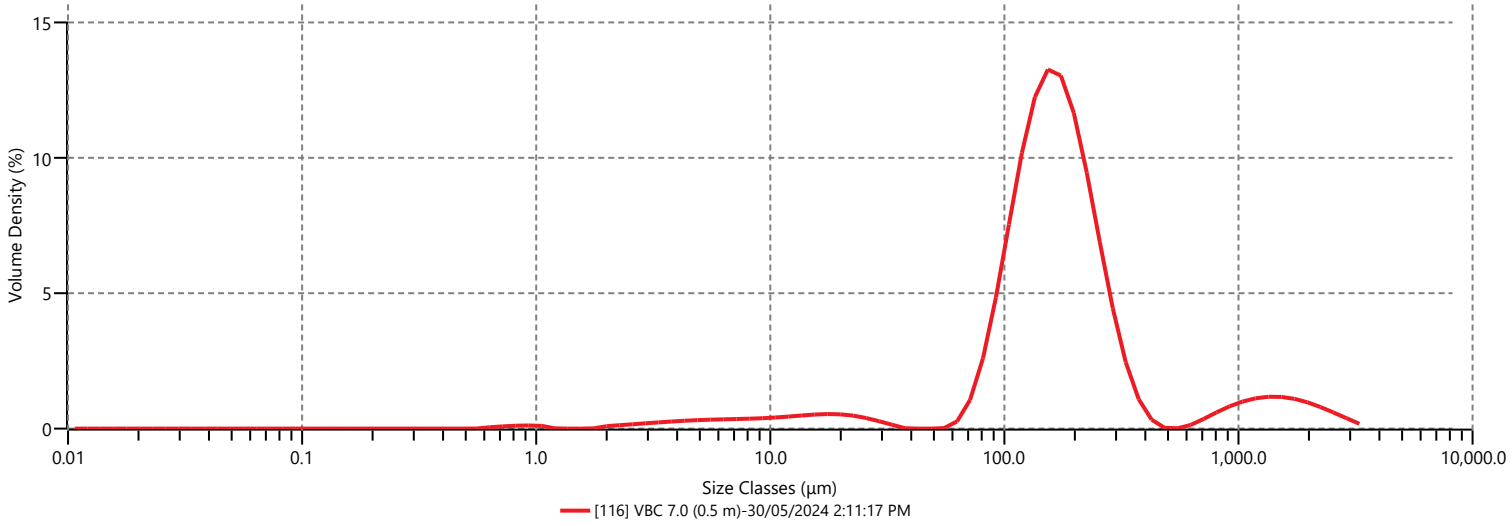
Measurement Details	
Sample Name	VBC 7.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/7
Operator Name	instrument

Measurement Details	
Analysis Date Time	30/05/2024 2:11:17 PM
Measurement Date Time	30/05/2024 2:11:17 PM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.38 %
Laser Obscuration	12.16 %

Result	
Concentration	0.0923 %
Span	1.597
Uniformity	1.061
Specific Surface Area	43.01 m^2/kg
D [3,2]	53.7 µm
D [4,3]	282 µm
Dv (10)	86.6 µm
Dv (50)	163 µm
Dv (90)	347 µm
Dv (95)	1320 µm
Volume Below (3) µm	0.82 %
Volume Below (6) µm	2.09 %
Volume Below (20) µm	5.50 %
Volume Below (31) µm	6.65 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	2.69	88.0	10.49	350	90.12	1410	95.53
0.0600	0.00	15.6	4.63	105	17.26	420	91.15	1680	96.86
0.120	0.00	31.0	6.65	125	27.86	500	91.30	2000	98.06
0.240	0.00	37.0	6.78	149	42.06	590	91.31	2380	99.02
0.490	0.00	44.0	6.78	177	56.97	710	91.56	2830	99.64
0.980	0.29	53.0	6.78	210	70.51	840	92.12	3360	99.95
2.00	0.43	63.0	6.88	250	80.66	1000	93.05		
3.90	1.22	74.0	7.62	300	87.30	1190	94.25		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 8.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/8
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 2:20:01 PM
Measurement Date Time	30/05/2024 2:20:01 PM
Result Source	Edited

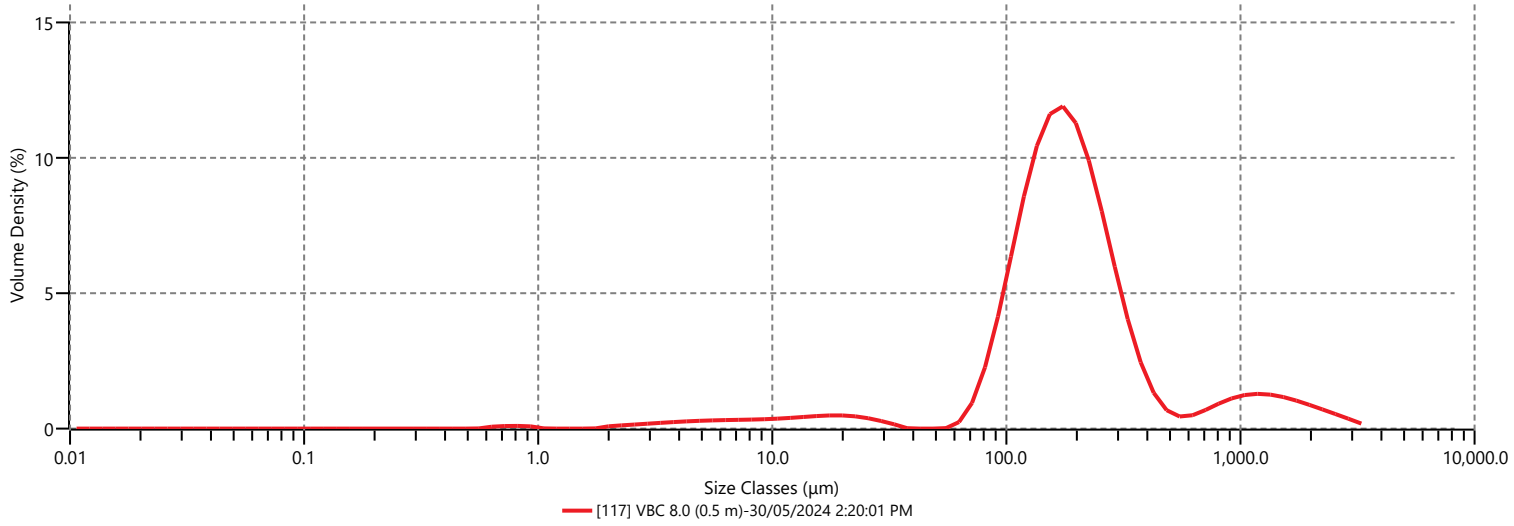
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.41 %
Laser Obscuration	12.77 %

Result

Concentration	0.1077 %
Span	2.677
Uniformity	1.045
Specific Surface Area	39.03 m^2/kg
D [3,2]	59.1 µm
D [4,3]	303 µm
Dv (10)	89.7 µm
Dv (50)	178 µm
Dv (90)	566 µm
Dv (95)	1280 µm
Volume Below (3) µm	0.70 %
Volume Below (6) µm	1.88 %
Volume Below (20) µm	4.95 %
Volume Below (31) µm	6.07 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	2.42	88.0	9.48	350	86.00	1410	95.81
0.0600	0.00	15.6	4.17	105	15.21	420	88.55	1680	97.12
0.120	0.00	31.0	6.07	125	24.13	500	89.61	2000	98.22
0.240	0.00	37.0	6.21	149	36.28	590	90.12	2380	99.08
0.490	0.00	44.0	6.21	177	49.58	710	90.79	2830	99.64
0.980	0.29	53.0	6.21	210	62.44	840	91.70	3360	99.95
2.00	0.34	63.0	6.30	250	73.30	1000	92.97		
3.90	1.08	74.0	6.97	300	81.57	1190	94.40		

Analysis - Under

Malvern Instruments

Measurement Details

Sample Name	VBC 9.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/9
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 2:29:56 PM
Measurement Date Time	30/05/2024 2:29:56 PM
Result Source	Edited

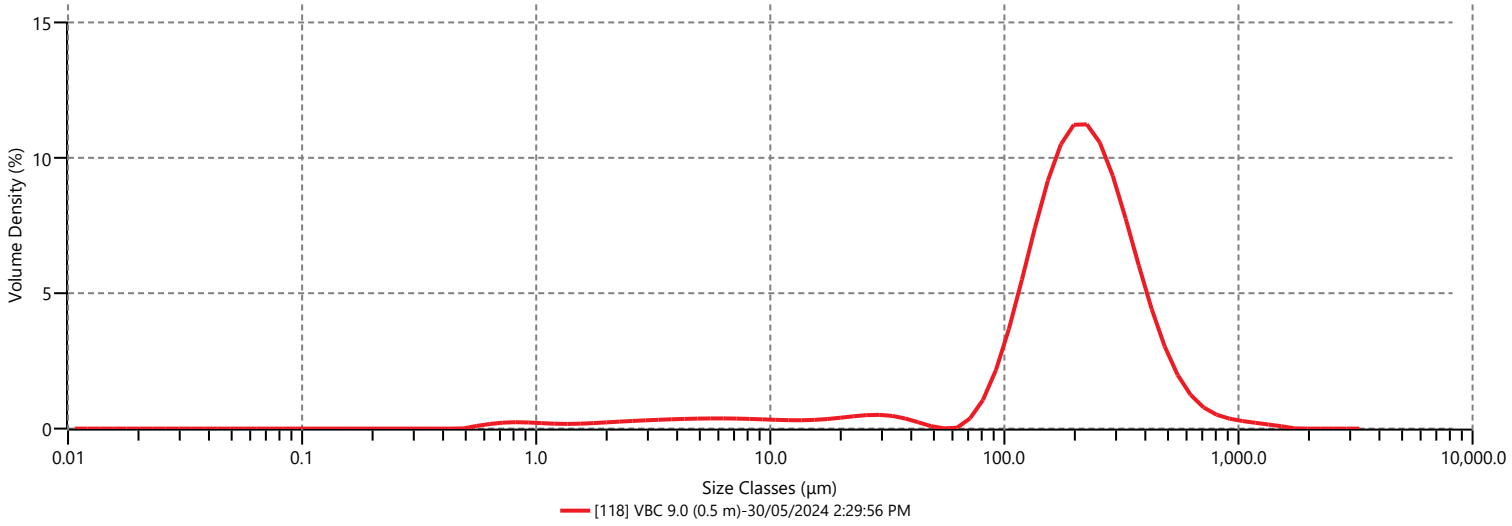
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.29 %
Laser Obscuration	20.89 %

Result

Concentration	0.1019 %
Span	1.583
Uniformity	0.524
Specific Surface Area	73.58 m^2/kg
D [3,2]	31.4 µm
D [4,3]	234 µm
Dv (10)	83.9 µm
Dv (50)	206 µm
Dv (90)	411 µm
Dv (95)	506 µm
Volume Below (3) µm	2.40 %
Volume Below (6) µm	4.00 %
Volume Below (20) µm	6.69 %
Volume Below (31) µm	8.06 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	4.63	88.0	10.46	350	83.95	1410	99.91
0.0600	0.00	15.6	6.11	105	13.59	420	90.64	1680	100.00
0.120	0.00	31.0	8.06	125	19.13	500	94.77	2000	100.00
0.240	0.00	37.0	8.58	149	27.88	590	97.07	2380	100.00
0.490	0.00	44.0	8.92	177	38.92	710	98.35	2830	100.00
0.980	0.79	53.0	9.05	210	51.28	840	99.01	3360	100.00
2.00	1.68	63.0	9.05	250	63.96	1000	99.43		
3.90	2.97	74.0	9.28	300	75.81	1190	99.72		

Analysis - Under

Malvern Instruments

Measurement Details

Sample Name	VBC 10.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/10
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 2:39:21 PM
Measurement Date Time	30/05/2024 2:39:21 PM
Result Source	Edited

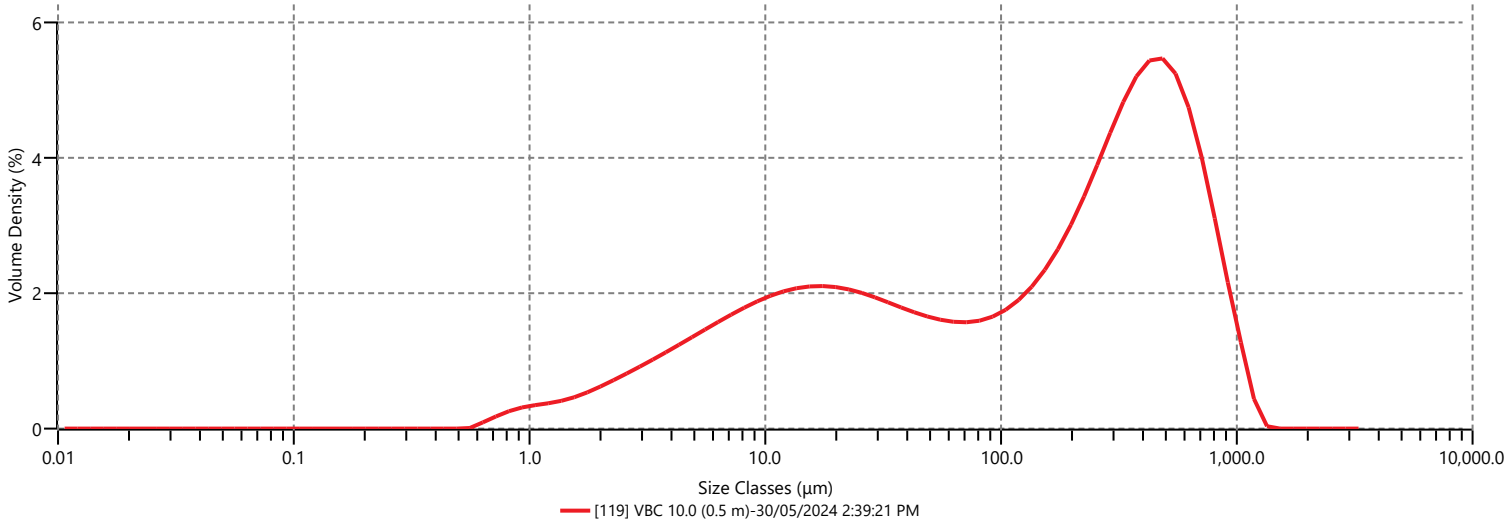
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.29 %
Laser Obscuration	12.95 %

