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Beachlands South Fast-Track Application

Geotechnical Report

Prepared for

Beachlands South Limited Partnership

Prepared by

Tonkin & Taylor Ltd

Date

June 2026

Job Number

1014358.3200 v2

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Document control

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Distribution:

Beachlands South Limited Partnership

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Appendix C T+T 2026 Geotechnical Investigation Data

- CPT Logs [CPT CPT-001 to CPT-023]
- HA Logs [BH001 to BH035]
- Piezometer Installation Records [BH001 to BH003, BH005 to BH009, BH011, BH015, BH017 to BH018, BH020 to BH022, BH025 to BH026, BH028, BH030, BH032, BH034]
- Groundwater Monitoring Graphs
- Geotechnics' Laboratory Testing Results [BH003, BH011, BH018, BH027, BH034]



5 May 2026

Our Ref: 2025000.0032.1.0/Rep01
Customer Reference: 1014358.3100

Tonkin & Taylor Limited
PO BOX 5271
AUCKLAND 1141

Attention: James Lee

Dear James

Beachlands South

Site Report – Piezocone Penetration Testing

Customer's Instructions

We were instructed to complete:

- 23 Piezocone penetration tests (CPT-001 – CPT-023) to a target depth of 20 m or refusal.

Specifications

None issued.

Dates of Procedures

14th - 22nd April 2026

Locations

Test locations were determined by the customer.

The attached plan(s) provides indicative locations only and is not to scale. All other information we provide regarding location should be referenced to the asset owner.

Coordinates are provided in the CPT plots.

- a Method used to determine locations: GPS\GNSS (Handheld)
- b Method used to determine RL: Estimated from contours
- c Expected accuracy for location (NZTM): 1 m
- d Expected accuracy for elevation (NZVD16): 1 m

Method

- ISO 22476-1: 2012(E) - Geotechnical investigation and testing – Field testing – Part 1: Electrical cone and piezocone penetration test

Results

The following is attached:

- Location plan.
- CPT plots.
- Probe calibration certificate.

Raw CPTu data files have been supplied via email.

Test Remarks

Test IDs	CPT-001, CPT-002, CPT-003, CPT-004, CPT-005, CPT-006, CPT-007, CPT-008, CPT-009, CPT-010, CPT-011, CPT-012, CPT-013, CPT-014, CPT-015, CPT-016, CPT-017, CPT-018, CPT-019, CPT-020, CPT-021, CPT-022, CPT-023
Operator	JFAA, FRBA
Machine	Pagani TG63-150, capacity 150 kN
Cone	Pagani Probe No. 001226 (10 cm ² , compression type, 100 MPa). Tip net area ratio (an) = 0.79
	Porewater pressure location u ₂ , glycerine saturated
Friction Reducer	Ring type, Outer diameter 46mm, amount 1, Located at 0.50m behind the base of the cone

CPT-001 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 14.81m
 Actual Depth: 14.78m
 Operation Date: 14/04/2026
 Coordinates: NZTM - N 5915340.8281 E 1777332.7098
 16.5m (NZVD16)
 Ground Water Level: 3.8m (assumed)
 Test Notes: Test refusal at 14.81 m > 25MPa, danger of overloading Local Friction (Fs) load cell
 Other Tests: Hole collapsed (Dry) at 0.20 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	252.66	2992.78
Baseline (Initial - Final)	-0.03	-0.13	-0.28
% of MSO (Initial - Final)	-0.09	-0.01	0.00
Max Measure value	29.29	1574.40	5849.50

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-002 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 20.2m
 Actual Depth: 15.19m
 Operation Date: 14/04/2026
 Coordinates: NZTM - N 5915189.2193 E 1777440.3382
 25.6m (NZVD16)
 Ground Water Level: 1.85m (assumed)
 Test Notes: Target depth reached
 Other Tests: Hole collapsed (Dry) at 0.90 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	251.53	2992.49
Baseline (Initial - Final)	-0.01	0.10	-0.19
% of MSO (Initial - Final)	-0.05	0.02	-0.01
Max Measure value	10.31	538.20	2598.80

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-003 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 14.81m
 Actual Depth: 15.58m
 Operation Date: 14/04/2026
 Coordinates: NZTM - N 5915115.4772 E 1777353.3411
 20.5m (NZVD16)
 Ground Water Level: 2.1m (assumed)
 Test Notes: Test refusal at 15.63 m > 15MPa, danger of overloading Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 0.30 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	251.92	2992.59
Baseline (Initial - Final)	-0.01	0.29	-0.10
% of MSO (Initial - Final)	-0.06	0.06	0.00
Max Measure value	18.92	474.90	6189.10

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-004 -

Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 20.2m
 Actual Depth: 20.05m
 Operation Date: 14/04/2026
 Coordinates: NZTM - N 5915009.1822 E 1777467.3274
 27.9m (NZVD16)
 Ground Water Level: 1.8m (assumed)
 Test Notes: Target depth reached
 Other Tests: Hole collapsed (Dry) at 0.75 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	252.18	2992.30
Baseline (Initial - Final)	0.00	0.06	-0.10
% of MSO (Initial - Final)	0.00	0.02	0.00
Max Measure value	10.91	339.20	1955.70

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-005 -

Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 12.98m
 Actual Depth: 12.96m
 Operation Date: 16/04/2026
 Coordinates: NZTM - N 5914932.0279 E 1777362.668
 18.4m (NZVD16)
 Ground Water Level: 7.6m
 Test Notes: Test refusal at 12.98 m > 30MPa, danger of overloading Local Friction (Fs) load cell
 Other Tests: None

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.66	251.31	2992.87
Baseline (Initial - Final)	-0.03	1.09	-0.29
% of MSO (Initial - Final)	-0.09	0.08	-0.01
Max Measure value	34.28	1288.30	5613.70

Meets ISO 22476-1:2012 - Application class 3

CPT-006 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 19.45m
 Actual Depth: 19.41m
 Operation Date: 16/04/2026
 Coordinates: NZTM - N 5914720.2077 E 1777257.2219
 16.8m (NZVD16)
 Ground Water Level: 3.3m (assumed)
 Test Notes: Test refusal at 19.45 m > 20MPa, danger of overloading Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 1.10 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.66	251.66	2993.06
Baseline (Initial - Final)	-0.02	0.68	0.19
% of MSO (Initial - Final)	-0.09	0.07	0.00
Max Measure value	23.24	985.10	5869.10

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-007 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 20.8m
 Actual Depth: 20.76m
 Operation Date: 16/04/2026
 Coordinates: NZTM - N 5914519.1715 E 1777210.5352
 23.5m (NZVD16)
 Ground Water Level: 2.6m
 Test Notes: Target depth reached
 Other Tests: None

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.65	252.08	2993.25
Baseline (Initial - Final)	-0.05	0.29	0.10
% of MSO (Initial - Final)	-0.47	0.09	0.01
Max Measure value	10.37	319.60	1425.60

Meets ISO 22476-1:2012 - Application class 3

CPT-008 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 14.89m
 Actual Depth: 14.83m
 Operation Date: 16/04/2026
 Coordinates: NZTM - N 5914422.2874 E 1777259.5528
 20.9m (NZVD16)
 Ground Water Level: 9.7m
 Test Notes: Test refusal at 14.89 m > 15MPa, anchor failure
 Other Tests: None

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	252.02	2993.25
Baseline (Initial - Final)	-0.01	0.45	0.29
% of MSO (Initial - Final)	-0.03	0.13	0.00
Max Measure value	16.94	348.60	5747.70

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-009 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 19.25m
 Actual Depth: 19.17m
 Operation Date: 17/04/2026
 Coordinates: NZTM - N 5914208.5164 E 1777434.7952
 17.9m (NZVD16)
 Ground Water Level: 2.4m
 Test Notes: Test refusal at 19.25 m > 25MPa, danger of overloading Local Friction (Fs) load cell
 Other Tests: None

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.63	252.15	2994.01
Baseline (Initial - Final)	0.02	1.45	0.48
% of MSO (Initial - Final)	0.06	0.12	0.01
Max Measure value	26.17	1201.30	4160.20

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-010 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 9.82m
 Actual Depth: 9.8m
 Operation Date: 17/04/2026
 Coordinates: NZTM - N 5914280.8502 E 1777625.9497
 32.8m (NZVD16)
 Ground Water Level: 2.3m (assumed)
 Test Notes: Test refusal at 9.81 m > 20MPa, overloaded
 Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 0.75 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.66	252.34	2994.49
Baseline (Initial - Final)	0.00	-0.03	-0.19
% of MSO (Initial - Final)	0.00	-0.01	0.00
Max Measure value	22.06	611.10	6878.20

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-011 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 18.82m
 Actual Depth: 18.74m
 Operation Date: 17/04/2026
 Coordinates: NZTM - N 5914516.6546 E 1777553.6915
 30.4m (NZVD16)
 Ground Water Level: 1.8m (assumed)
 Test Notes: Test refusal at 18.82 m > 15MPa, danger of
 overloading Local Friction (Fs) load cell
 Other Tests: Hole collapsed (Dry) at 0.85 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.68	252.50	2994.01
Baseline (Initial - Final)	-0.04	0.35	0.28
% of MSO (Initial - Final)	-0.24	0.04	0.02
Max Measure value	17.73	998.10	1751.20

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-012 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 18.81m
 Actual Depth: 18.77m
 Operation Date: 20/04/2026
 Coordinates: NZTM - N 5914204.5963 E 1777771.7935
 36.6m (NZVD16)
 Ground Water Level: 2.8m (assumed)
 Test Notes: Test refusal at 18.81 m > 40MPa, anchor failure
 Other Tests: Hole collapsed (Dry) at 0.82 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.34	249.13	3083.19
Baseline (Initial - Final)	-0.02	1.88	-0.78
% of MSO (Initial - Final)	-0.04	0.15	-0.05
Max Measure value	40.10	1240.60	1575.00

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-013 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 7.17m
 Actual Depth: 7.16m
 Operation Date: 17/04/2026
 Coordinates: NZTM - N 5914414.1595 E 1777810.7553
 42.1m (NZVD16)
 Ground Water Level: 3.8m (assumed)
 Test Notes: Test refusal at 7.17 m > 15MPa, danger of overloading Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 0.85 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.69	252.56	2993.73
Baseline (Initial - Final)	-0.01	-0.03	0.38
% of MSO (Initial - Final)	-0.06	-0.01	0.01
Max Measure value	19.40	434.00	6453.80

Meets ISO 22476-1:2012 - Application class 3

CPT-014 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 20.5m
 Actual Depth: 20.48m
 Operation Date: 17/04/2026
 Coordinates: NZTM - N 5914597.4332 E 1777822.5907
 36.6m (NZVD16)
 Ground Water Level: 1.8m (assumed)
 Test Notes: Target depth reached
 Other Tests: Hole collapsed (Dry) at 0.92 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.66	252.72	2994.20
Baseline (Initial - Final)	0.01	-0.13	0.00
% of MSO (Initial - Final)	0.06	-0.04	0.00
Max Measure value	9.73	365.80	2023.90

Meets ISO 22476-1:2012 - Application class 3

CPT-015 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 13.46m
 Actual Depth: 13.44m
 Operation Date: 20/04/2026
 Coordinates: NZTM - N 5914661.5504 E 1777974.2893
 36.8m (NZVD16)
 Ground Water Level: 1.4m
 Test Notes: Test refusal at 13.46 m > 30MPa, overloaded
 Pore Pressure (u2) transducer
 Other Tests: None