Result

Concentration	0.0276 %
Span	4.069
Uniformity	1.347
Specific Surface Area	150.2 m^2/kg
D [3,2]	15.4 µm
D [4,3]	250 µm
Dv (10)	5.80 µm
Dv (50)	158 µm
Dv (90)	648 µm
Dv (95)	786 µm
Volume Below (3) µm	4.79 %
Volume Below (6) µm	10.34 %
Volume Below (20) µm	25.48 %
Volume Below (31) µm	31.25 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	13.16	88.0	42.64	350	68.88	1410	100.00
0.0600	0.00	15.6	22.07	105	44.59	420	75.15	1680	100.00
0.120	0.00	31.0	31.25	125	46.69	500	81.39	2000	100.00
0.240	0.00	37.0	33.38	149	49.13	590	87.10	2380	100.00
0.490	0.00	44.0	35.36	177	51.92	710	92.55	2830	100.00
0.980	0.68	53.0	37.38	210	55.16	840	96.35	3360	100.00
2.00	2.74	63.0	39.18	250	59.18	1000	98.80		
3.90	6.57	74.0	40.83	300	64.11	1190	99.85		

Analysis - Under

Malvern Instruments

Measurement Details

Sample Name	VBC 11.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/11
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 2:47:18 PM
Measurement Date Time	30/05/2024 2:47:18 PM
Result Source	Edited

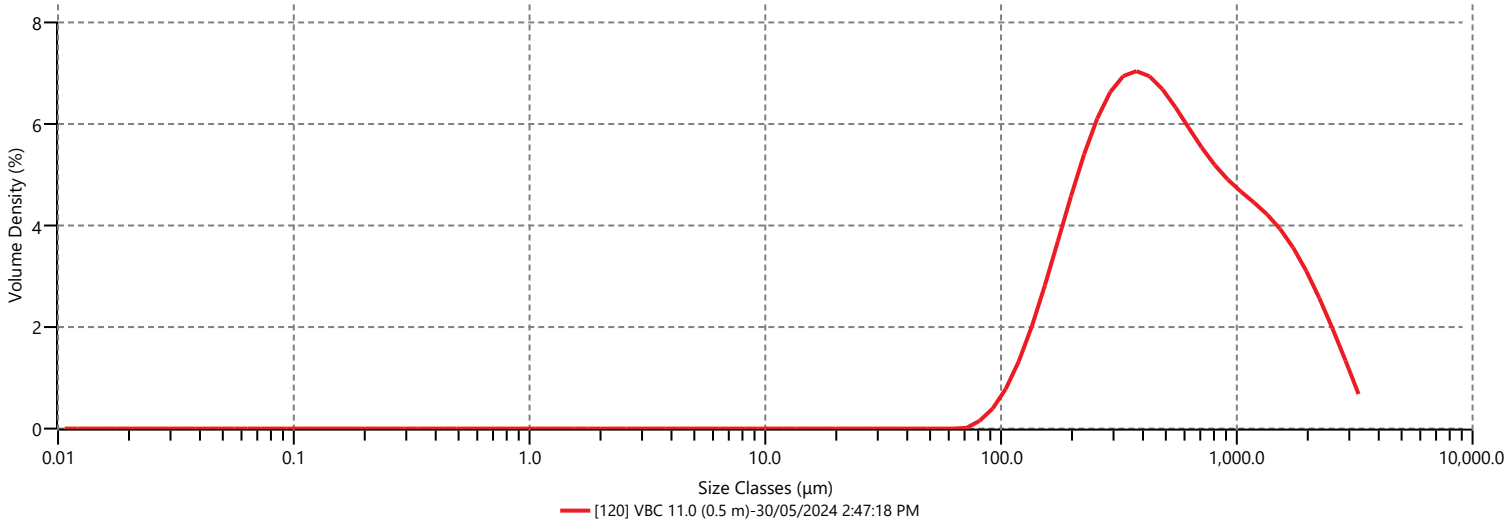
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.62 %
Laser Obscuration	13.12 %

Result

Concentration	0.7174 %
Span	3.020
Uniformity	0.899
Specific Surface Area	5.840 m^2/kg
D [3,2]	395 µm
D [4,3]	744 µm
Dv (10)	190 µm
Dv (50)	501 µm
Dv (90)	1700 µm
Dv (95)	2160 µm
Volume Below (3) µm	0.00 %
Volume Below (6) µm	0.00 %
Volume Below (20) µm	0.00 %
Volume Below (31) µm	0.00 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	0.00	88.0	0.17	350	33.82	1410	85.23
0.0600	0.00	15.6	0.00	105	0.78	420	42.19	1680	89.69
0.120	0.00	31.0	0.00	125	2.06	500	49.94	2000	93.52
0.240	0.00	37.0	0.00	149	4.48	590	56.84	2380	96.62
0.490	0.00	44.0	0.00	177	8.10	710	63.84	2830	98.69
0.980	0.00	53.0	0.00	210	12.93	840	69.67	3360	99.82
2.00	0.00	63.0	0.00	250	19.26	1000	75.26		
3.90	0.00	74.0	0.00	300	26.88	1190	80.46		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 12.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/12
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 3:08:09 PM
Measurement Date Time	30/05/2024 3:08:09 PM
Result Source	Edited

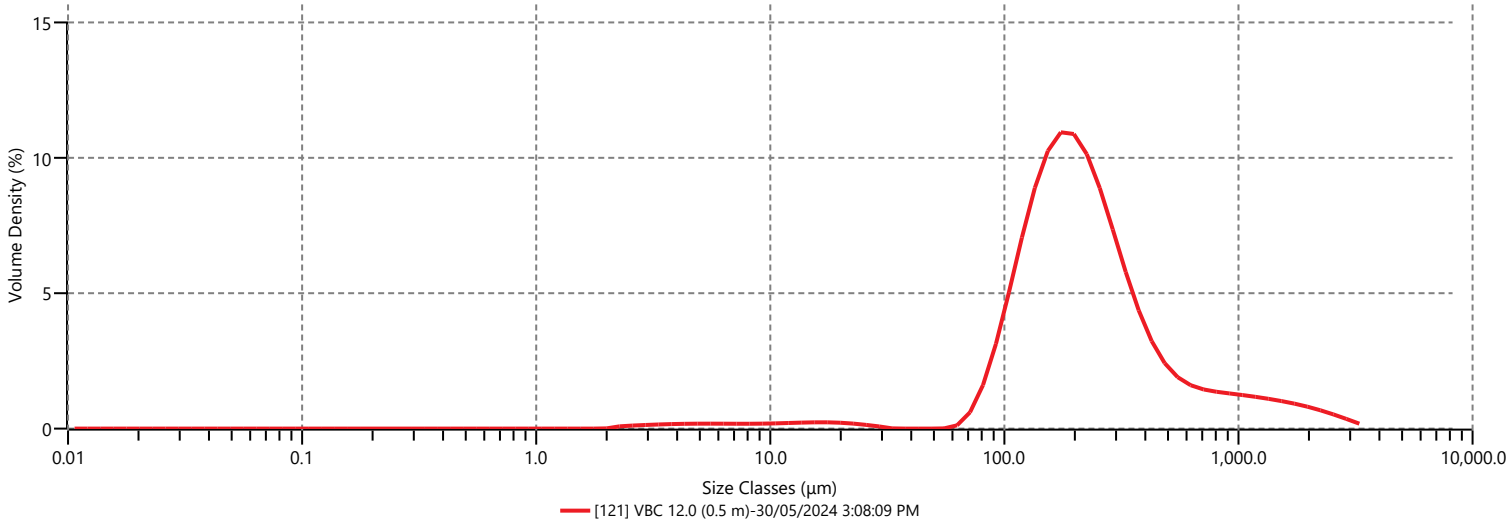
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.37 %
Laser Obscuration	17.63 %

Result

Concentration	0.2638 %
Span	2.754
Uniformity	0.960
Specific Surface Area	21.52 m^2/kg
D [3,2]	107 µm
D [4,3]	335 µm
Dv (10)	106 µm
Dv (50)	206 µm
Dv (90)	672 µm
Dv (95)	1210 µm
Volume Below (3) µm	0.25 %
Volume Below (6) µm	1.02 %
Volume Below (20) µm	2.60 %
Volume Below (31) µm	3.02 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	1.32	88.0	5.25	350	78.55	1410	96.14
0.0600	0.00	15.6	2.23	105	9.68	420	83.39	1680	97.29
0.120	0.00	31.0	3.02	125	16.93	500	86.53	2000	98.29
0.240	0.00	37.0	3.03	149	27.33	590	88.65	2380	99.10
0.490	0.00	44.0	3.03	177	39.29	710	90.51	2830	99.65
0.980	0.00	53.0	3.03	210	51.52	840	92.04	3360	99.95
2.00	0.00	63.0	3.07	250	62.79	1000	93.52		
3.90	0.51	74.0	3.47	300	72.42	1190	94.89		

Analysis - Under

Malvern Instruments

Malvern

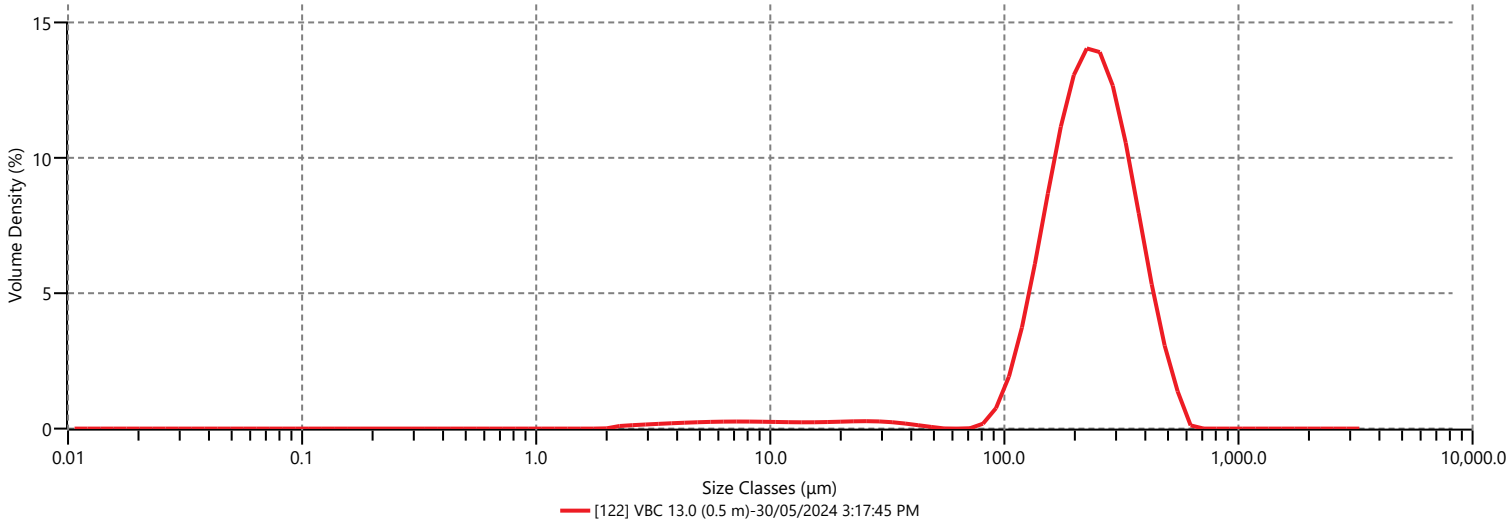
Measurement Details	
Sample Name	VBC 13.0 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/13
Operator Name	instrument

Measurement Details	
Analysis Date Time	30/05/2024 3:17:45 PM
Measurement Date Time	30/05/2024 3:17:45 PM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.33 %
Laser Obscuration	9.68 %

Result	
Concentration	0.1278 %
Span	1.124
Uniformity	0.358
Specific Surface Area	23.25 m^2/kg
D [3,2]	99.3 µm
D [4,3]	241 µm
Dv (10)	127 µm
Dv (50)	229 µm
Dv (90)	385 µm
Dv (95)	436 µm
Volume Below (3) µm	0.28 %
Volume Below (6) µm	1.24 %
Volume Below (20) µm	3.18 %
Volume Below (31) µm	3.95 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	1.68	88.0	4.68	350	84.97	1410	100.00
0.0600	0.00	15.6	2.79	105	6.00	420	93.67	1680	100.00
0.120	0.00	31.0	3.95	125	9.49	500	98.26	2000	100.00
0.240	0.00	37.0	4.21	149	16.84	590	99.99	2380	100.00
0.490	0.00	44.0	4.39	177	27.92	710	100.00	2830	100.00
0.980	0.00	53.0	4.47	210	41.97	840	100.00	3360	100.00
2.00	0.00	63.0	4.47	250	58.00	1000	100.00		
3.90	0.59	74.0	4.47	300	73.87	1190	100.00		