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.35	249.32	3084.06
Baseline (Initial - Final)	-0.04	2.29	-0.98
% of MSO (Initial - Final)	-0.11	0.17	-0.01
Max Measure value	33.90	1338.60	7881.30

Meets ISO 22476-1:2012 - Application class 3

CPT-016 -

Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 9.02m
 Actual Depth: 9m
 Operation Date: 22/04/2026
 Coordinates: NZTM - N 5914559.231 E 1778136.6502
 36.8m (NZVD16)
 Ground Water Level: 3.1m (assumed)
 Test Notes: Test refusal at 9.02 m > 15Mpa, danger of overloading Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 2.90 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.63	252.02	2993.25
Baseline (Initial - Final)	-0.02	0.29	0.19
% of MSO (Initial - Final)	-0.08	0.05	0.00
Max Measure value	19.54	589.40	5655.80

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-017 -

Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 13.26m
 Actual Depth: 13.23m
 Operation Date: 20/04/2026
 Coordinates: NZTM - N 5914217.7325 E 1778034.8719
 47.2m (NZVD16)
 Ground Water Level: 3.4m (assumed)
 Test Notes: Test refusal at 13.26 m > 35MPa, danger of overloading Pore Pressure (u2) transducer
 Other Tests: Hole collapsed at 3.10 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.34	249.45	3083.97
Baseline (Initial - Final)	0.01	1.81	-0.98
% of MSO (Initial - Final)	0.03	0.20	-0.02
Max Measure value	36.62	923.10	6377.00

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-018 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 13.11m
 Actual Depth: 13.05m
 Operation Date: 22/04/2026
 Coordinates: NZTM - N 5914280.3644 E 1778190.6469
 50.7m (NZVD16)
 Ground Water Level: 3.2m (assumed)
 Test Notes: Test refusal at 13.11 m > 20MPa, danger of overloading Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 2.45 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.62	251.95	2992.49
Baseline (Initial - Final)	0.01	-0.06	0.67
% of MSO (Initial - Final)	0.05	-0.01	0.01
Max Measure value	20.72	430.80	5588.00

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-019 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 15.63m
 Actual Depth: 15.62m
 Operation Date: 20/04/2026
 Coordinates: NZTM - N 5914041.2268 E 1778083.3638
 47.1m (NZVD16)
 Ground Water Level: 3.4m (assumed)
 Test Notes: Test refusal at 15.63 m > 20MPa, overloaded Pore Pressure (u2) transducer
 Other Tests: Hole collapsed (Dry) at 2.20 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.36	249.51	3083.77
Baseline (Initial - Final)	-0.04	1.43	-0.68
% of MSO (Initial - Final)	-0.16	0.12	-0.01
Max Measure value	22.98	1239.20	6846.90

Meets ISO 22476-1:2012 - Application class 3

CPT-020 -

Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 5.68m
 Actual Depth: 5.67m
 Operation Date: 22/04/2026
 Coordinates: NZTM - N 5914762.6508 E 1778372.1354
 24.4m (NZVD16)
 Ground Water Level: 2.5m (assumed)
 Test Notes: Test refusal at 5.68 m > 35MPa, danger of overloading Local Friction (Fs) load cell
 Other Tests: Hole collapsed (Dry) at 1.62 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	251.92	2994.01
Baseline (Initial - Final)	-0.04	1.09	-0.67
% of MSO (Initial - Final)	-0.11	0.07	-0.02
Max Measure value	35.88	1558.60	3697.80

Meets ISO 22476-1:2012 - Application class 2

CPT-021 -

Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 9.94m
 Actual Depth: 9.89m
 Operation Date: 22/04/2026
 Coordinates: NZTM - N 5914636.5362 E 1779105.8324
 46.4m (NZVD16)
 Ground Water Level: 2.9m (assumed)
 Test Notes: Test refusal at 9.94 m > 35MPa, danger of overloading Local Friction (Fs) load cell
 Other Tests: Hole collapsed (Dry) at 2.75 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.65	252.11	2993.35
Baseline (Initial - Final)	-0.02	0.61	0.19
% of MSO (Initial - Final)	-0.06	0.04	0.01
Max Measure value	38.78	1571.60	1312.00

Meets ISO 22476-1:2012 - Application class 4(TE1)

CPT-022 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 8.78m
 Actual Depth: 8.77m
 Operation Date: 22/04/2026
 Coordinates: NZTM - N 5914558.8846 E 1779249.285
 56.8m (NZVD16)
 Ground Water Level: 3.1m (assumed)
 Test Notes: Test refusal at 8.78 m > 25MPa, danger of overloading Local Friction (Fs) load cell
 Other Tests: Hole collapsed (Dry) at 6.70 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.66	252.40	2993.25
Baseline (Initial - Final)	-0.03	0.74	0.38
% of MSO (Initial - Final)	-0.09	0.05	0.01
Max Measure value	29.29	1574.40	5849.50

Meets ISO 22476-1:2012 - Application class 3

CPT-023 - Target Depth: 20m
 Predrill Depth: 0m
 Penetration Length: 12.66m
 Actual Depth: 12.65m
 Operation Date: 22/04/2026
 Coordinates: NZTM - N 5914371.876 E 1779223.953
 50.05m (NZVD16)
 Ground Water Level: 2.1m (assumed)
 Test Notes: Test refusal at 12.75 m > 50MPa, danger of overloading Point Resistance (Qc) load cell
 Other Tests: Hole collapsed (Dry) at 1.78 m

	qc (MPa)	fs (kPa)	u2 (kPa)
Baseline Initial	21.64	252.82	2993.82
Baseline (Initial - Final)	0.04	0.23	0.10
% of MSO (Initial - Final)	0.07	0.02	0.00
Max Measure value	53.92	1186.30	1921.30

Meets ISO 22476-1:2012 - Application class 3

Raw Data: The data presented in this report is factual and based on the results of CPTu testing undertaken with reasonable diligence. Any interpretation of the data is the sole responsibility of the user.

Measured Water Levels: Where water level measurements are reported, the depth was determined immediately after the test with an electronic water level meter. Where water level measurement

was not successful, a hydrostatic line of best fit was added to the CPTu plot and is noted in the report as 'assumed'.

Penetration Speed: Adding 1 m length rods requires a pause in penetration and the testing is therefore non-continuous. Where materials may damage equipment, penetration speed is reduced to protect equipment and limit inclination deviation. Penetration speed is recorded in the tab data and when reduced to <15 mm/second or >25 mm/second is not in accordance with the test method.

Interpreted Parameters (outliers); can occasionally occur due to the addition of 1 m length rods. Values for q_c and f_s have been averaged where the data point coincides with a rod change to represent ground conditions more accurately. Averaging of these values is not in accordance with the test method.

Tip Resistance (q_c): The CPTu plots show tip resistance as q_c .

The static pore water pressure line shown is assumed to be hydrostatic from the phreatic surface. The validity of this assumption must be checked by the user.

Pore Pressure (u_2): The test method for taking pore pressure readings may not be suitable for the type of material being tested. Therefore, the corrected or calculated parameters based on u_2 values are not included in this report.

Friction Ratio (Rf): There is no offset between tip resistance and sleeve friction used for friction ratio determination.

General Remarks

This report has been prepared for the benefit of Tonkin & Taylor Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

The inherent uncertainties of site investigation work, mean the nature and continuity of subsoil away from the test location could vary from the data logged.

As agreed, we have forwarded a copy of our unlocked spreadsheets. We take no responsibility for alteration or loss of data in the electronic transfer/transmittal, or manipulation of the data after it has been transmitted.

Please reproduce this report in full when transmitting to others or including in internal reports.

If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of the letterhead page.

GEOTECHNICS LTD

Report approved by:

Authorised for Geotechnics by:

.....
Fraser Bainbridge
Project Manager

.....
Paul Burton
Project Director
Key Technical Person

5-May-26
t:\geotechnicsgroup\projects\2025000\2025000.0032 - beachland south, ha &
cpts\workingmaterial\cpt\report\20260505.jfaa.2025000.0032.1.rep01.beachlands south.docx



CRS: NZGD 2000 New Zealand Transverse Mercator Credits: Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Earthstar Geographics, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors



APPROVED

DATE _____

SCALE (A3) 1:7,000

EV 0

CPT-001 110 Jack Lachlan Drive, Beachlands - 14 April, 2026

Pre-Drill: 0m NZTM 1777332.7098mE 5915340.8281mN 16.5m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

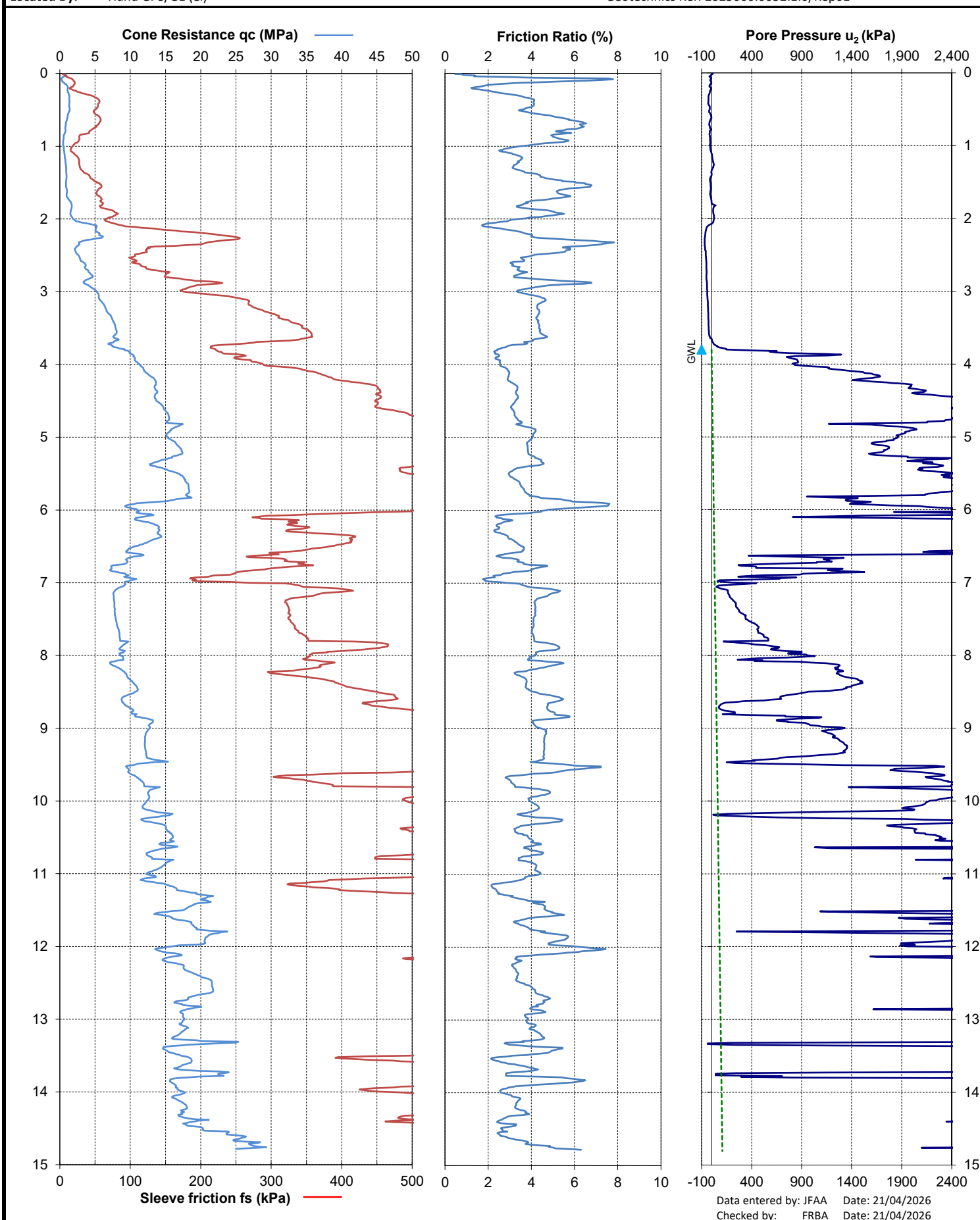
Assumed GWL: 3.8m (BGL) Other Tests: Hole collapsed (Dry) at 0.20 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 14.81 m > 25MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-002 110 Jack Lachlan Drive, Beachlands - 14 April, 2026

Pre-Drill: 0m NZTM 1777440.3382mE 5915189.2193mN 25.6m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

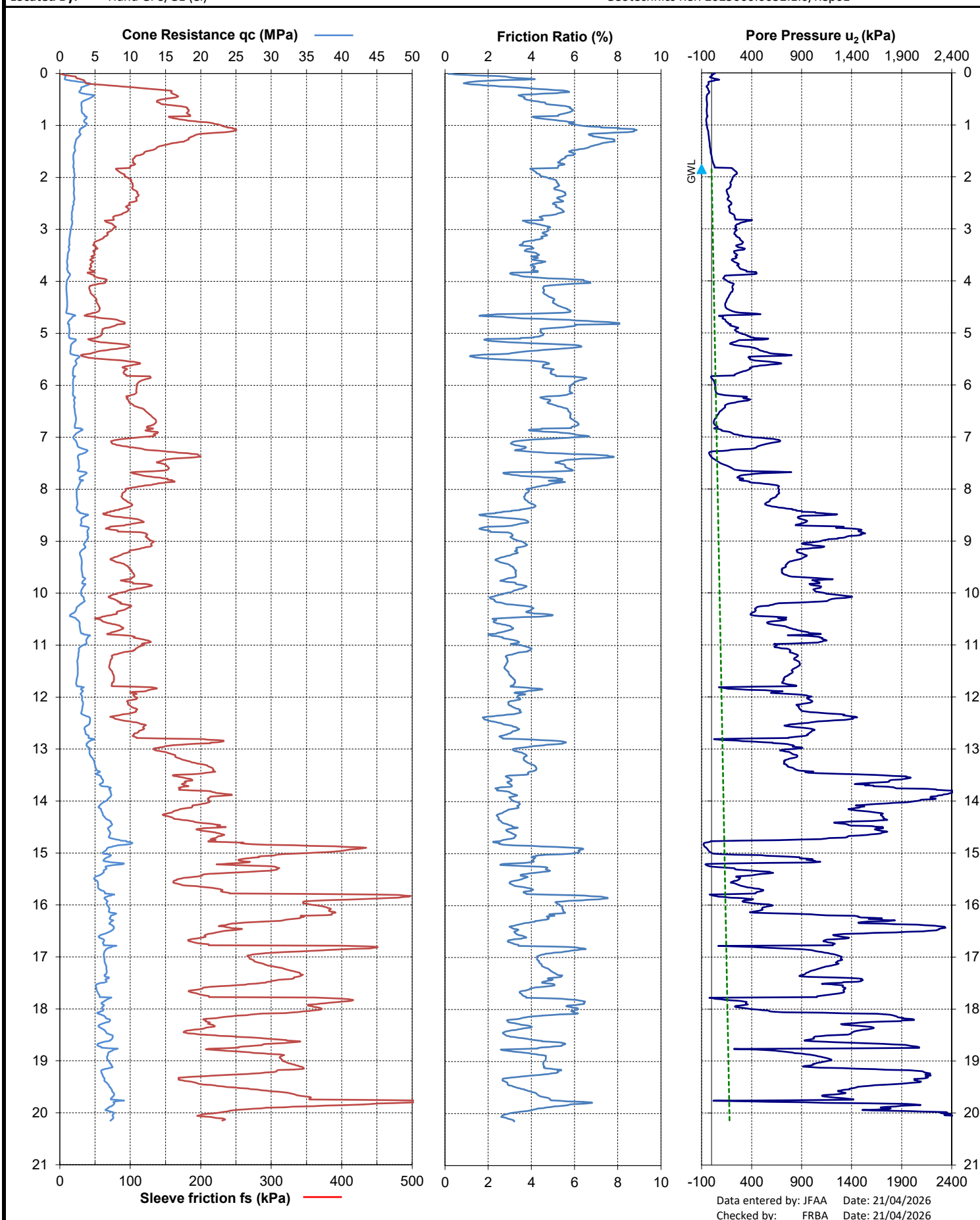
Assumed GWL: 1.85m (BGL) Other Tests: Hole collapsed (Dry) at 0.90 m

p. +64 9 356 3510

Operator: JFAA Comments: Target depth reached

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-003 110 Jack Lachlan Drive, Beachlands - 14 April, 2026

Pre-Drill: 0m NZTM 1777353.3411mE 5915115.4772mN 20.5m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

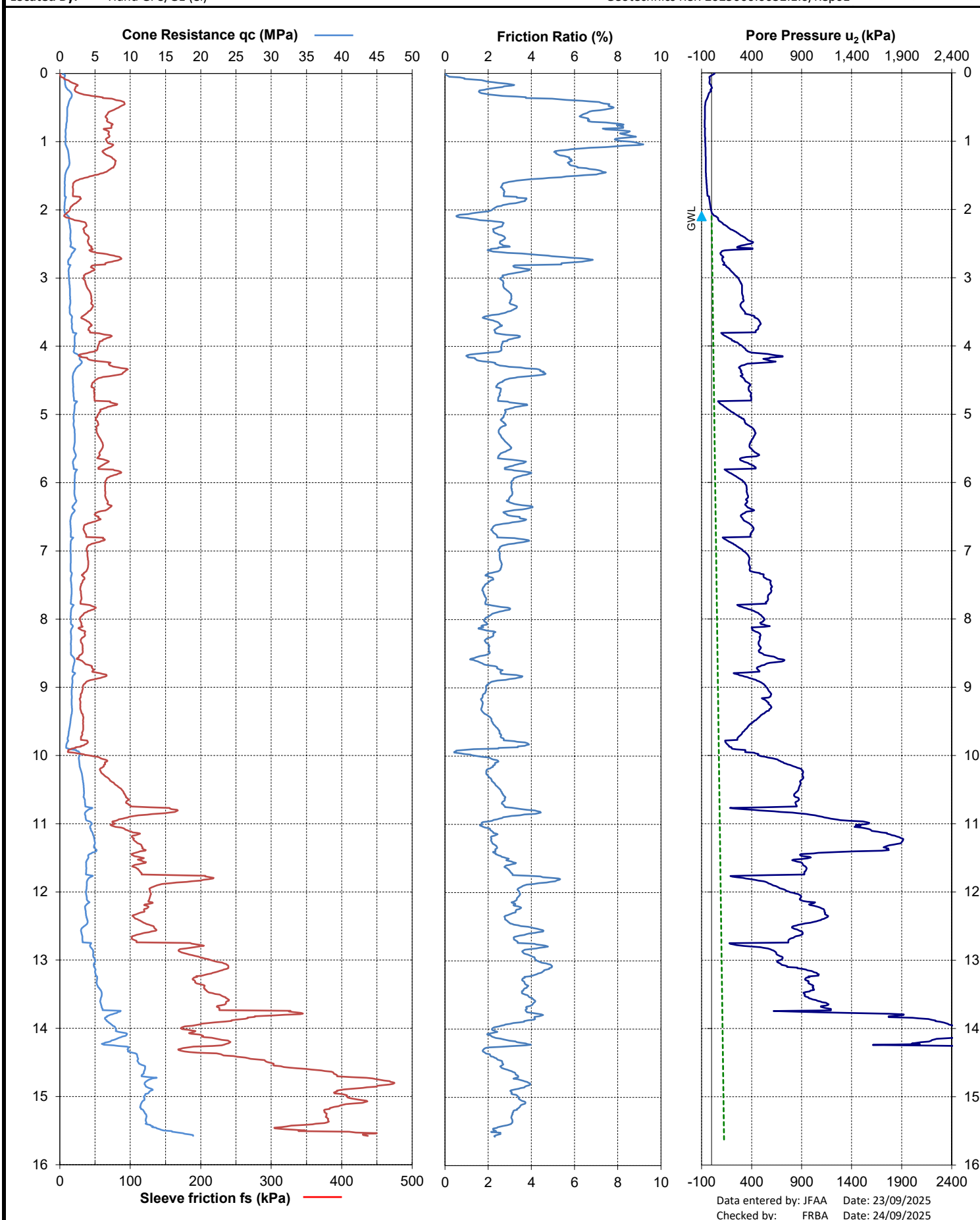
Assumed GWL: 2.1m (BGL) Other Tests: Hole collapsed (Dry) at 0.30 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 15.63 m > 15MPa, danger of overloading Pore Pressure (u_2) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

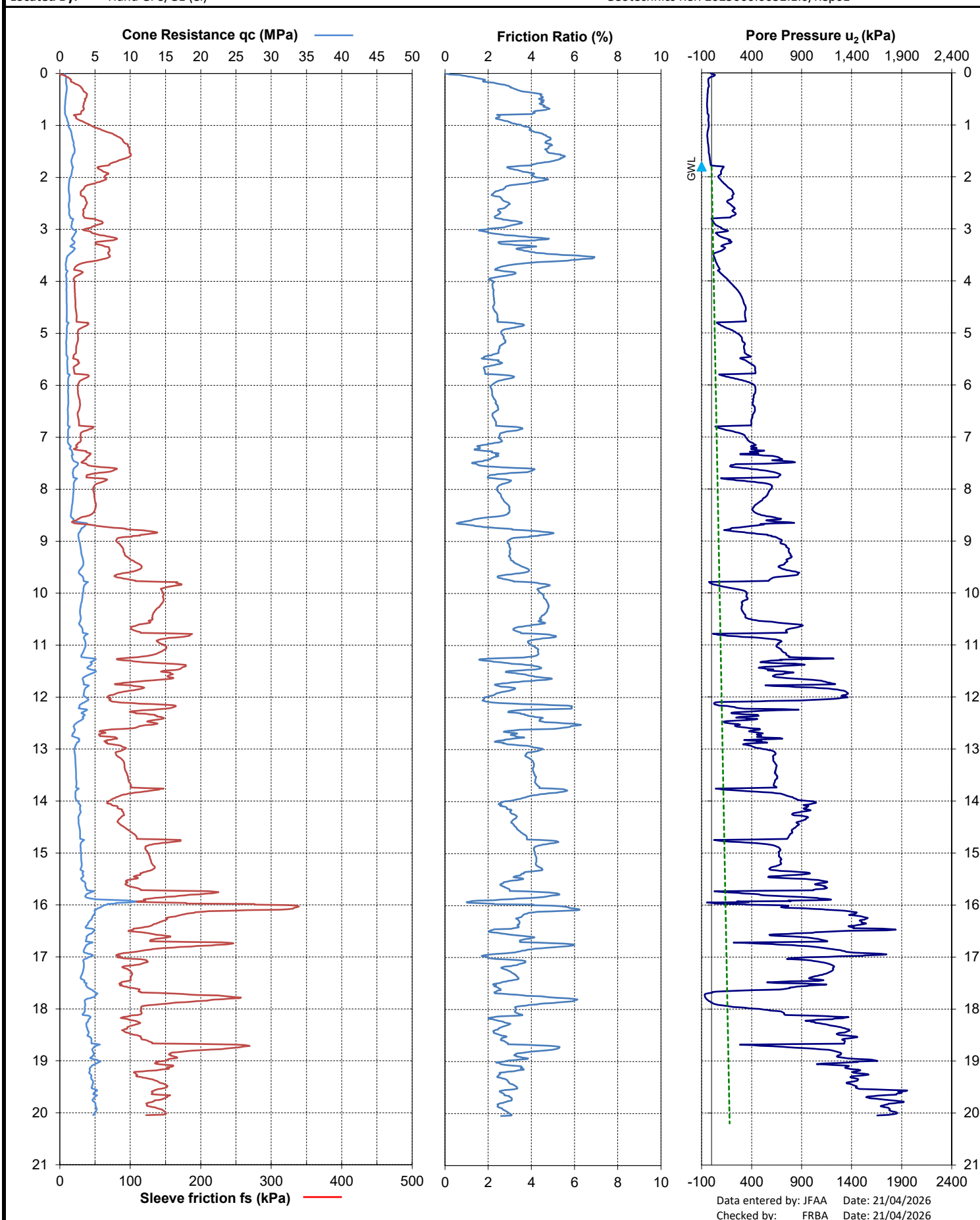
CPT-004 110 Jack Lachlan Drive, Beachlands - 14 April, 2026