Analysis - Under

Malvern Instruments

Malvern

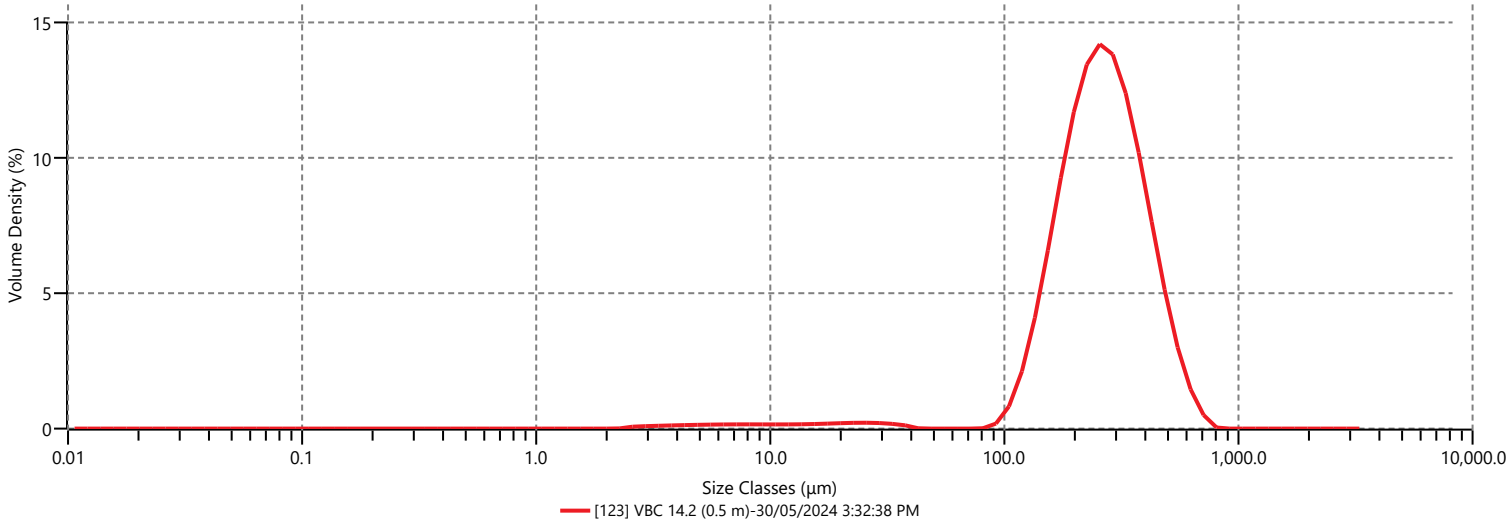
Measurement Details	
Sample Name	VBC 14.2 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/14
Operator Name	instrument

Measurement Details	
Analysis Date Time	30/05/2024 3:32:38 PM
Measurement Date Time	30/05/2024 3:32:38 PM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.51 %
Laser Obscuration	9.96 %

Result	
Concentration	0.1833 %
Span	1.121
Uniformity	0.353
Specific Surface Area	16.77 m^2/kg
D [3,2]	138 µm
D [4,3]	276 µm
Dv (10)	148 µm
Dv (50)	259 µm
Dv (90)	438 µm
Dv (95)	501 µm
Volume Below (3) µm	0.11 %
Volume Below (6) µm	0.68 %
Volume Below (20) µm	1.96 %
Volume Below (31) µm	2.57 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	0.95	88.0	2.84	350	76.47	1410	100.00
0.0600	0.00	15.6	1.66	105	3.29	420	87.87	1680	100.00
0.120	0.00	31.0	2.57	125	5.12	500	94.96	2000	100.00
0.240	0.00	37.0	2.76	149	10.17	590	98.51	2380	100.00
0.490	0.00	44.0	2.82	177	18.97	710	99.81	2830	100.00
0.980	0.00	53.0	2.82	210	31.31	840	100.00	3360	100.00
2.00	0.00	63.0	2.82	250	46.86	1000	100.00		
3.90	0.30	74.0	2.82	300	63.64	1190	100.00		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 15 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/15
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 3:40:05 PM
Measurement Date Time	30/05/2024 3:40:05 PM
Result Source	Edited

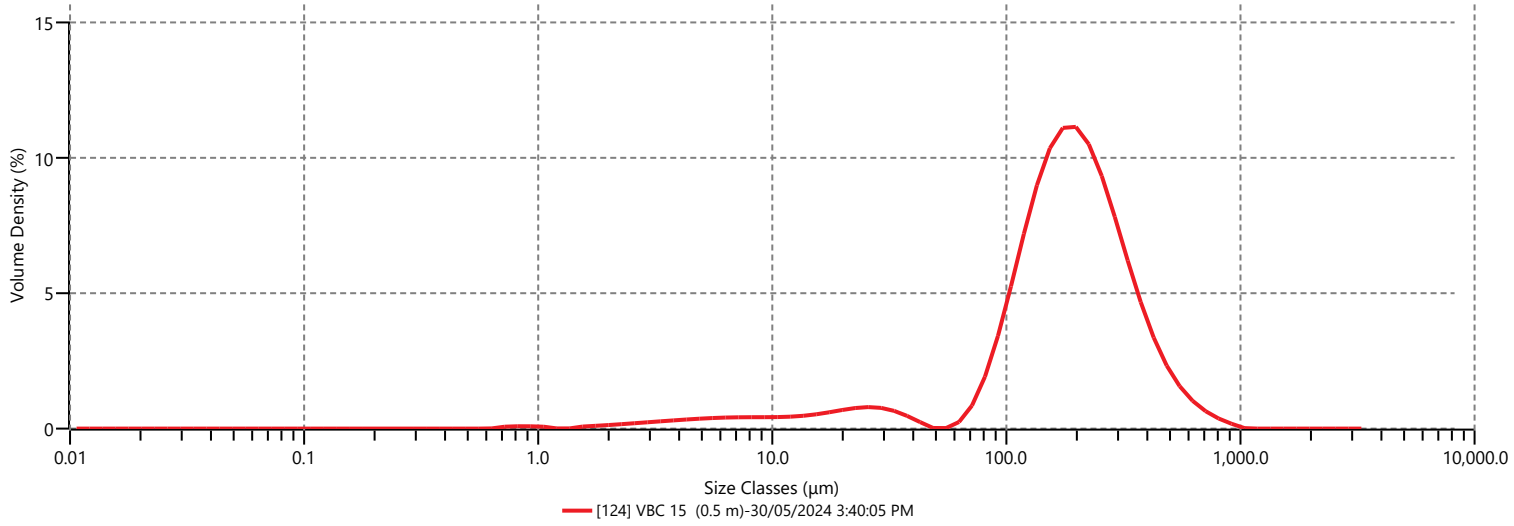
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.33 %
Laser Obscuration	18.89 %

Result

Concentration	0.1396 %
Span	1.637
Uniformity	0.516
Specific Surface Area	44.88 m^2/kg
D [3,2]	51.4 µm
D [4,3]	207 µm
Dv (10)	70.7 µm
Dv (50)	184 µm
Dv (90)	372 µm
Dv (95)	455 µm
Volume Below (3) µm	0.97 %
Volume Below (6) µm	2.46 %
Volume Below (20) µm	6.17 %
Volume Below (31) µm	8.37 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	3.17	88.0	12.37	350	88.10	1410	100.00
0.0600	0.00	15.6	5.18	105	17.11	420	93.26	1680	100.00
0.120	0.00	31.0	8.37	125	24.55	500	96.41	2000	100.00
0.240	0.00	37.0	9.08	149	35.06	590	98.22	2380	100.00
0.490	0.00	44.0	9.47	177	47.15	710	99.28	2830	100.00
0.980	0.20	53.0	9.53	210	59.65	840	99.79	3360	100.00
2.00	0.48	63.0	9.63	250	71.35	1000	100.00		
3.90	1.44	74.0	10.25	300	81.53	1190	100.00		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 16 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/16
Operator Name	instrument

Measurement Details

Analysis Date Time	30/05/2024 3:51:53 PM
Measurement Date Time	30/05/2024 3:51:53 PM
Result Source	Edited

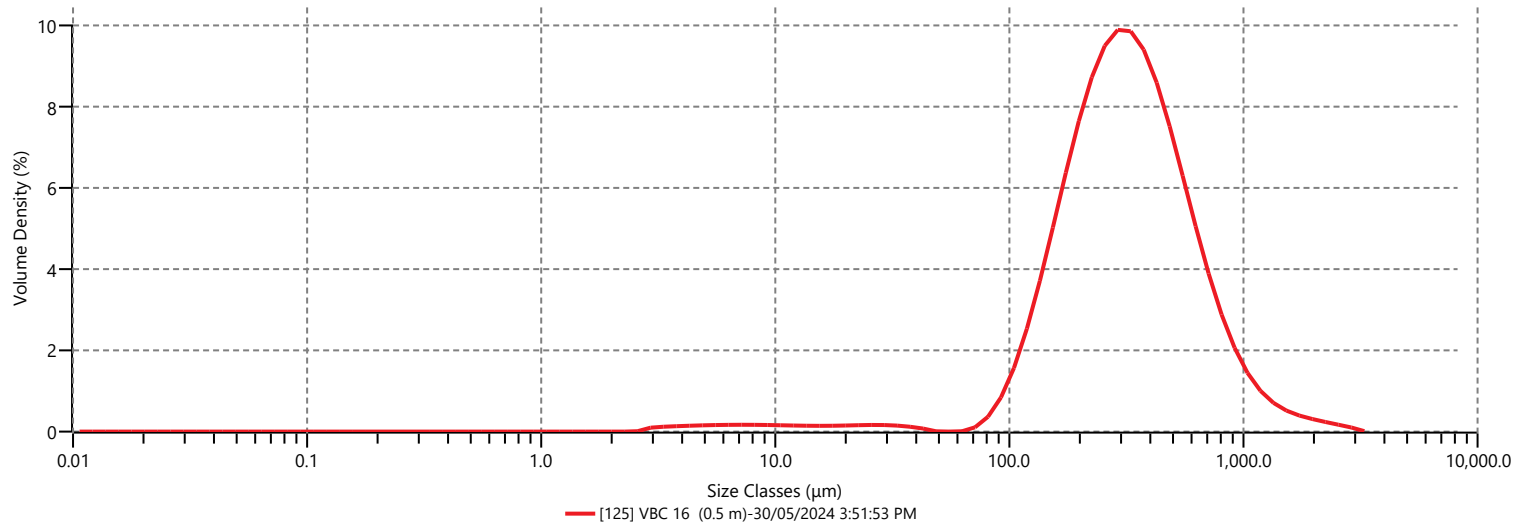
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.31 %
Laser Obscuration	14.80 %

Result

Concentration	0.3038 %
Span	1.798
Uniformity	0.602
Specific Surface Area	15.44 m^2/kg
D [3,2]	149 µm
D [4,3]	387 µm
Dv (10)	143 µm
Dv (50)	311 µm
Dv (90)	703 µm
Dv (95)	908 µm
Volume Below (3) µm	0.06 %
Volume Below (6) µm	0.70 %
Volume Below (20) µm	1.92 %
Volume Below (31) µm	2.37 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	0.98	88.0	3.14	350	57.54	1410	98.49
0.0600	0.00	15.6	1.68	105	4.40	420	68.52	1680	99.07
0.120	0.00	31.0	2.37	125	6.89	500	77.65	2000	99.47
0.240	0.00	37.0	2.54	149	11.34	590	84.65	2380	99.77
0.490	0.00	44.0	2.65	177	17.69	710	90.26	2830	99.94
0.980	0.00	53.0	2.67	210	25.84	840	93.83	3360	100.00
2.00	0.00	63.0	2.67	250	35.98	1000	96.19		
3.90	0.27	74.0	2.73	300	47.58	1190	97.61		

Analysis - Under

Malvern Instruments

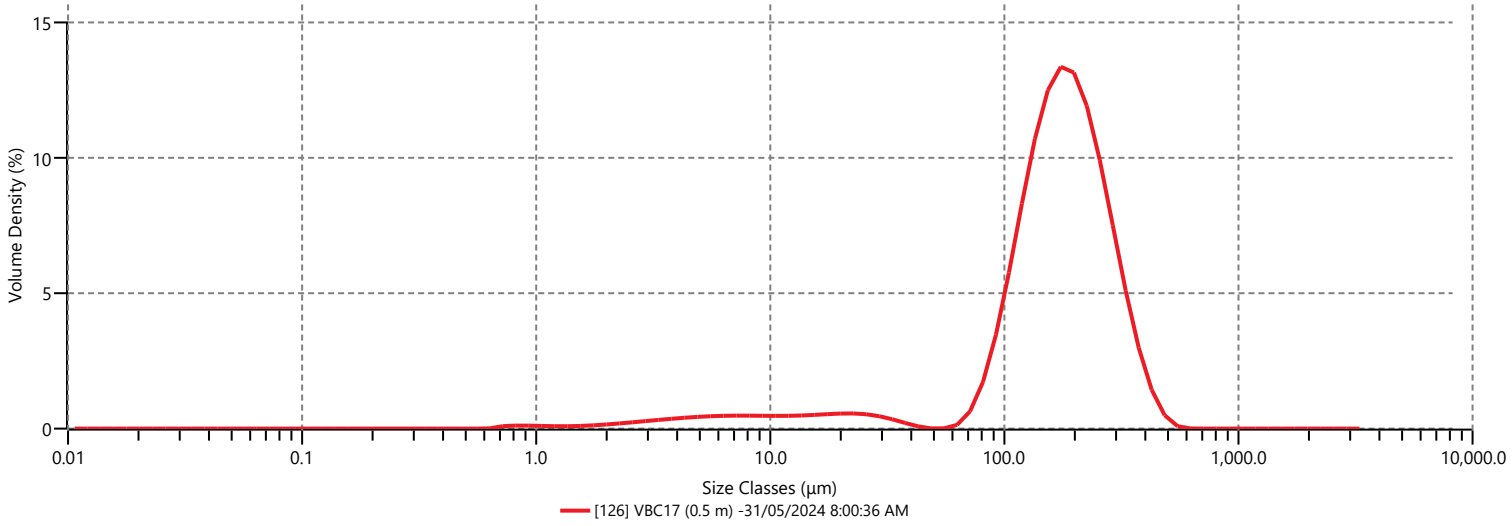
Measurement Details	
Sample Name	VBC17 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/17
Operator Name	instrument

Measurement Details	
Analysis Date Time	31/05/2024 8:00:36 AM
Measurement Date Time	31/05/2024 8:00:36 AM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.32 %
Laser Obscuration	10.90 %

Result	
Concentration	0.0658 %
Span	1.267
Uniformity	0.400
Specific Surface Area	52.75 m^2/kg
D [3,2]	43.7 µm
D [4,3]	180 µm
Dv (10)	79.3 µm
Dv (50)	173 µm
Dv (90)	299 µm
Dv (95)	341 µm
Volume Below (3) µm	1.31 %
Volume Below (6) µm	3.08 %
Volume Below (20) µm	6.93 %
Volume Below (31) µm	8.43 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	3.89	88.0	11.35	350	95.82	1410	100.00
0.0600	0.00	15.6	6.06	105	16.33	420	98.87	1680	100.00
0.120	0.00	31.0	8.43	125	24.80	500	99.86	2000	100.00
0.240	0.00	37.0	8.79	149	37.33	590	100.00	2380	100.00
0.490	0.00	44.0	8.95	177	51.93	710	100.00	2830	100.00
0.980	0.26	53.0	8.97	210	66.78	840	100.00	3360	100.00
2.00	0.74	63.0	9.01	250	79.91	1000	100.00		
3.90	1.88	74.0	9.44	300	90.22	1190	100.00		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC18 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/18
Operator Name	instrument