Pre-Drill: 0m NZTM 1777467.3274mE 5915009.1822mN 27.9m(NZVD16)
 Assumed GWL: 1.8m (BGL) Other Tests: Hole collapsed (Dry) at 0.75 m
 Operator: JFAA Comments: Target depth reached
 Located By: Hand GPS/GE (el)

1 Hill Street, Onehunga
 e. auckland@geotechnics.co.nz
 p. +64 9 356 3510



Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-005 110 Jack Lachlan Drive, Beachlands - 16 April, 2026

Pre-Drill: 0m NZTM 1777362.668mE 5914932.0279mN 18.4m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

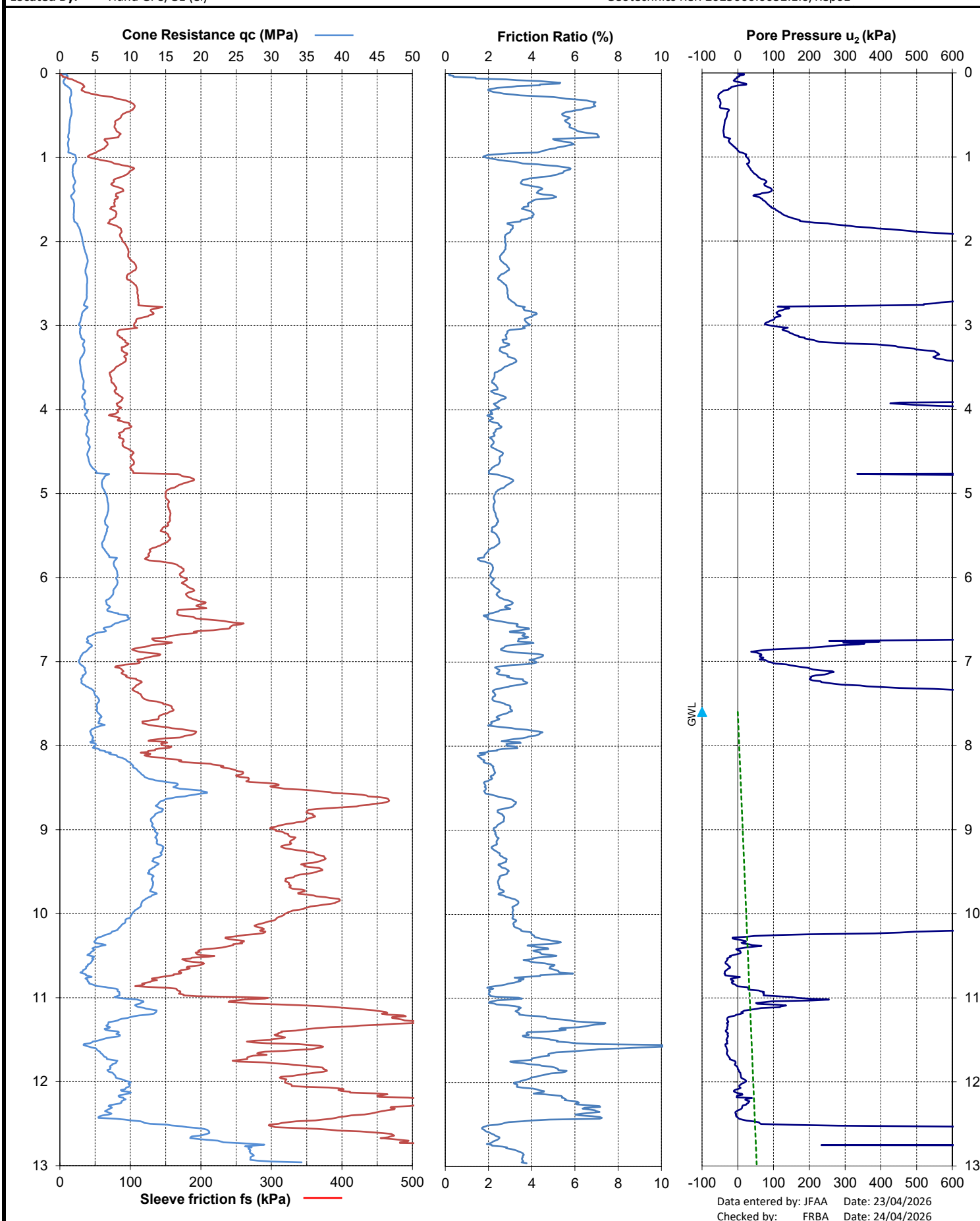
Measured GWL: 7.6m (BGL) Other Tests: None

p. +64 9 356 3510

Operator: FRBA Comments: Test refusal at 12.98 m > 30MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01



CPT-006 110 Jack Lachlan Drive, Beachlands - 16 April, 2026

Pre-Drill: 0m NZTM 1777257.2219mE 5914720.2077mN 16.8m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

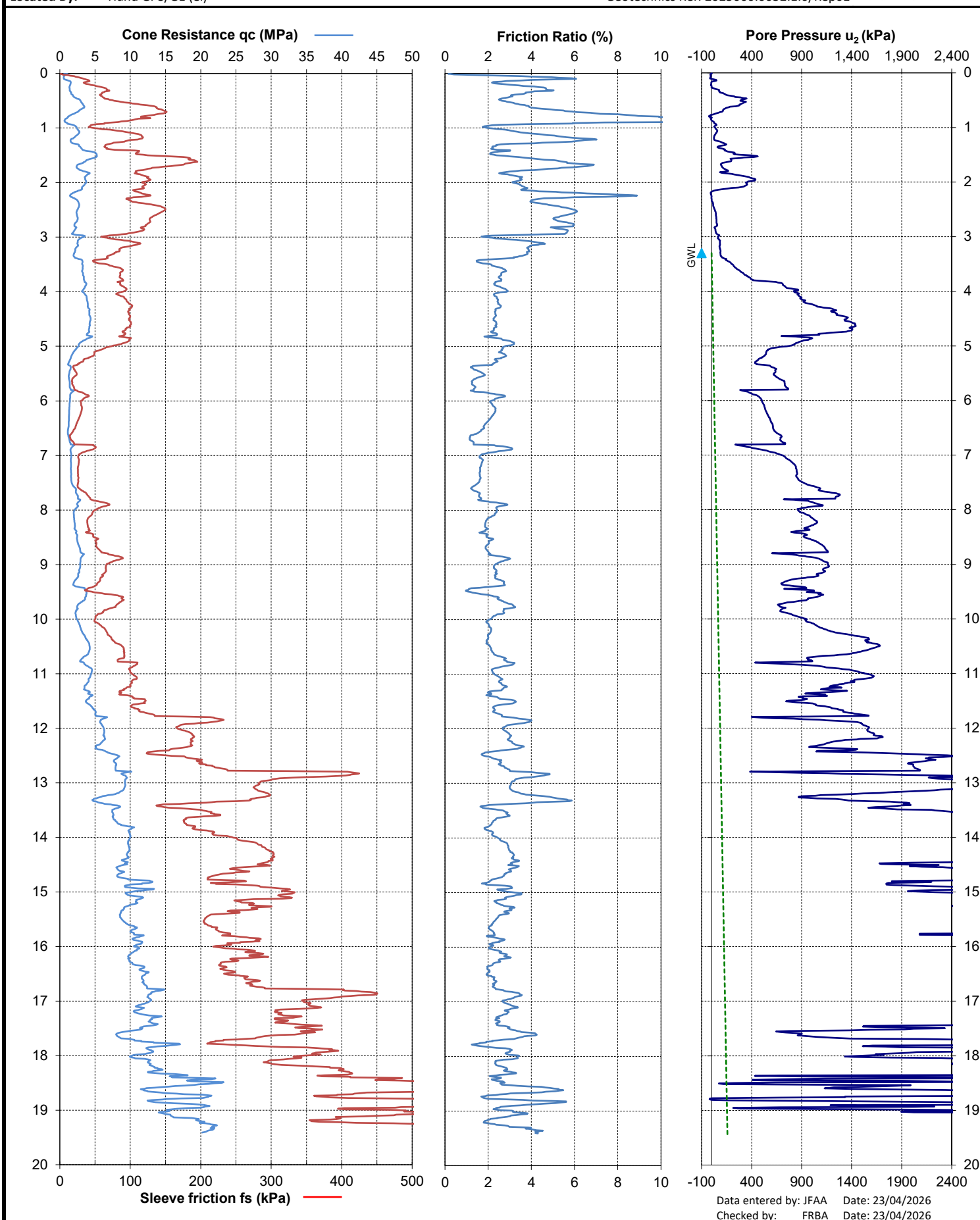
Assumed GWL: 3.3m (BGL) Other Tests: Hole collapsed (Dry) at 1.10 m

p. +64 9 356 3510

Operator: FRBA Comments: Test refusal at 19.45 m > 20MPa, danger of overloading Pore Pressure (u₂) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-007 110 Jack Lachlan Drive, Beachlands - 16 April, 2026

Pre-Drill: 0m NZTM 1777210.5352mE 5914519.1715mN 23.5m(NZVD16)

Measured GWL: 2.6m (BGL) Other Tests: None

Operator: FRBA Comments: Target depth reached

Located By: Hand GPS/GE (el)

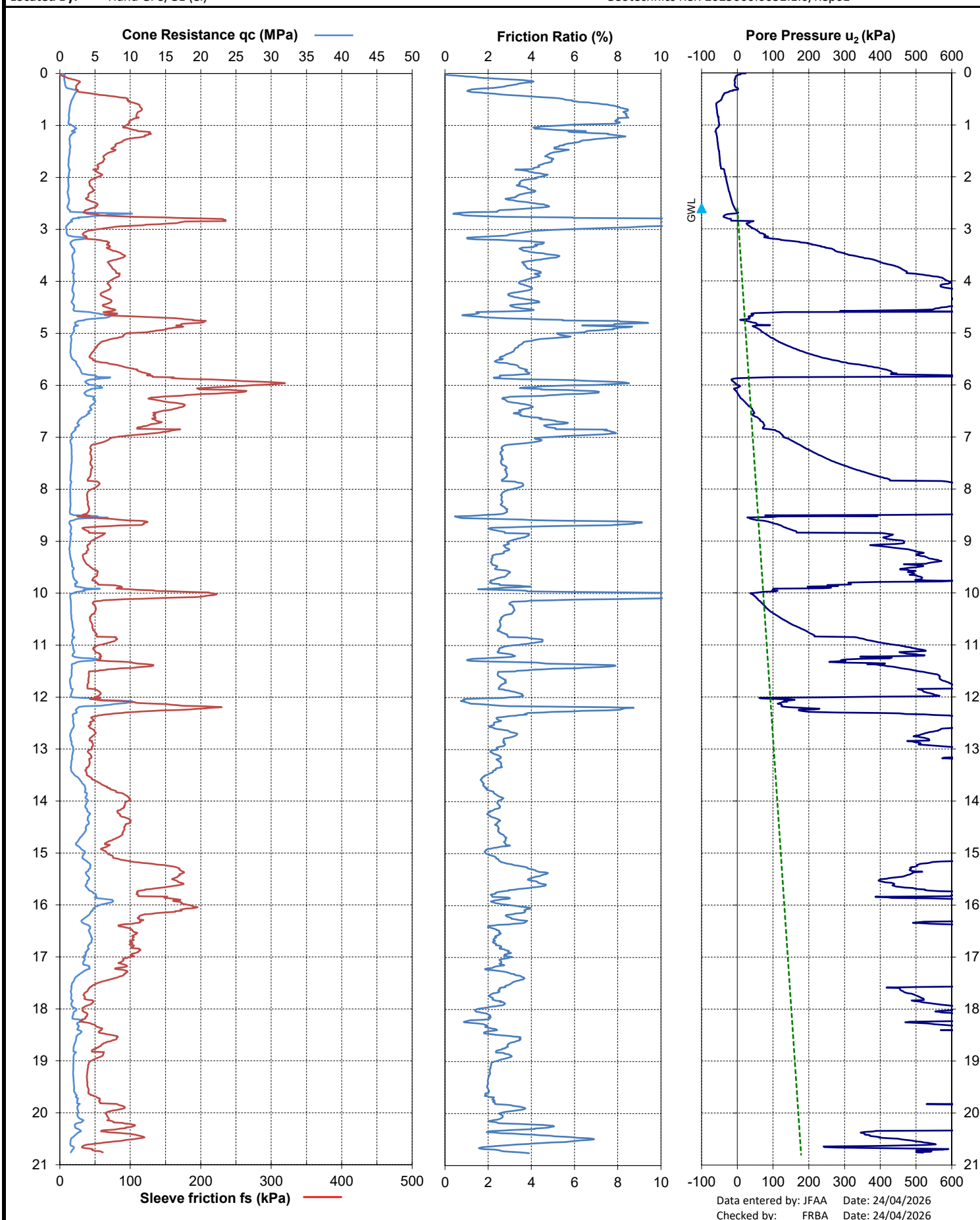
1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

p. +64 9 356 3510



Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

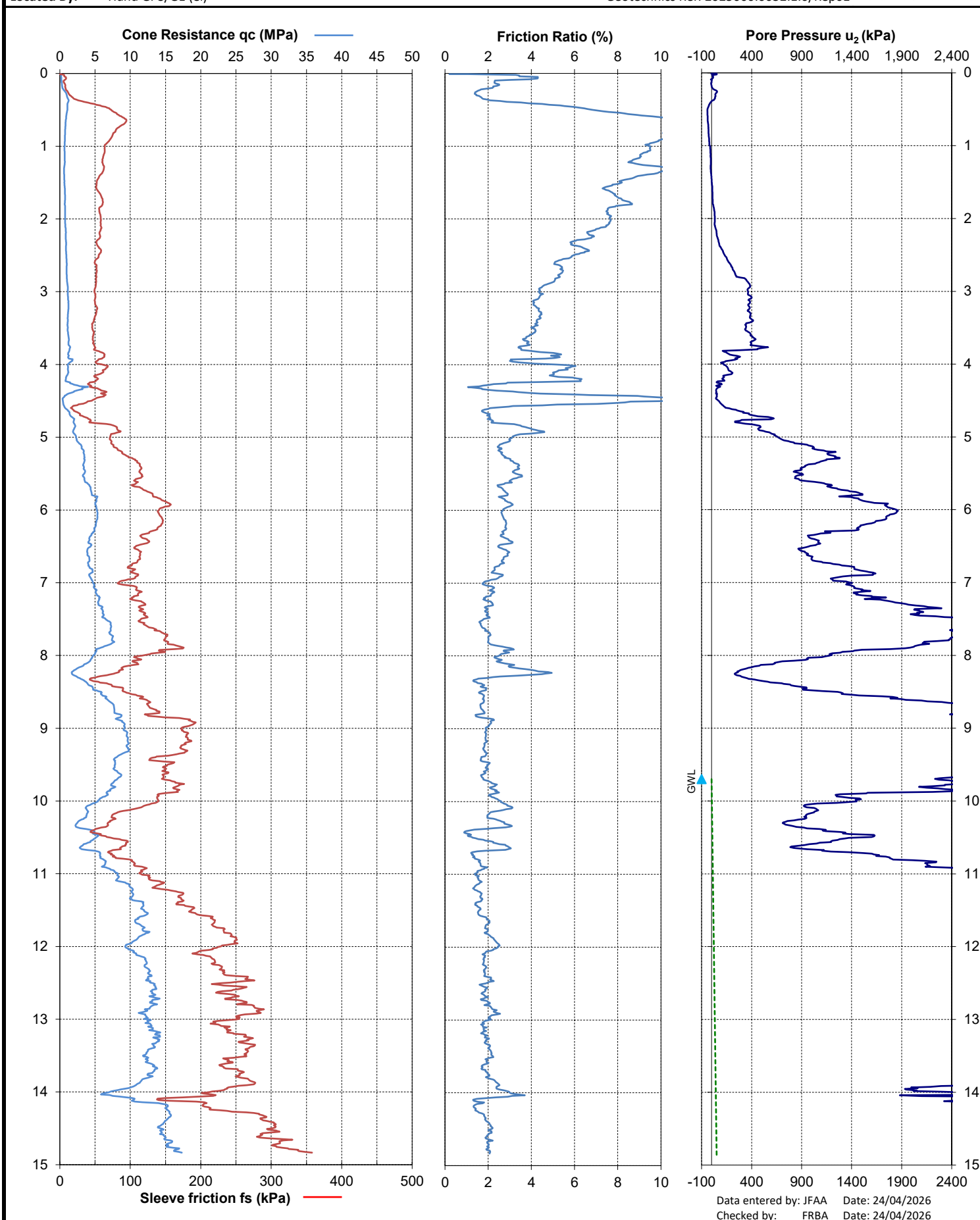
CPT-008 110 Jack Lachlan Drive, Beachlands - 16 April, 2026

Pre-Drill: 0m NZTM 1777259.5528mE 5914422.2874mN 20.9m(NZVD16)
 Measured GWL: 9.7m (BGL) Other Tests: None
 Operator: FRBA Comments: Test refusal at 14.89 m > 15MPa, anchor failure
 Located By: Hand GPS/GE (el)

1 Hill Street, Onehunga
 e. auckland@geotechnics.co.nz
 p. +64 9 356 3510



Geotechnics Ref: 2025000.0032.1.0/Rep01 **GEOTECHNICS**



CPT-009 110 Jack Lachlan Drive, Beachlands - 17 April, 2026

Pre-Drill: 0m NZTM 1777434.7952mE 5914208.5164mN 17.9m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

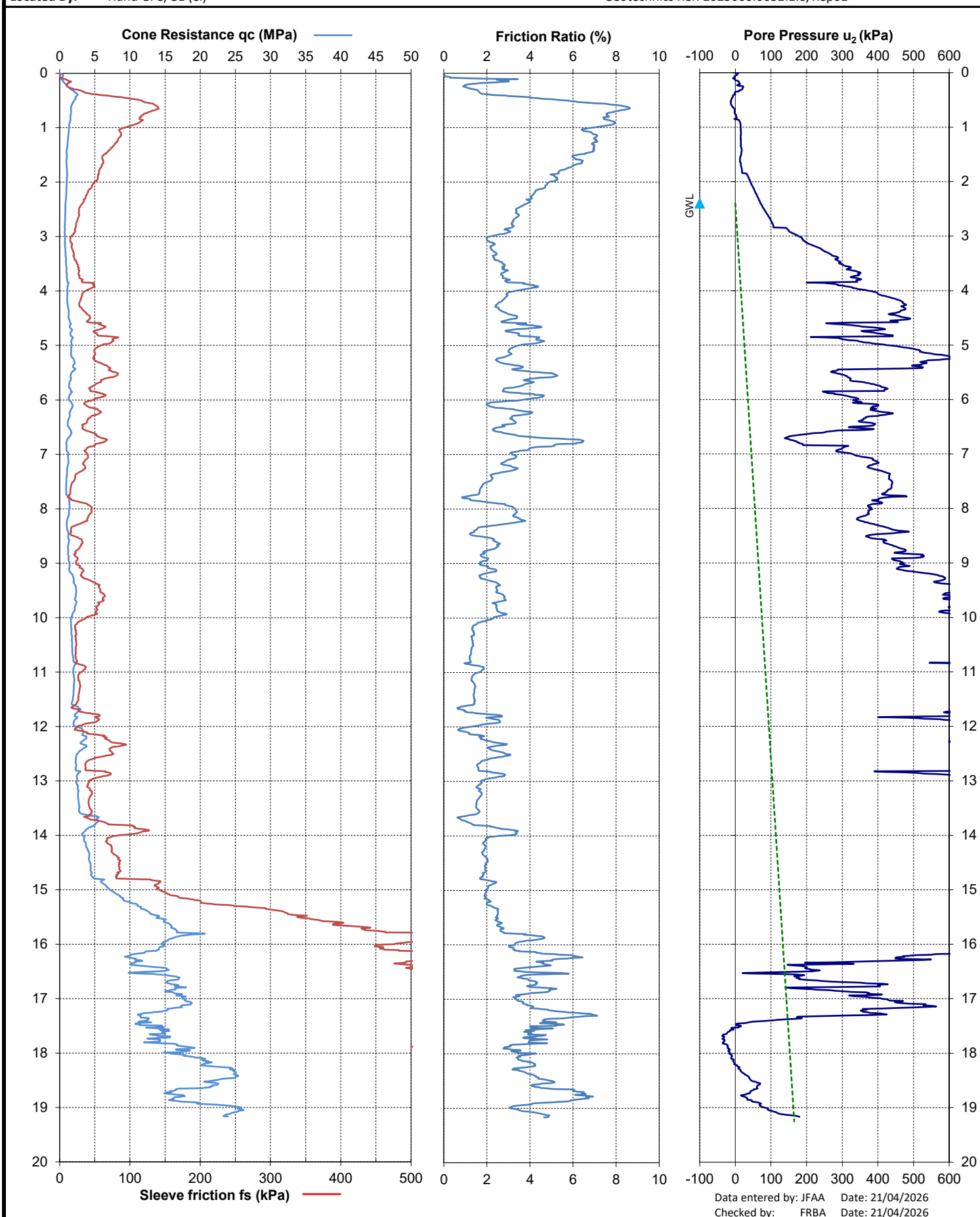
Measured GWL: 2.4m (BGL) Other Tests: None

p. +64 9 356 3510

Operator: FRBA Comments: Test refusal at 19.25 m > 25MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01