Measurement Details

Analysis Date Time	31/05/2024 8:09:30 AM
Measurement Date Time	31/05/2024 8:09:30 AM
Result Source	Edited

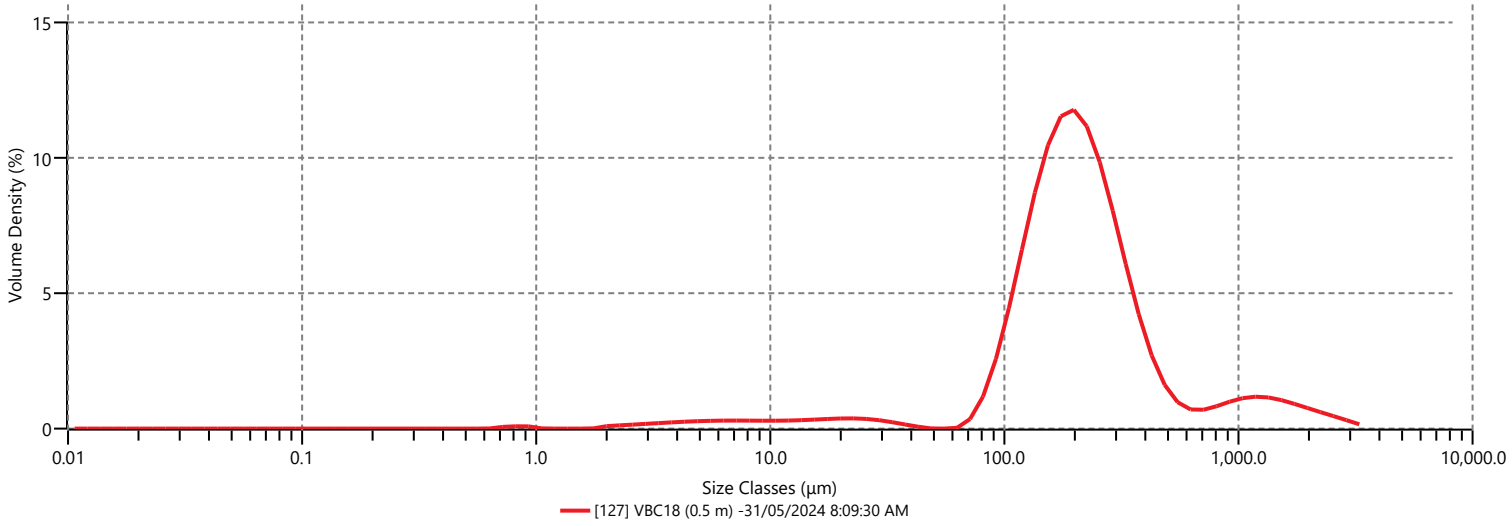
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.39 %
Laser Obscuration	32.11 %

Result

Concentration	0.3528 %
Span	2.032
Uniformity	0.895
Specific Surface Area	33.09 m^2/kg
D [3,2]	69.7 µm
D [4,3]	313 µm
Dv (10)	102 µm
Dv (50)	201 µm
Dv (90)	511 µm
Dv (95)	1190 µm
Volume Below (3) µm	0.61 %
Volume Below (6) µm	1.72 %
Volume Below (20) µm	4.16 %
Volume Below (31) µm	5.18 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	2.23	88.0	7.08	350	82.87	1410	96.32
0.0600	0.00	15.6	3.59	105	10.85	420	87.43	1680	97.51
0.120	0.00	31.0	5.18	125	17.52	500	89.78	2000	98.47
0.240	0.00	37.0	5.43	149	27.78	590	90.92	2380	99.21
0.490	0.00	44.0	5.55	177	40.16	710	91.74	2830	99.69
0.980	0.20	53.0	5.57	210	53.31	840	92.59	3360	99.96
2.00	0.25	63.0	5.57	250	65.74	1000	93.72		
3.90	0.96	74.0	5.77	300	76.36	1190	95.03		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC19 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/19
Operator Name	instrument

Measurement Details

Analysis Date Time	31/05/2024 8:20:41 AM
Measurement Date Time	31/05/2024 8:20:41 AM
Result Source	Edited

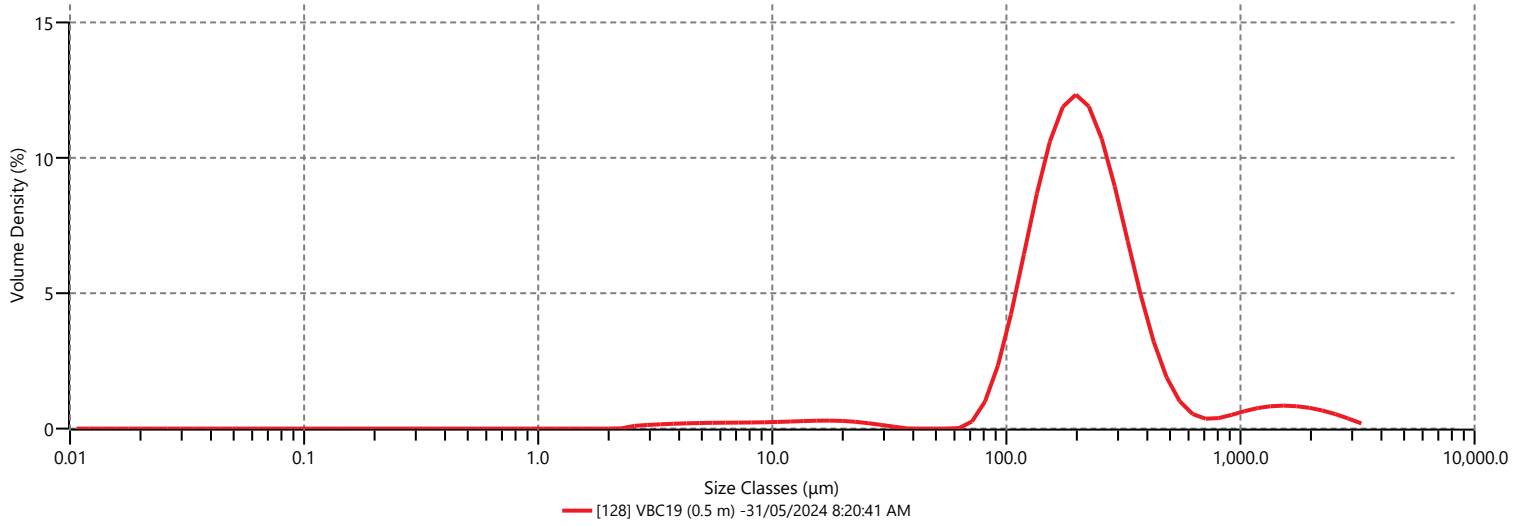
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.37 %
Laser Obscuration	12.66 %

Result

Concentration	0.1792 %
Span	1.579
Uniformity	0.802
Specific Surface Area	22.11 m^2/kg
D [3,2]	104 µm
D [4,3]	306 µm
Dv (10)	111 µm
Dv (50)	206 µm
Dv (90)	437 µm
Dv (95)	1070 µm
Volume Below (3) µm	0.17 %
Volume Below (6) µm	1.02 %
Volume Below (20) µm	3.02 %
Volume Below (31) µm	3.62 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	1.40	88.0	4.94	350	83.84	1410	96.39
0.0600	0.00	15.6	2.55	105	8.42	420	89.19	1680	97.36
0.120	0.00	31.0	3.62	125	14.87	500	91.97	2000	98.28
0.240	0.00	37.0	3.68	149	25.11	590	93.18	2380	99.07
0.490	0.00	44.0	3.68	177	37.77	710	93.73	2830	99.63
0.980	0.00	53.0	3.68	210	51.48	840	94.14	3360	99.95
2.00	0.00	63.0	3.68	250	64.78	1000	94.71		
3.90	0.45	74.0	3.83	300	76.45	1190	95.50		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 20 (0.5 m)
SOP File Name	Sediment.msop
Lab Number	2024136/20
Operator Name	instrument

Measurement Details

Analysis Date Time	31/05/2024 8:33:44 AM
Measurement Date Time	31/05/2024 8:33:44 AM
Result Source	Edited

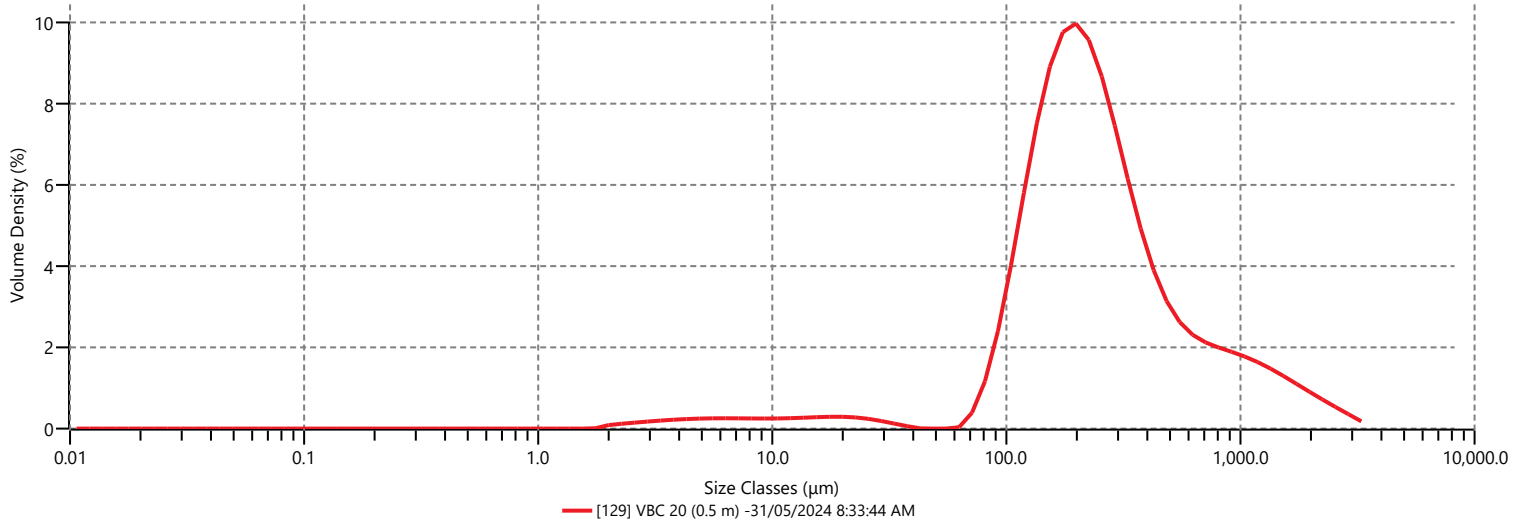
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.37 %
Laser Obscuration	17.84 %

Result

Concentration	0.2306 %
Span	3.316
Uniformity	1.023
Specific Surface Area	24.82 m^2/kg
D [3,2]	93.0 µm
D [4,3]	374 µm
Dv (10)	108 µm
Dv (50)	225 µm
Dv (90)	853 µm
Dv (95)	1320 µm
Volume Below (3) µm	0.40 %
Volume Below (6) µm	1.43 %
Volume Below (20) µm	3.49 %
Volume Below (31) µm	4.19 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	1.86	88.0	5.88	350	72.47	1410	95.61
0.0600	0.00	15.6	3.03	105	9.34	420	78.02	1680	97.07
0.120	0.00	31.0	4.19	125	15.25	500	81.95	2000	98.22
0.240	0.00	37.0	4.32	149	24.08	590	84.86	2380	99.10
0.490	0.00	44.0	4.35	177	34.60	710	87.56	2830	99.65
0.980	0.00	53.0	4.35	210	45.72	840	89.80	3360	99.95
2.00	0.04	63.0	4.35	250	56.43	1000	91.95		
3.90	0.74	74.0	4.59	300	66.01	1190	93.91		

Analysis - Under

Malvern Instruments

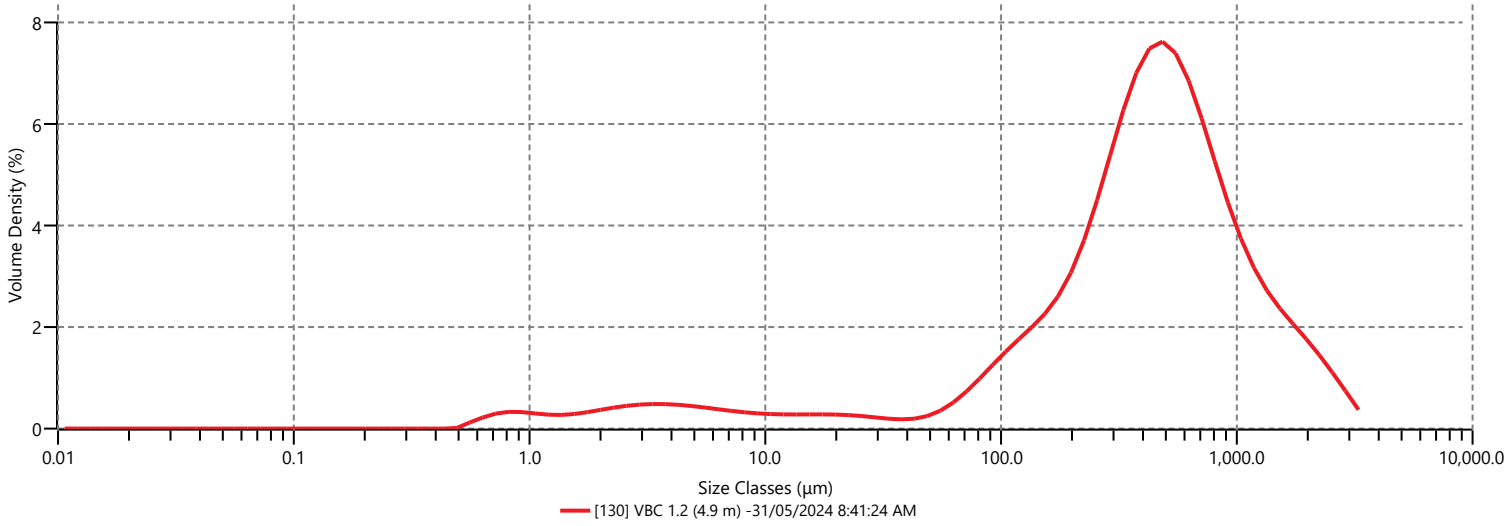
Measurement Details	
Sample Name	VBC 1.2 (4.9 m)
SOP File Name	Sediment.msop
Lab Number	2024136/21
Operator Name	instrument