CPT-010 110 Jack Lachlan Drive, Beachlands - 17 April, 2026

Pre-Drill: 0m NZTM 1777625.9497mE 5914280.8502mN 32.8m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

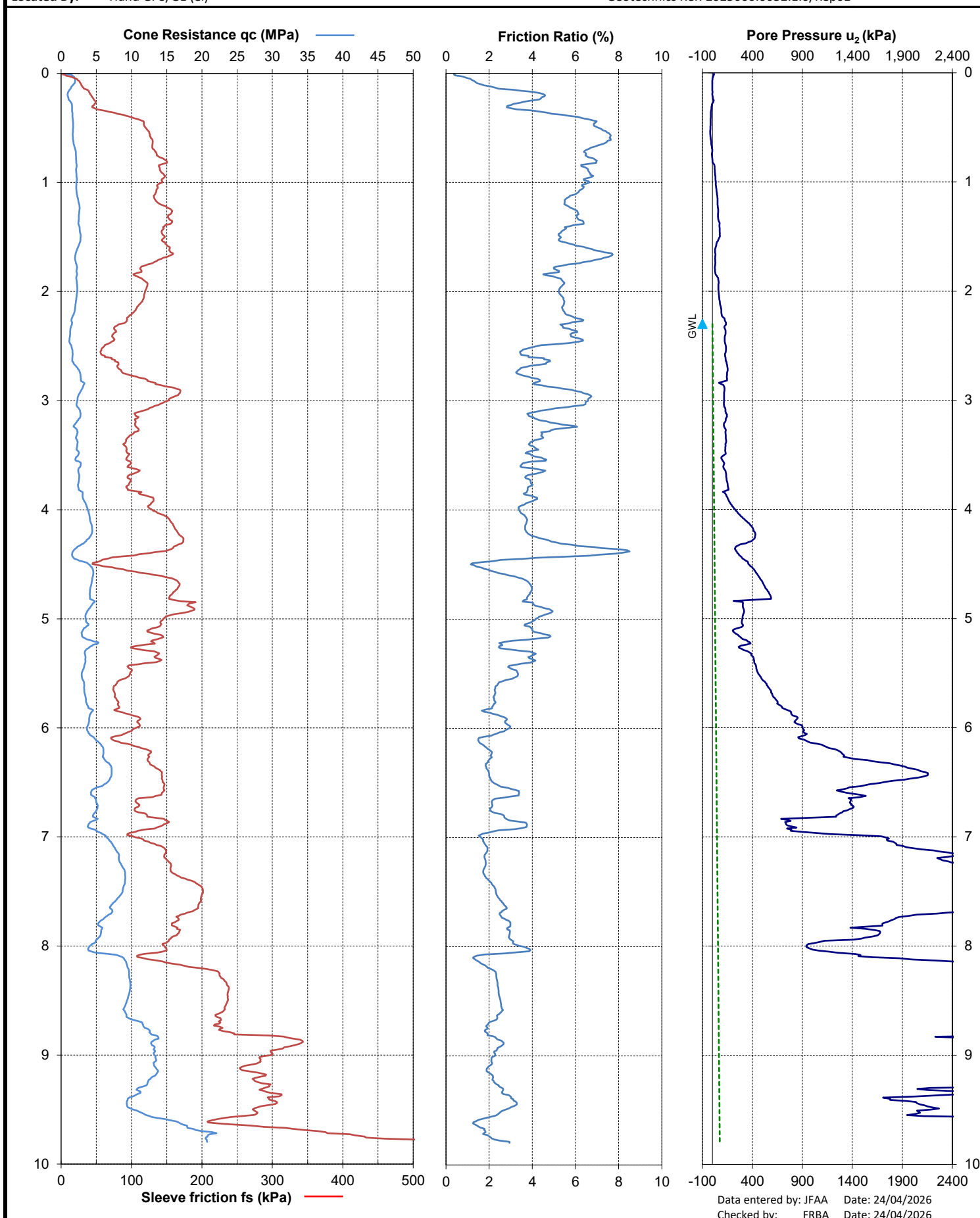
Assumed GWL: 2.3m (BGL) Other Tests: Hole collapsed (Dry) at 0.75 m

p. +64 9 356 3510

Operator: FRBA Comments: Test refusal at 9.81 m > 20MPa, overloaded Pore Pressure (u₂) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

**GEOTECHNICS**

CPT-011 110 Jack Lachlan Drive, Beachlands - 17 April, 2026

Pre-Drill: 0m NZTM 1777553.6915mE 5914516.6546mN 30.4m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

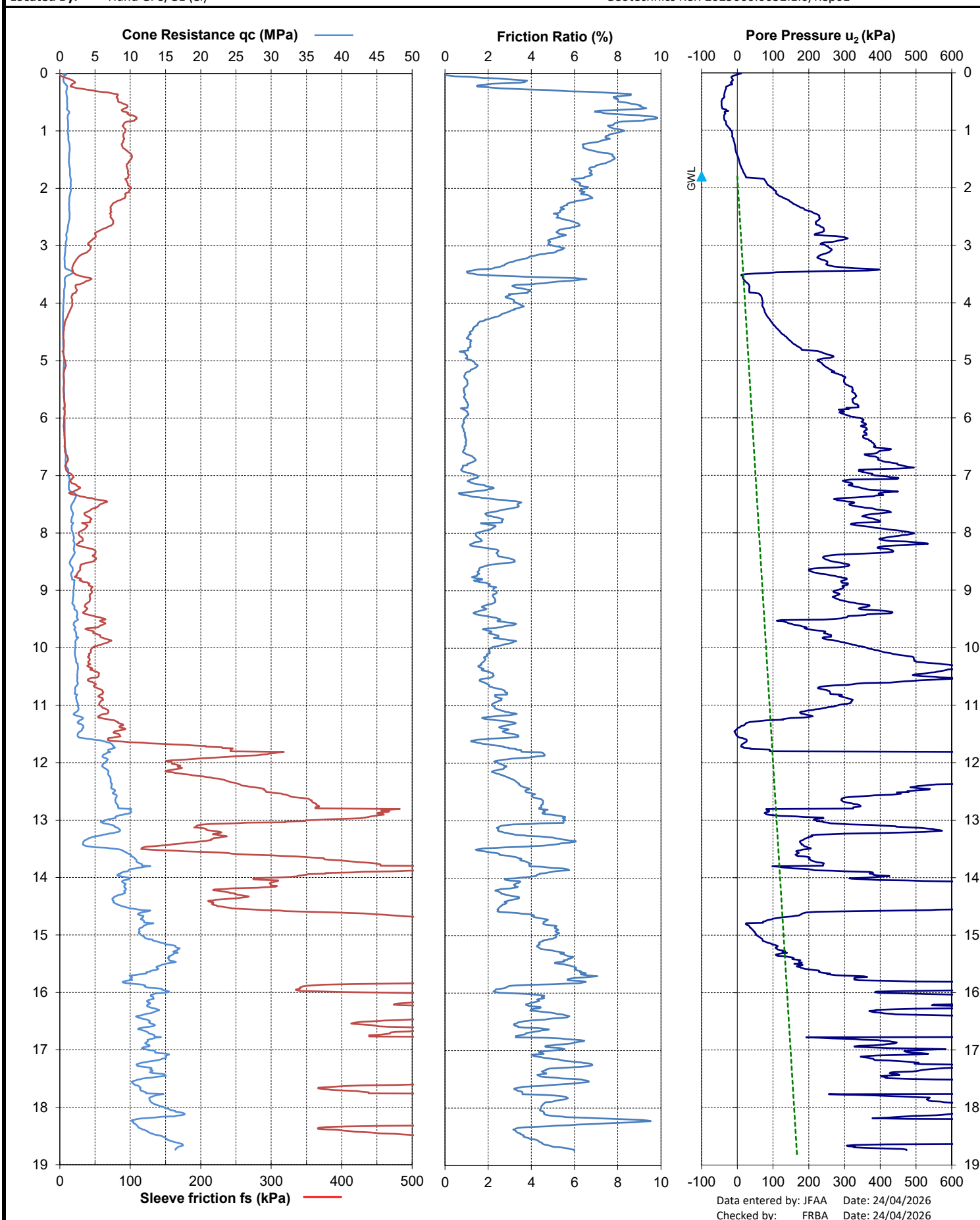
Assumed GWL: 1.8m (BGL) Other Tests: Hole collapsed (Dry) at 0.85 m

p. +64 9 356 3510

Operator: FRBA Comments: Test refusal at 18.82 m > 15MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

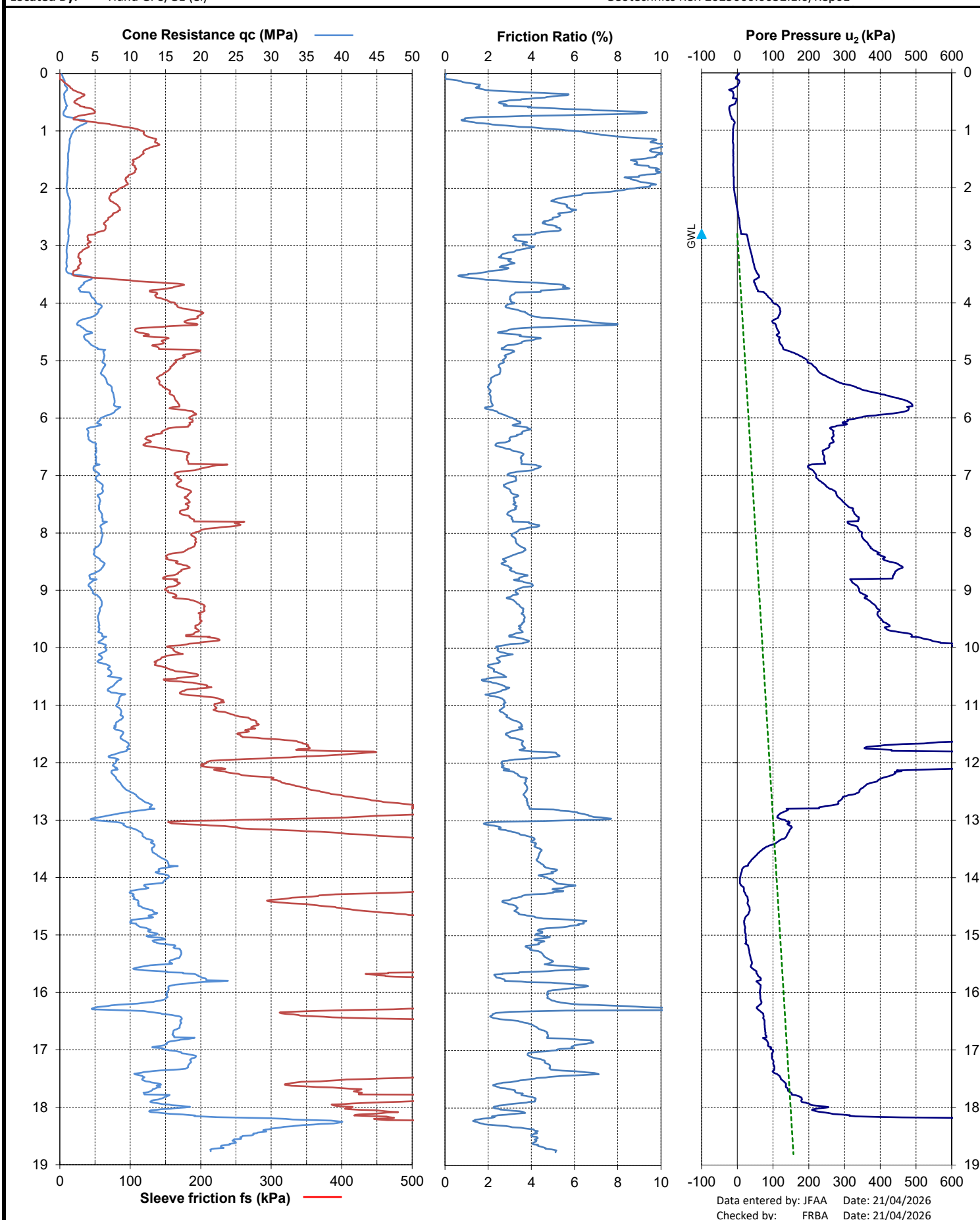
CPT-012 110 Jack Lachlan Drive, Beachlands - 20 April, 2026

Pre-Drill: 0m NZTM 1777771.7935mE 5914204.5963mN 36.6m(NZVD16)
 Assumed GWL: 2.8m (BGL) Other Tests: Hole collapsed (Dry) at 0.82 m
 Operator: JFAA Comments: Test refusal at 18.81 m > 40MPa, anchor failure
 Located By: Hand GPS/GE (el)

1 Hill Street, Onehunga
 e. auckland@geotechnics.co.nz
 p. +64 9 356 3510



Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-013 110 Jack Lachlan Drive, Beachlands - 17 April, 2026

Pre-Drill: 0m NZTM 1777810.7553mE 5914414.1595mN 42.1m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

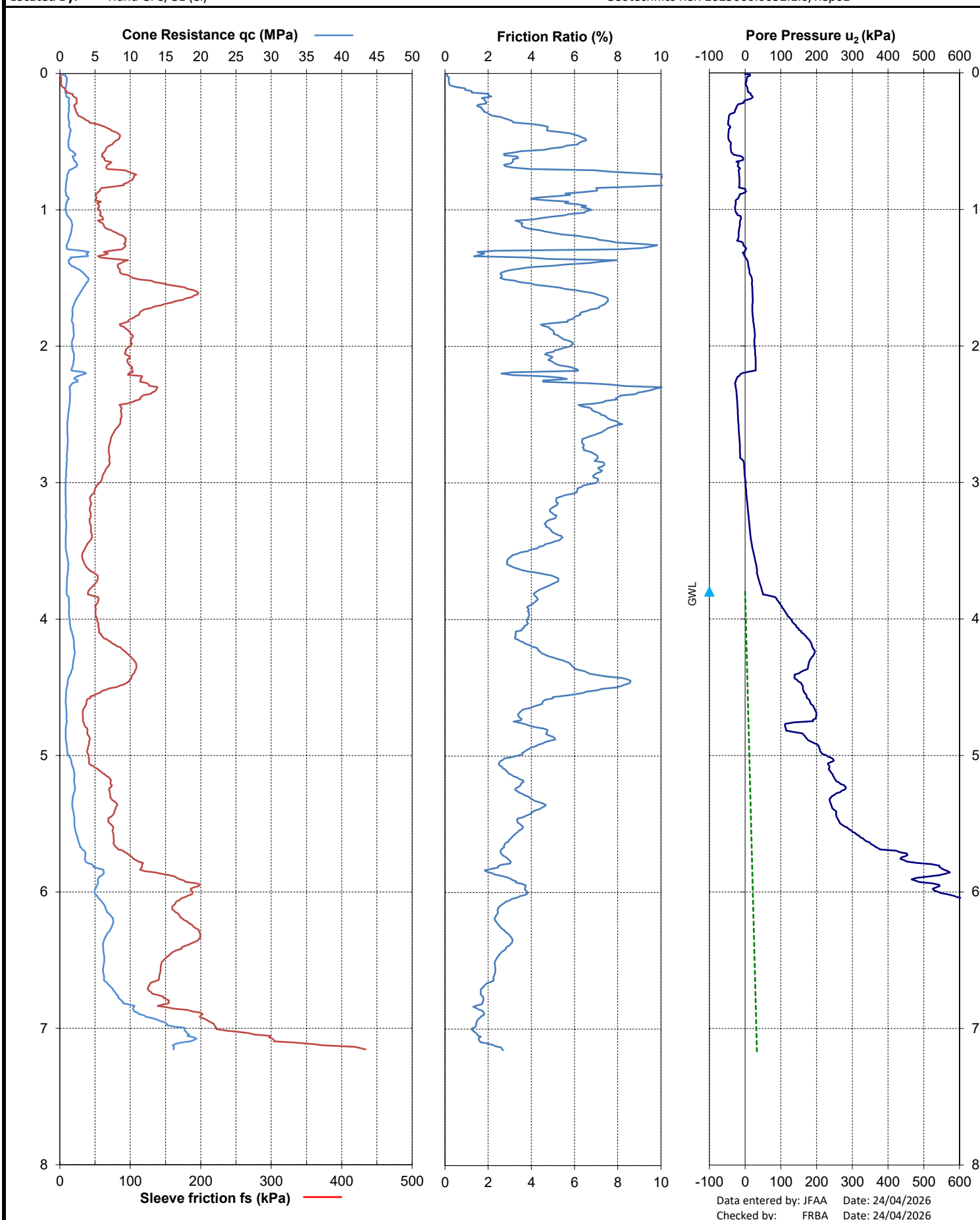
Assumed GWL: 3.8m (BGL) Other Tests: Hole collapsed (Dry) at 0.85 m

p. +64 9 356 3510

Operator: FRBA Comments: Test refusal at 7.17 m > 15MPa, danger of overloading Pore Pressure (u2) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

**GEOTECHNICS**

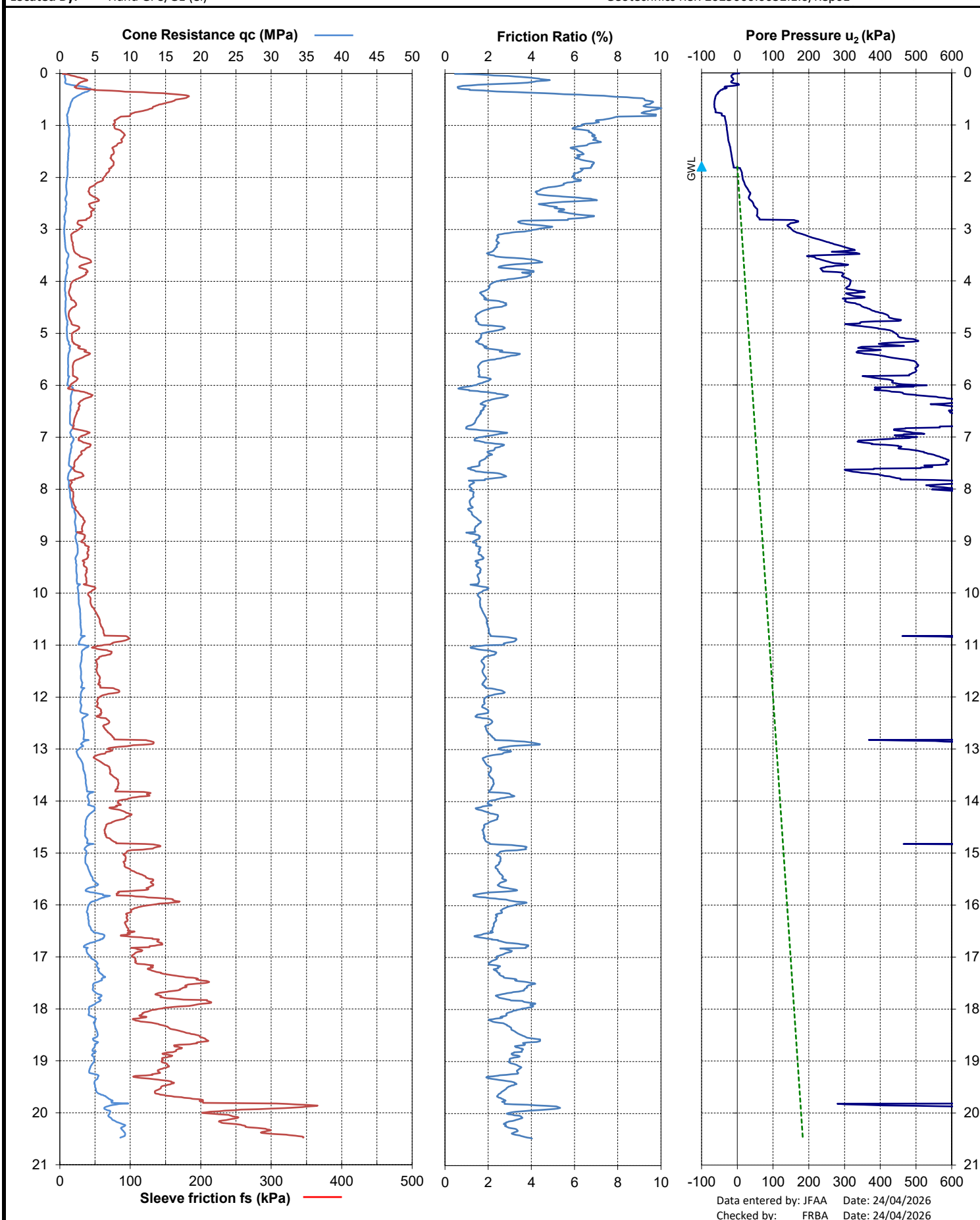
CPT-014 110 Jack Lachlan Drive, Beachlands - 17 April, 2026

Pre-Drill: 0m NZTM 1777822.5907mE 5914597.4332mN 36.6m(NZVD16)
 Assumed GWL: 1.8m (BGL) Other Tests: Hole collapsed (Dry) at 0.92 m
 Operator: FRBA Comments: Target depth reached
 Located By: Hand GPS/GE (el)

1 Hill Street, Onehunga
 e. auckland@geotechnics.co.nz
 p. +64 9 356 3510



Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-015 110 Jack Lachlan Drive, Beachlands - 20 April, 2026

Pre-Drill: 0m NZTM 1777974.2893mE 5914661.5504mN 36.8m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

Measured GWL: 1.4m (BGL)