Measurement Details	
Analysis Date Time	31/05/2024 8:41:24 AM
Measurement Date Time	31/05/2024 8:41:24 AM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.43 %
Laser Obscuration	10.67 %

Result	
Concentration	0.0397 %
Span	2.841
Uniformity	0.857
Specific Surface Area	91.27 m^2/kg
D [3,2]	25.3 µm
D [4,3]	583 µm
Dv (10)	63.7 µm
Dv (50)	433 µm
Dv (90)	1290 µm
Dv (95)	1790 µm
Volume Below (3) µm	3.59 %
Volume Below (6) µm	5.67 %
Volume Below (20) µm	8.05 %
Volume Below (31) µm	8.77 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	6.29	88.0	11.74	350	39.98	1410	91.51
0.0600	0.00	15.6	7.60	105	13.30	420	48.48	1680	94.18
0.120	0.00	31.0	8.77	125	15.21	500	57.13	2000	96.37
0.240	0.00	37.0	8.99	149	17.54	590	65.17	2380	98.12
0.490	0.00	44.0	9.20	177	20.25	710	73.16	2830	99.28
0.980	1.07	53.0	9.50	210	23.52	840	79.29	3360	99.90
2.00	2.45	63.0	9.96	250	27.92	1000	84.37		
3.90	4.42	74.0	10.64	300	33.84	1190	88.34		

Analysis - Under

Malvern Instruments

Measurement Details

Sample Name	VBC 7 (3.2 m)
SOP File Name	Sediment.msop
Lab Number	2024136/22
Operator Name	instrument

Measurement Details

Analysis Date Time	31/05/2024 8:48:56 AM
Measurement Date Time	31/05/2024 8:48:56 AM
Result Source	Edited

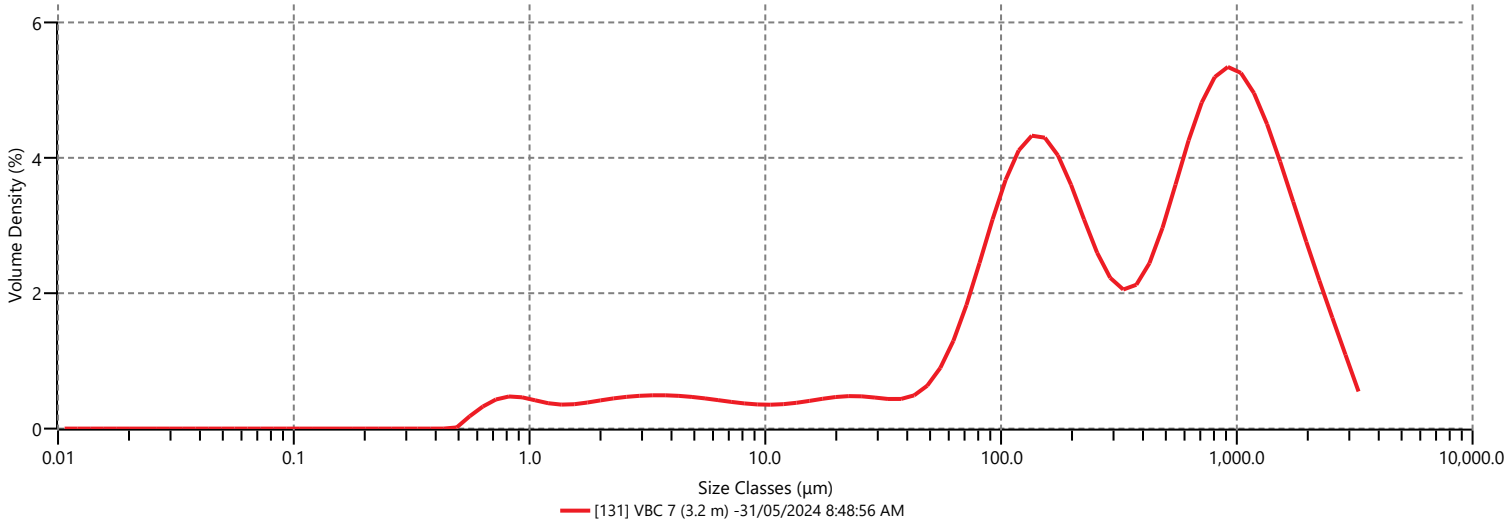
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.40 %
Laser Obscuration	14.51 %

Result

Concentration	0.0431 %
Span	4.224
Uniformity	1.361
Specific Surface Area	118.7 m^2/kg
D [3,2]	19.4 µm
D [4,3]	636 µm
Dv (10)	21.5 µm
Dv (50)	375 µm
Dv (90)	1600 µm
Dv (95)	2050 µm
Volume Below (3) µm	4.54 %
Volume Below (6) µm	6.70 %
Volume Below (20) µm	9.78 %
Volume Below (31) µm	11.13 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	7.39	88.0	18.53	350	49.06	1410	86.60
0.0600	0.00	15.6	9.06	105	22.36	420	51.67	1680	91.05
0.120	0.00	31.0	11.13	125	26.89	500	54.76	2000	94.56
0.240	0.00	37.0	11.63	149	31.85	590	58.55	2380	97.23
0.490	0.00	44.0	12.15	177	36.57	710	63.95	2830	98.94
0.980	1.55	53.0	12.91	210	40.73	840	69.52	3360	99.85
2.00	3.33	63.0	14.09	250	44.13	1000	75.59		
3.90	5.38	74.0	15.79	300	46.97	1190	81.44		

Analysis - Under

Malvern Instruments

Malvern

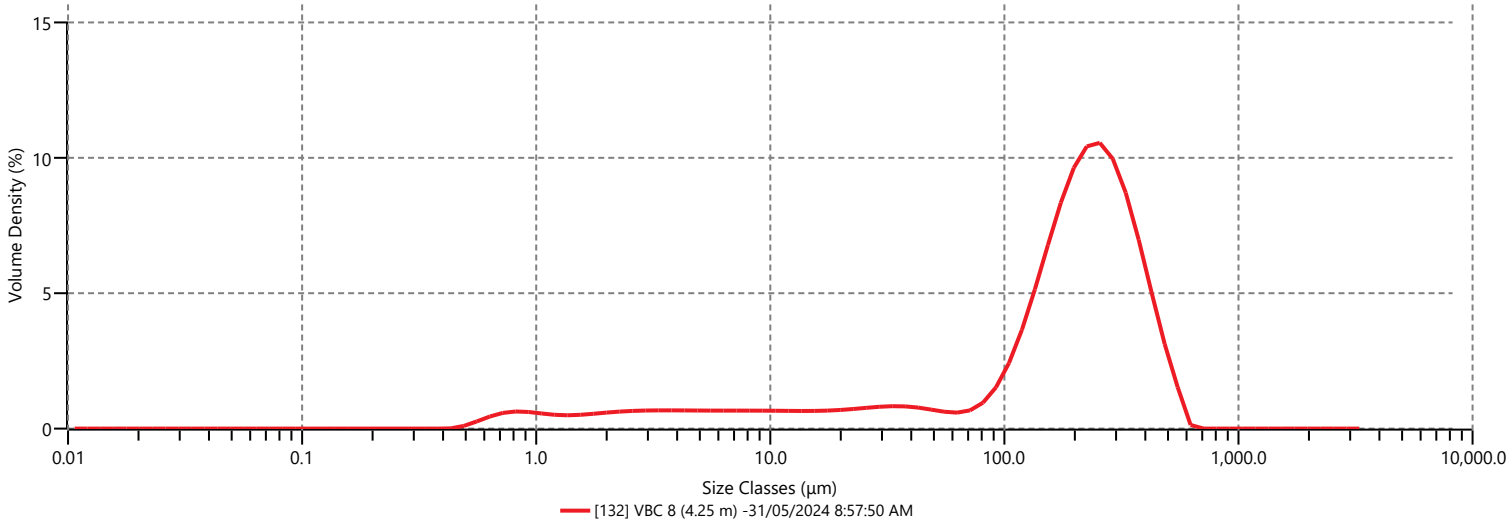
Measurement Details	
Sample Name	VBC 8 (4.25 m)
SOP File Name	Sediment.msop
Lab Number	2024136/23
Operator Name	instrument

Measurement Details	
Analysis Date Time	31/05/2024 8:57:50 AM
Measurement Date Time	31/05/2024 8:57:50 AM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.40 %
Laser Obscuration	18.38 %

Result	
Concentration	0.0398 %
Span	1.864
Uniformity	0.536
Specific Surface Area	167.5 m^2/kg
D [3,2]	13.8 µm
D [4,3]	203 µm
Dv (10)	6.96 µm
Dv (50)	202 µm
Dv (90)	383 µm
Dv (95)	438 µm
Volume Below (3) µm	6.33 %
Volume Below (6) µm	9.36 %
Volume Below (20) µm	14.55 %
Volume Below (31) µm	16.71 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	10.50	88.0	21.86	350	85.87	1410	100.00
0.0600	0.00	15.6	13.47	105	23.98	420	93.60	1680	100.00
0.120	0.00	31.0	16.71	125	27.62	500	98.09	2000	100.00
0.240	0.00	37.0	17.67	149	33.76	590	99.99	2380	100.00
0.490	0.04	44.0	18.58	177	42.20	710	100.00	2830	100.00
0.980	2.17	53.0	19.44	210	52.59	840	100.00	3360	100.00
2.00	4.63	63.0	20.12	250	64.54	1000	100.00		
3.90	7.48	74.0	20.78	300	76.80	1190	100.00		

Analysis - Under

Malvern Instruments

Malvern

Measurement Details

Sample Name	VBC 9 (3.1 m)
SOP File Name	Sediment.msop
Lab Number	2024136/24
Operator Name	instrument

Measurement Details

Analysis Date Time	31/05/2024 9:10:00 AM
Measurement Date Time	31/05/2024 9:10:00 AM
Result Source	Edited

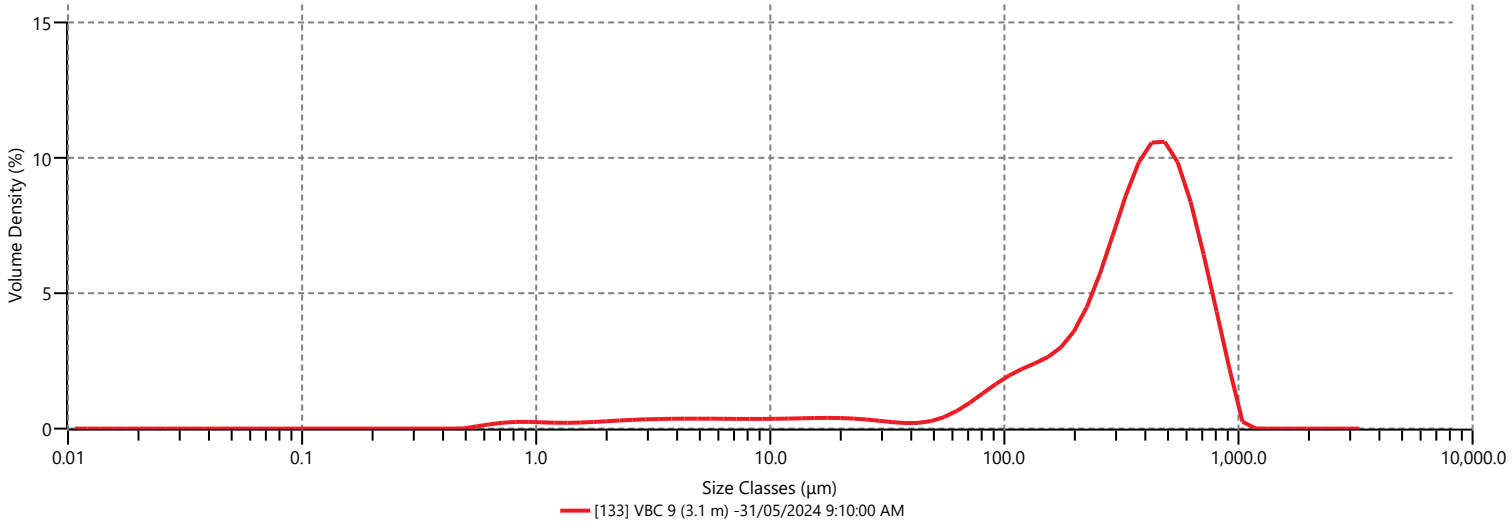
Analysis

Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.45 %
Laser Obscuration	10.18 %

Result

Concentration	0.0459 %
Span	1.683
Uniformity	0.507
Specific Surface Area	74.48 m^2/kg
D [3,2]	31.0 µm
D [4,3]	371 µm
Dv (10)	68.0 µm
Dv (50)	363 µm
Dv (90)	680 µm
Dv (95)	770 µm
Volume Below (3) µm	2.69 %
Volume Below (6) µm	4.33 %
Volume Below (20) µm	7.26 %
Volume Below (31) µm	8.24 %

Frequency (compatible)



Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	4.95	88.0	11.99	350	47.62	1410	100.00
0.0600	0.00	15.6	6.62	105	14.04	420	59.58	1680	100.00
0.120	0.00	31.0	8.24	125	16.45	500	71.70	2000	100.00
0.240	0.00	37.0	8.50	149	19.25	590	82.49	2380	100.00
0.490	0.00	44.0	8.73	177	22.39	710	91.83	2830	100.00
0.980	0.79	53.0	9.07	210	26.18	840	97.46	3360	100.00
2.00	1.86	63.0	9.64	250	31.56	1000	99.94		
3.90	3.30	74.0	10.53	300	39.25	1190	100.00		

Analysis - Under

Malvern Instruments

Malvern

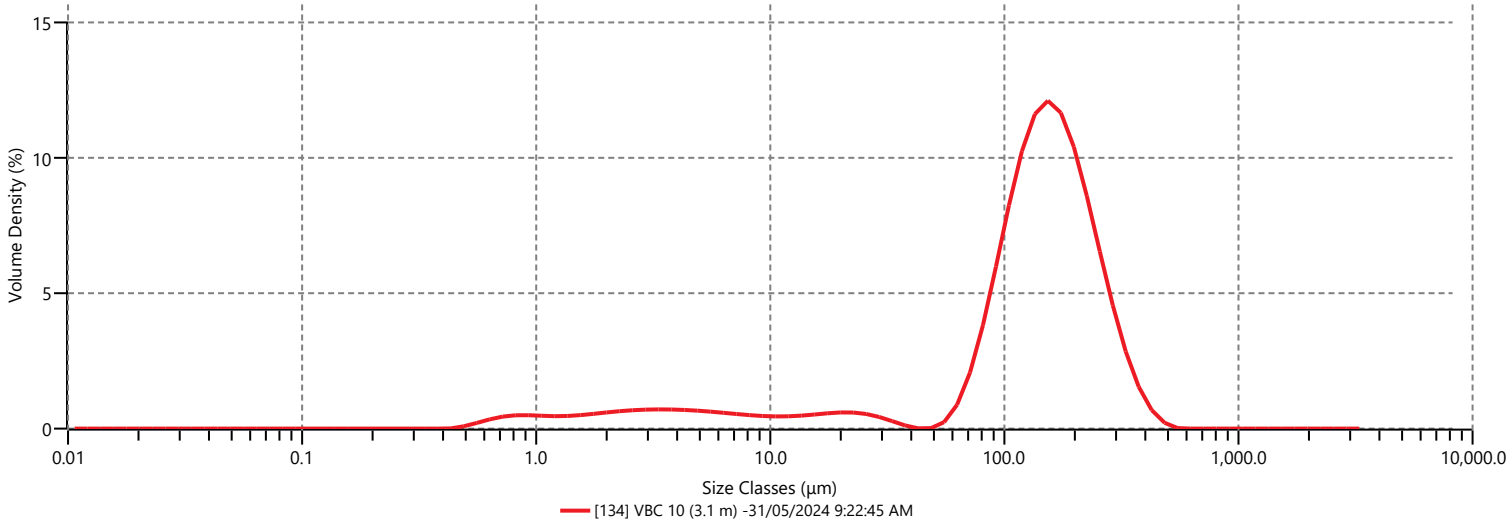
Measurement Details	
Sample Name	VBC 10 (3.1 m)
SOP File Name	Sediment.msop
Lab Number	2024136/25
Operator Name	instrument

Measurement Details	
Analysis Date Time	31/05/2024 9:22:45 AM
Measurement Date Time	31/05/2024 9:22:45 AM
Result Source	Edited

Analysis	
Particle Name	Sediment
Particle Refractive Index	1.500
Particle Absorption Index	0.200
Dispersant Name	Water
Dispersant Refractive Index	1.330
Scattering Model	Mie
Analysis Model	General Purpose
Weighted Residual	0.37 %
Laser Obscuration	18.52 %

Result	
Concentration	0.0440 %
Span	1.767
Uniformity	0.474
Specific Surface Area	150.4 m^2/kg
D [3,2]	15.3 µm
D [4,3]	147 µm
Dv (10)	8.33 µm
Dv (50)	143 µm
Dv (90)	260 µm
Dv (95)	302 µm
Volume Below (3) µm	5.76 %
Volume Below (6) µm	8.84 %
Volume Below (20) µm	12.85 %
Volume Below (31) µm	14.38 %

Frequency (compatible)

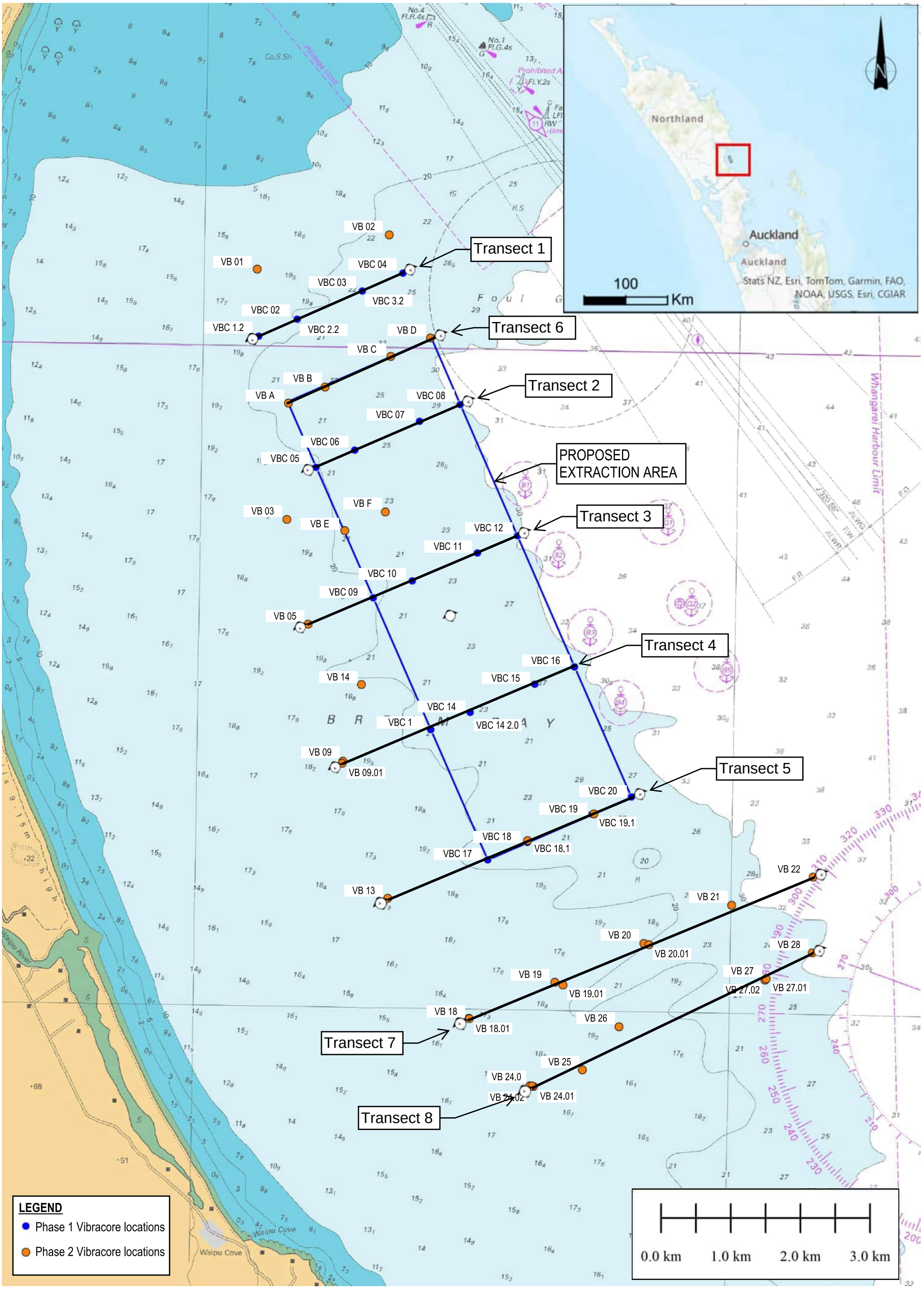


Result

Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under	Size (µm)	% Volume Under
0.0500	0.00	7.80	9.79	88.0	21.16	350	97.95	1410	100.00
0.0600	0.00	15.6	11.93	105	29.06	420	99.51	1680	100.00
0.120	0.00	31.0	14.38	125	40.00	500	99.96	2000	100.00
0.240	0.00	37.0	14.65	149	53.40	590	100.00	2380	100.00
0.490	0.03	44.0	14.71	177	66.87	710	100.00	2830	100.00
0.980	1.70	53.0	14.75	210	78.94	840	100.00	3360	100.00
2.00	4.02	63.0	15.25	250	88.24	1000	100.00		
3.90	6.98	74.0	16.91	300	94.77	1190	100.00		

Appendix D Vibracore interpretive cross sections

- **Transect location plan.**
- **Transect cross section profiles.**



Notes:

1) The base map is sourced from Land Information New Zealand. ENC: NZ 405219 North Island - East Approaches to Marsden Point.

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DRAWN	SOMA	Feb.25
CHECKED	CBM	Mar. 25
APPROVED	CBM	Mar. 25

SCALE (AT A3 SIZE): 1:50,000

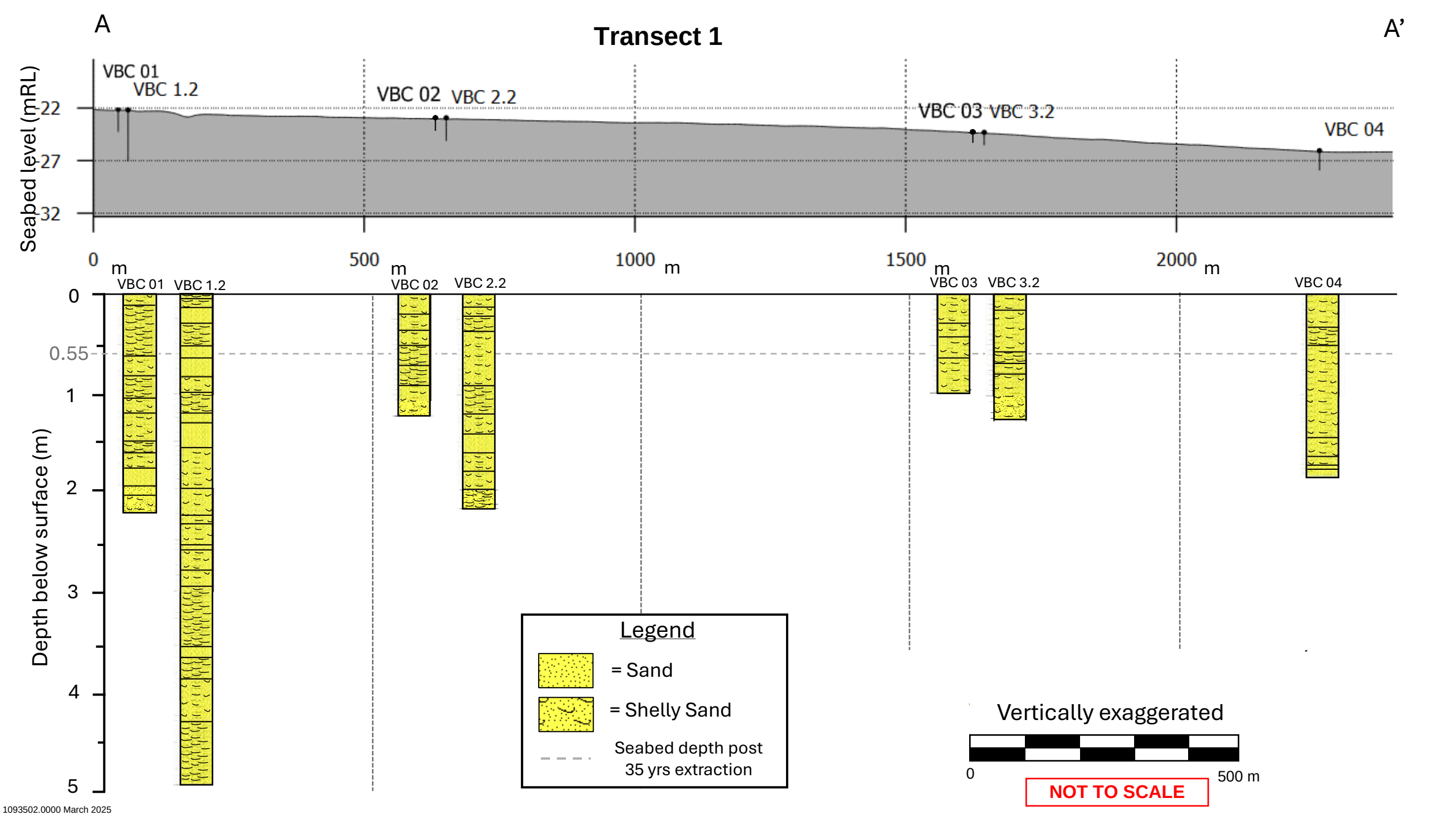
PROJECT No.: 1093502.0000

T+T A3P(NZTM)

Bream Bay: Transect Location plan

FIGURE No.

Rev. 0



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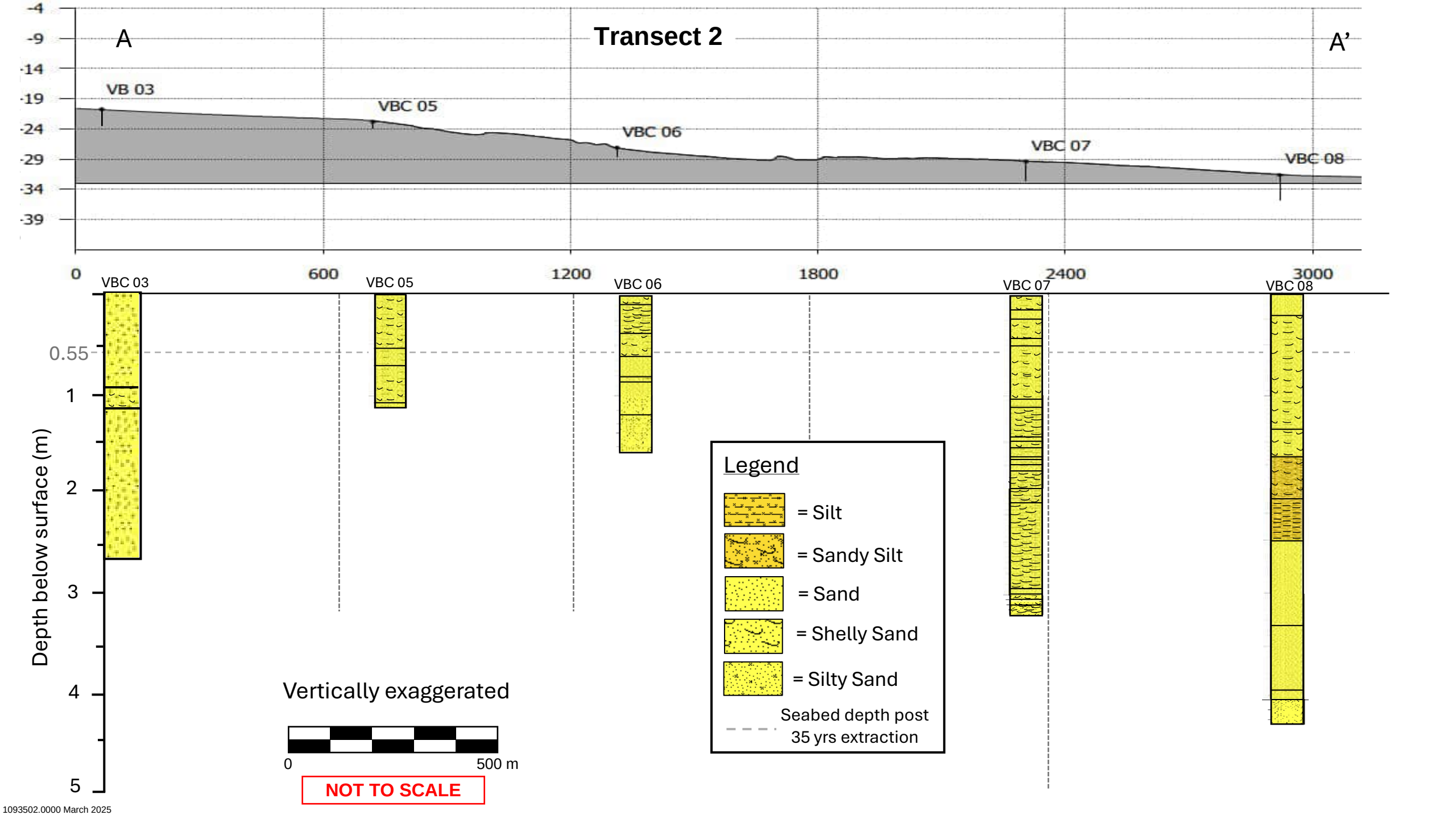
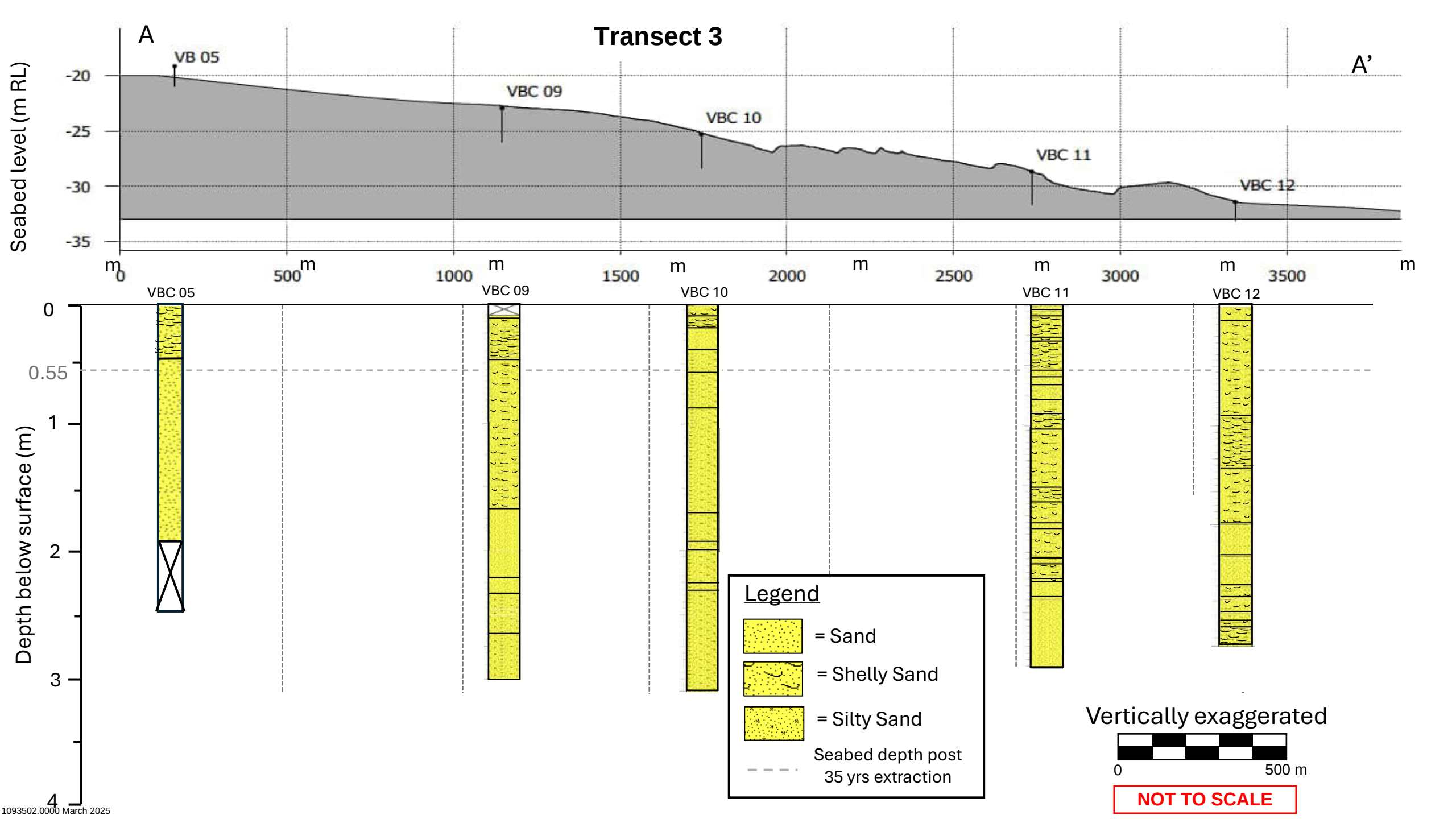
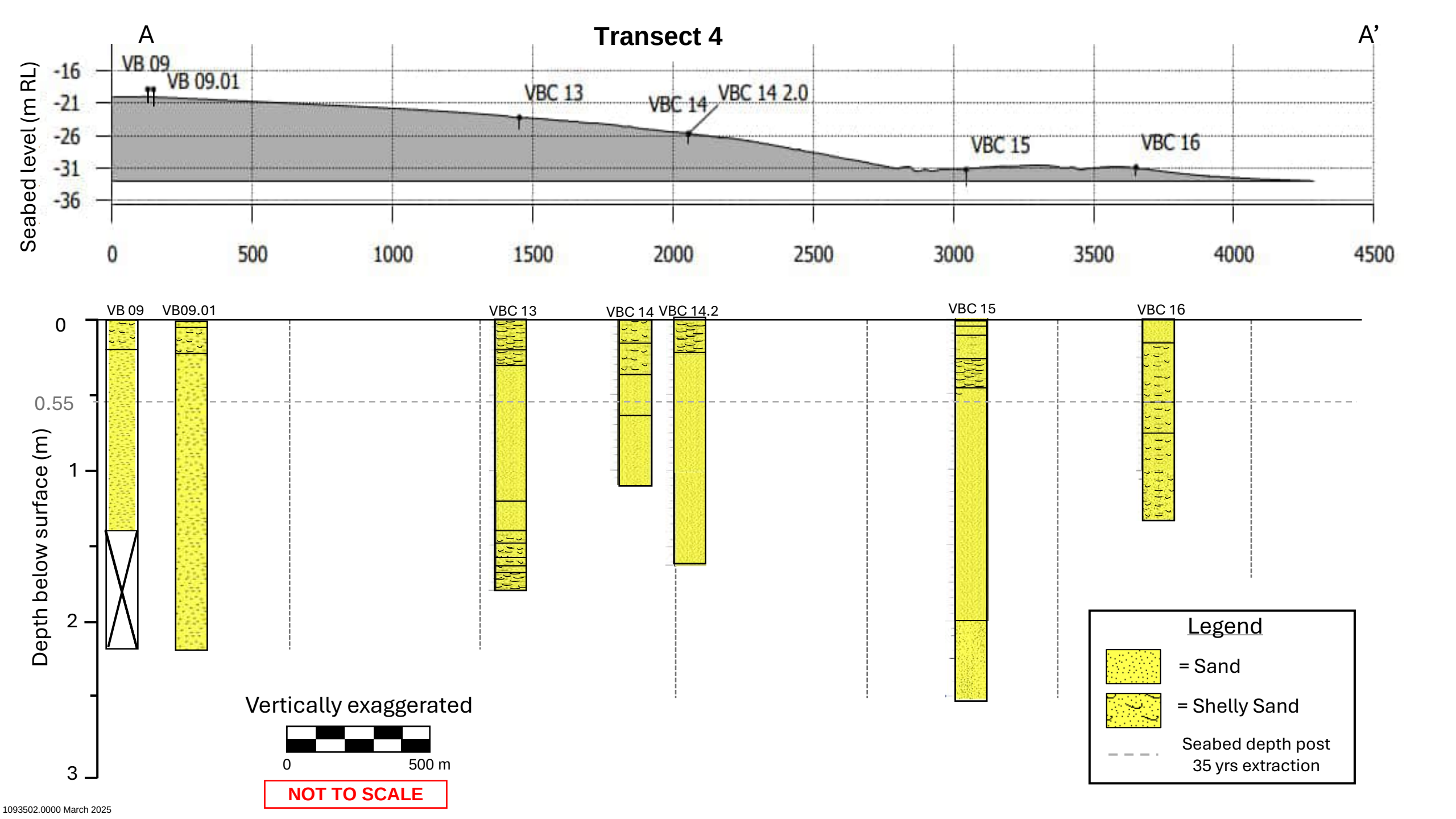
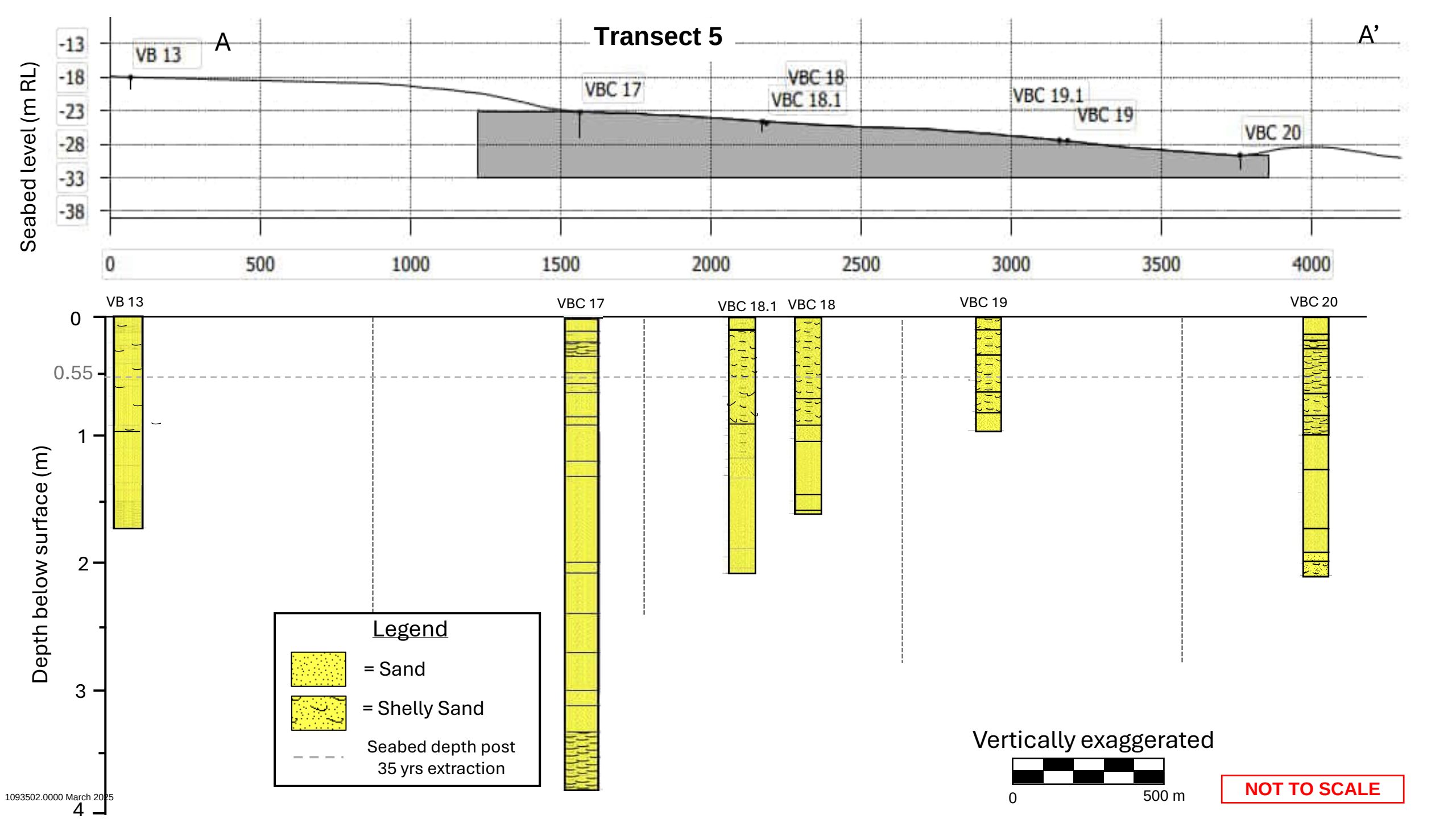

Transect 2
A
A'
-4
-9
-14
-19
-24
-29
-34
-39
VB 03
VBC 05
VBC 06
VBC 07
VBC 08
0
600
1200
1800
2400
3000
VBC 03
VBC 05
VBC 06
VBC 07
VBC 08
0.55
1
2
3
4
5
Depth below surface (m)
Legend
= Silt
= Sandy Silt
= Sand
= Shelly Sand
= Silty Sand
Seabed depth post 35 yrs extraction
Vertically exaggerated
0
500 m
NOT TO SCALE

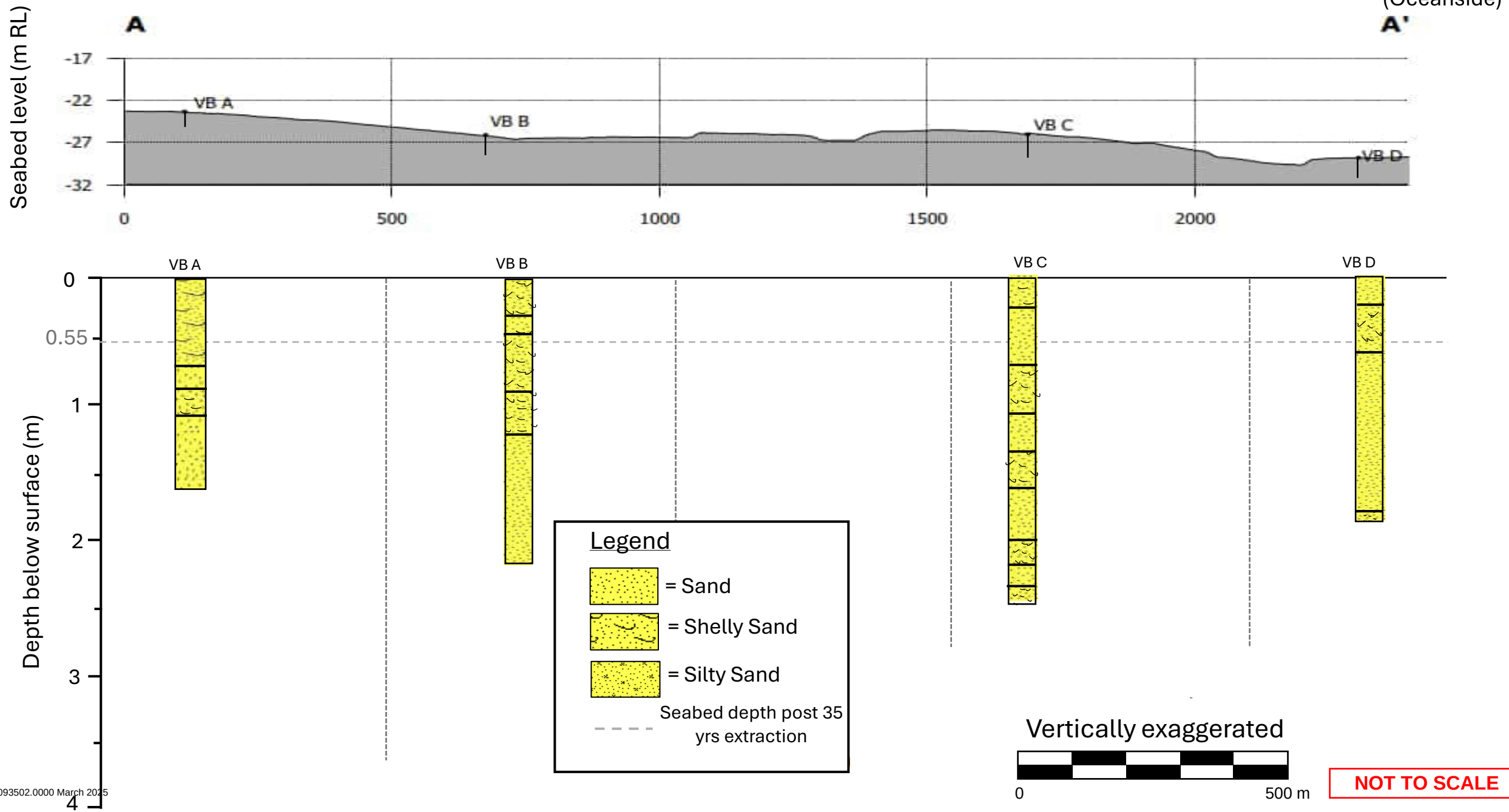

Transect 3
A
A'
VB 05
VBC 09
VBC 10
VBC 11
VBC 12
Seabed level (m RL)
-20
-25
-30
-35
0
500 m
1000 m
1500 m
2000 m
2500 m
3000 m
3500 m
VBC 05
VBC 09
VBC 10
VBC 11
VBC 12
Depth below surface (m)
0
0.55
1
2
3
4
Legend
= Sand
= Shelly Sand
= Silty Sand
Seabed depth post 35 yrs extraction
Vertically exaggerated
0
500 m
NOT TO SCALE


Transect 4
A
A'
Seabed level (m RL)
-16
-21
-26
-31
-36
VB 09
VB 09.01
VBC 13
VBC 14
VBC 14 2.0
VBC 15
VBC 16
0
500
1000
1500
2000
2500
3000
3500
4000
4500
VB 09
VB09.01
VBC 13
VBC 14
VBC 14.2
VBC 15
VBC 16
Depth below surface (m)
0
0.55
1
2
3
Vertically exaggerated
0
500 m
NOT TO SCALE
Legend
= Sand
= Shelly Sand
Seabed depth post 35 yrs extraction

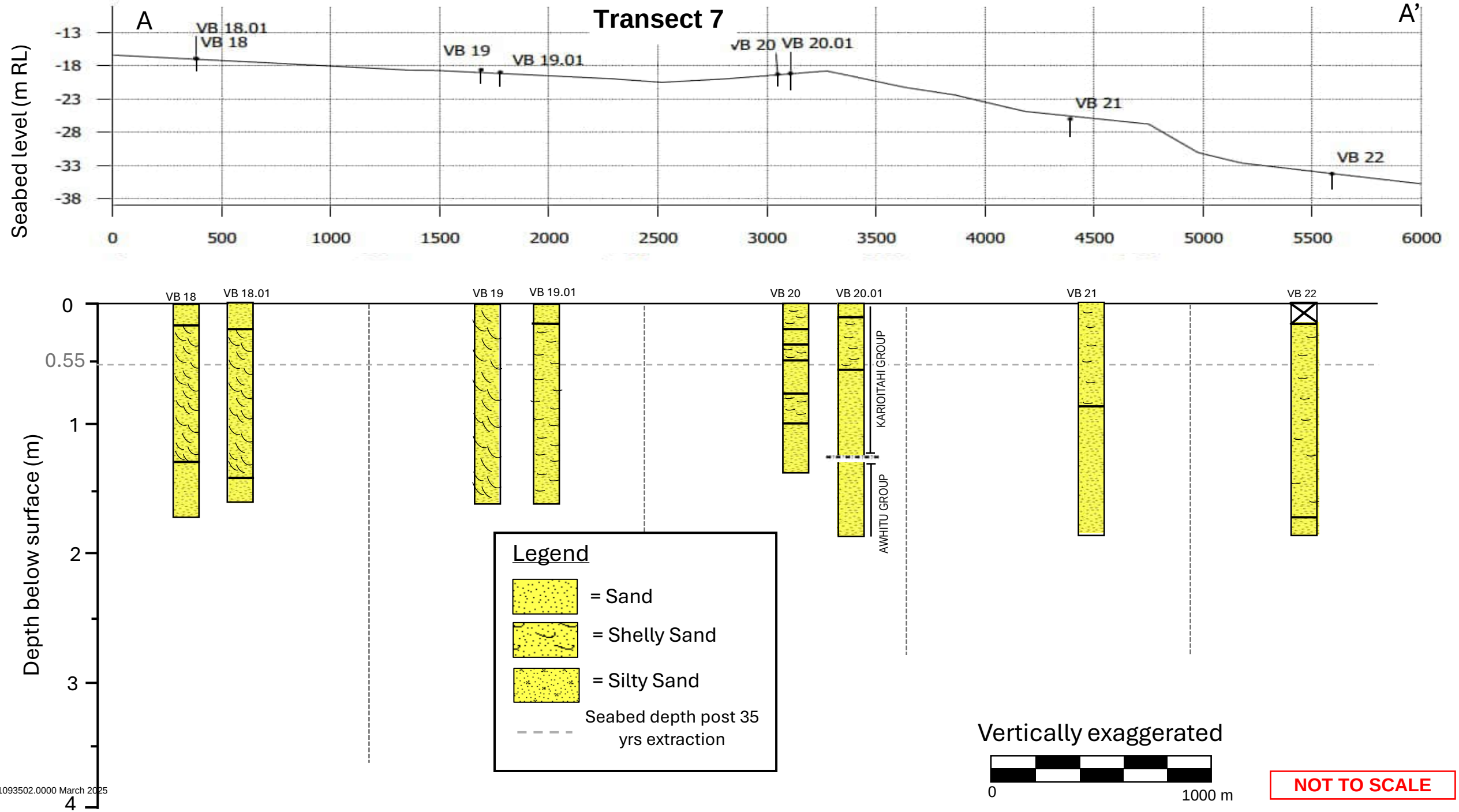

Transect 5
A
A'
Seabed level (m RL)
-13
-18
-23
-28
-33
-38
VB 13
VBC 17
VBC 18
VBC 18.1
VBC 19.1
VBC 19
VBC 20
0
500
1000
1500
2000
2500
3000
3500
4000
VB 13
VBC 17
VBC 18.1
VBC 18
VBC 19
VBC 20
Depth below surface (m)
0
0.55
1
2
3
4
Legend
= Sand
= Shelly Sand
Seabed depth post 35 yrs extraction
Vertically exaggerated
0
500 m
NOT TO SCALE
1093502.0000 March 2025

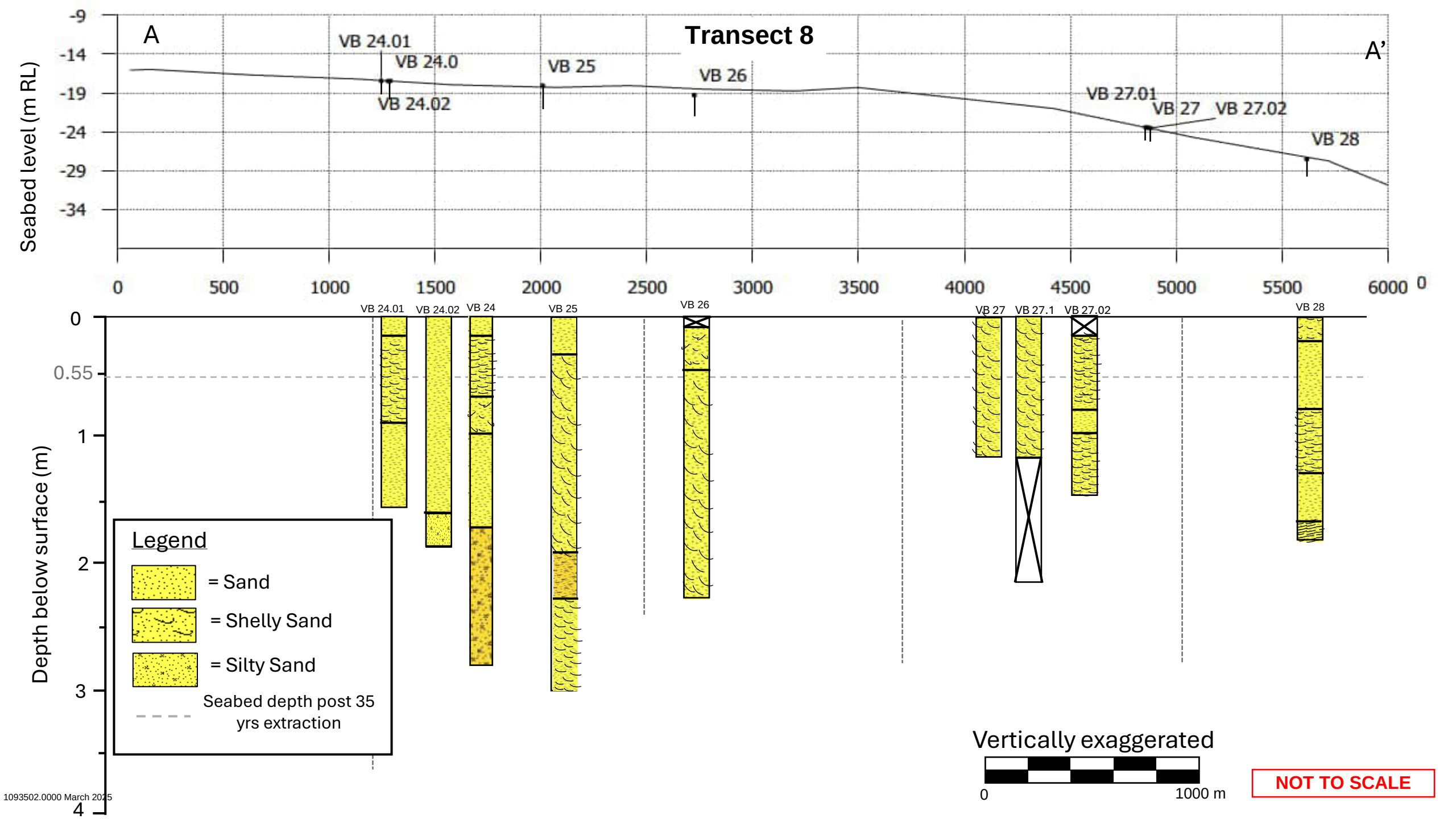
Transect 6

(Oceanside)



NOT TO SCALE


Transect 7
A
A'
Seabed level (m RL)
-13
-18
-23
-28
-33
-38
VB 18.01
VB 18
VB 19
VB 19.01
VB 20
VB 20.01
VB 21
VB 22
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
Depth below surface (m)
0
0.55
1
2
3
4
KARIOITAHI GROUP
AWHITU GROUP
Legend
= Sand
= Shelly Sand
= Silty Sand
Seabed depth post 35 yrs extraction
Vertically exaggerated
0
1000 m
NOT TO SCALE


Transect 8
A
A'
Seabed level (m RL)
-9
-14
-19
-24
-29
-34
VB 24.01
VB 24.0
VB 24.02
VB 25
VB 26
VB 27.01
VB 27
VB 27.02
VB 28
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
VB 24.01
VB 24.02
VB 24
VB 25
VB 26
VB 27
VB 27.1
VB 27.02
VB 28
Depth below surface (m)
0
0.55
1
2
3
4
Legend
= Sand
= Shelly Sand
= Silty Sand
Seabed depth post 35 yrs extraction
Vertically exaggerated
0
1000 m
NOT TO SCALE
1093502.0000 March 2025

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