Other Tests: None

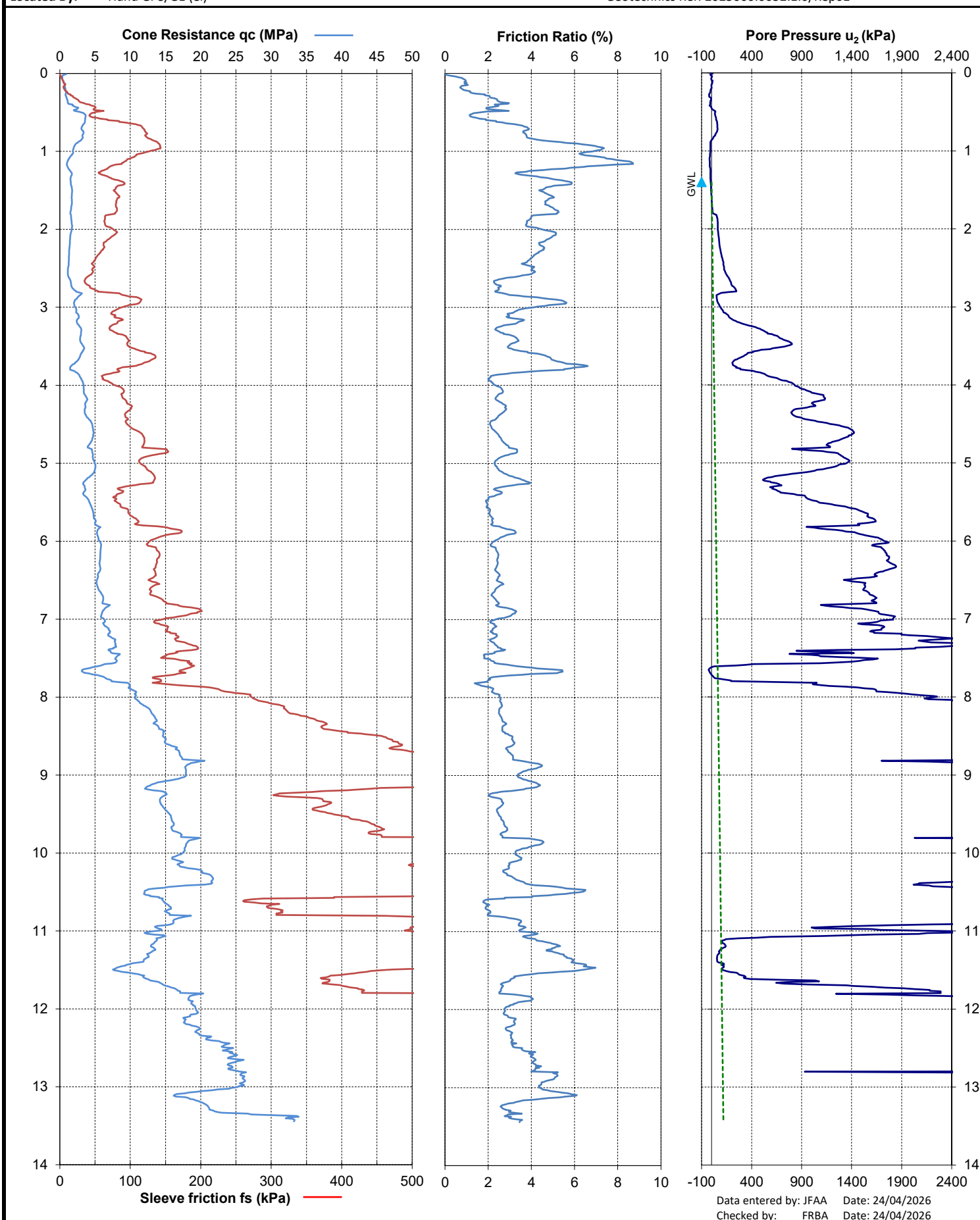
p. +64 9 356 3510

Operator: JFAA

Comments: Test refusal at 13.46 m > 30MPa, overloaded Pore Pressure (u2) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-016 110 Jack Lachlan Drive, Beachlands - 22 April, 2026

Pre-Drill: 0m NZTM 1778136.6502mE 5914559.231mN 36.8m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

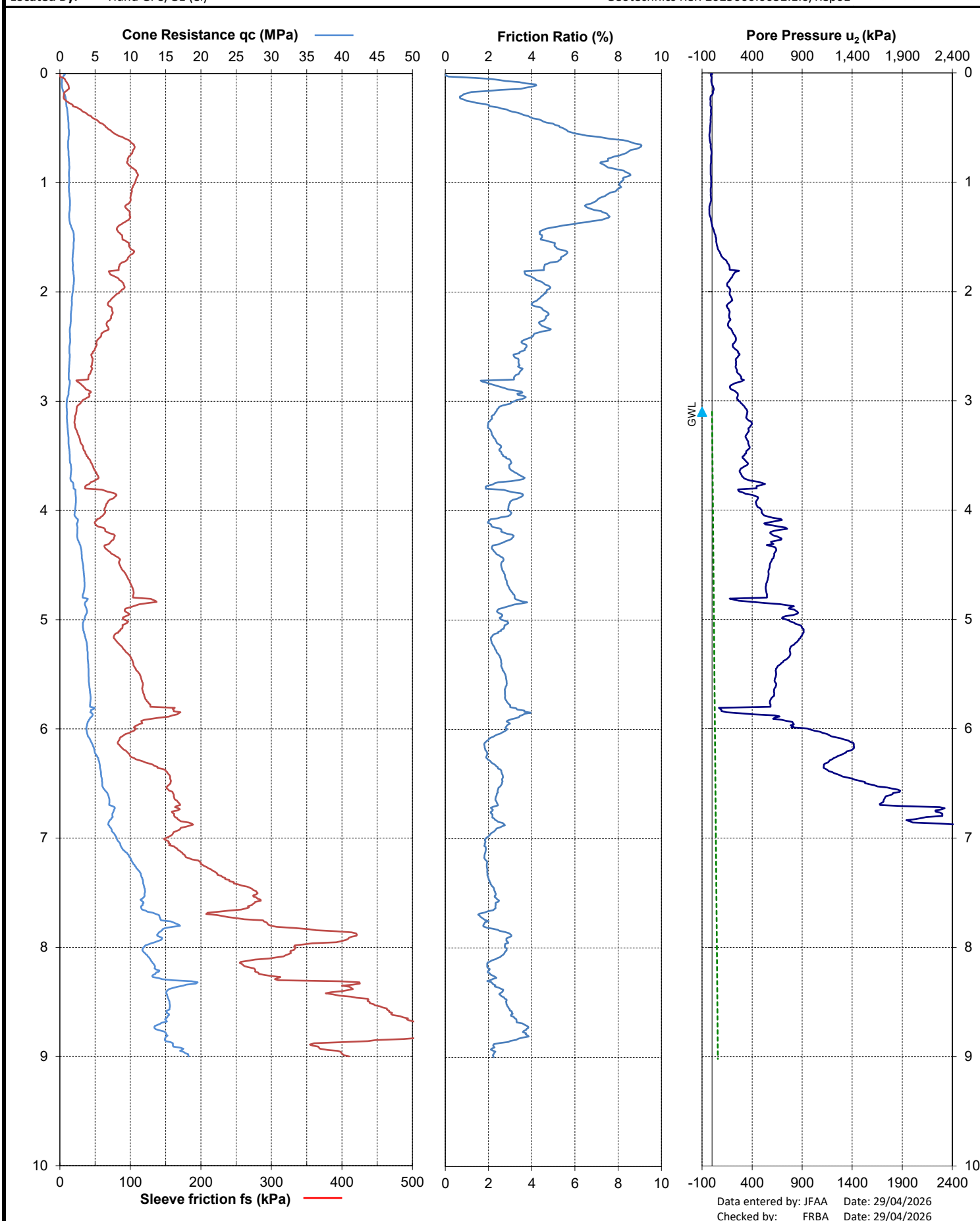
Assumed GWL: 3.1m (BGL) Other Tests: Hole collapsed (Dry) at 2.90 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 9.02 m > 15Mpa, danger of overloading Pore Pressure (u2) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-017 110 Jack Lachlan Drive, Beachlands - 20 April, 2026

Pre-Drill: 0m NZTM 1778034.8719mE 5914217.7325mN 47.2m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

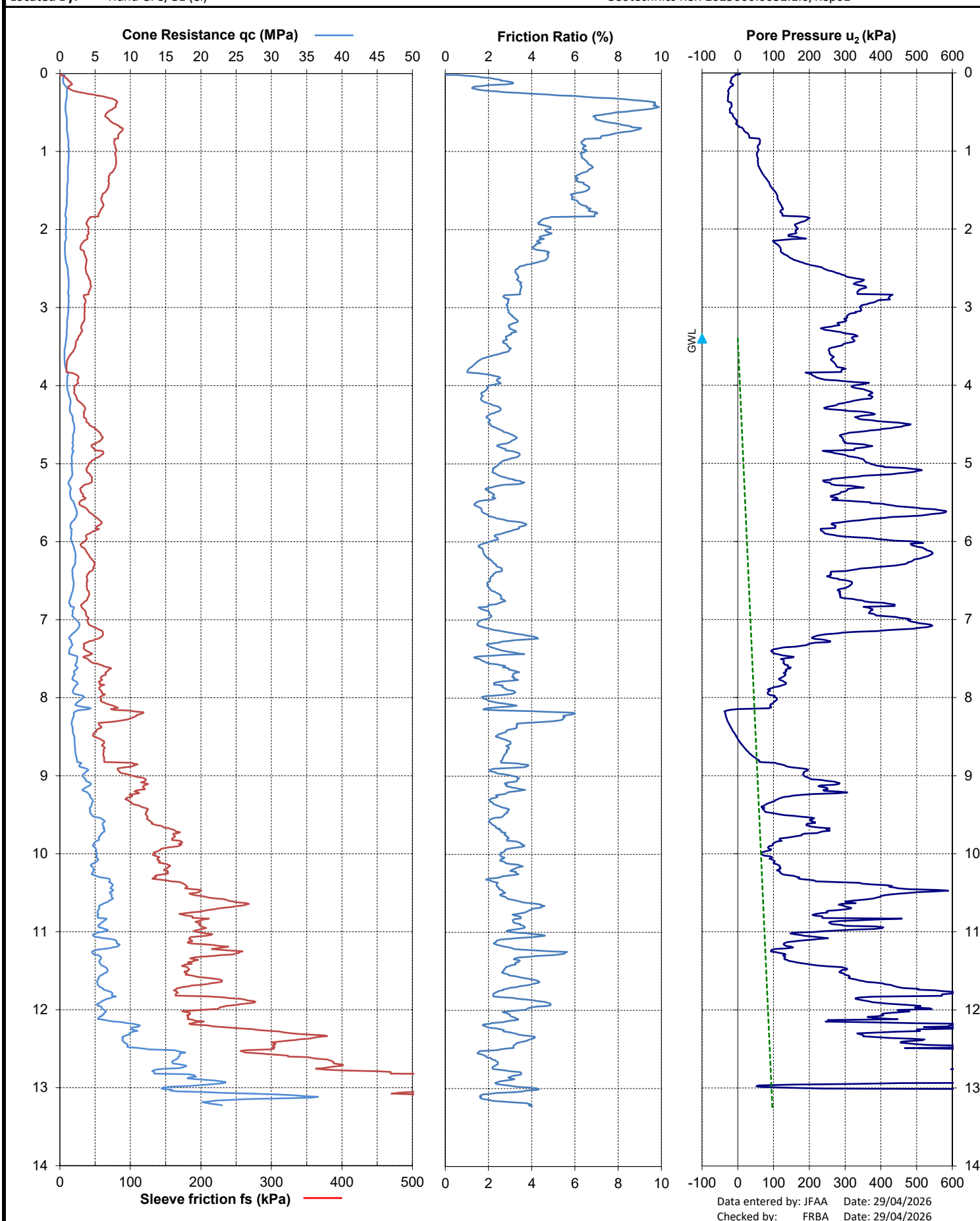
Assumed GWL: 3.4m (BGL) Other Tests: Hole collapsed at 3.10 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 13.26 m > 35MPa, danger of overloading Pore Pressure (u₂) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01



CPT-018 110 Jack Lachlan Drive, Beachlands - 22 April, 2026

Pre-Drill: 0m NZTM 1778190.6469mE 5914280.3644mN 50.7m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

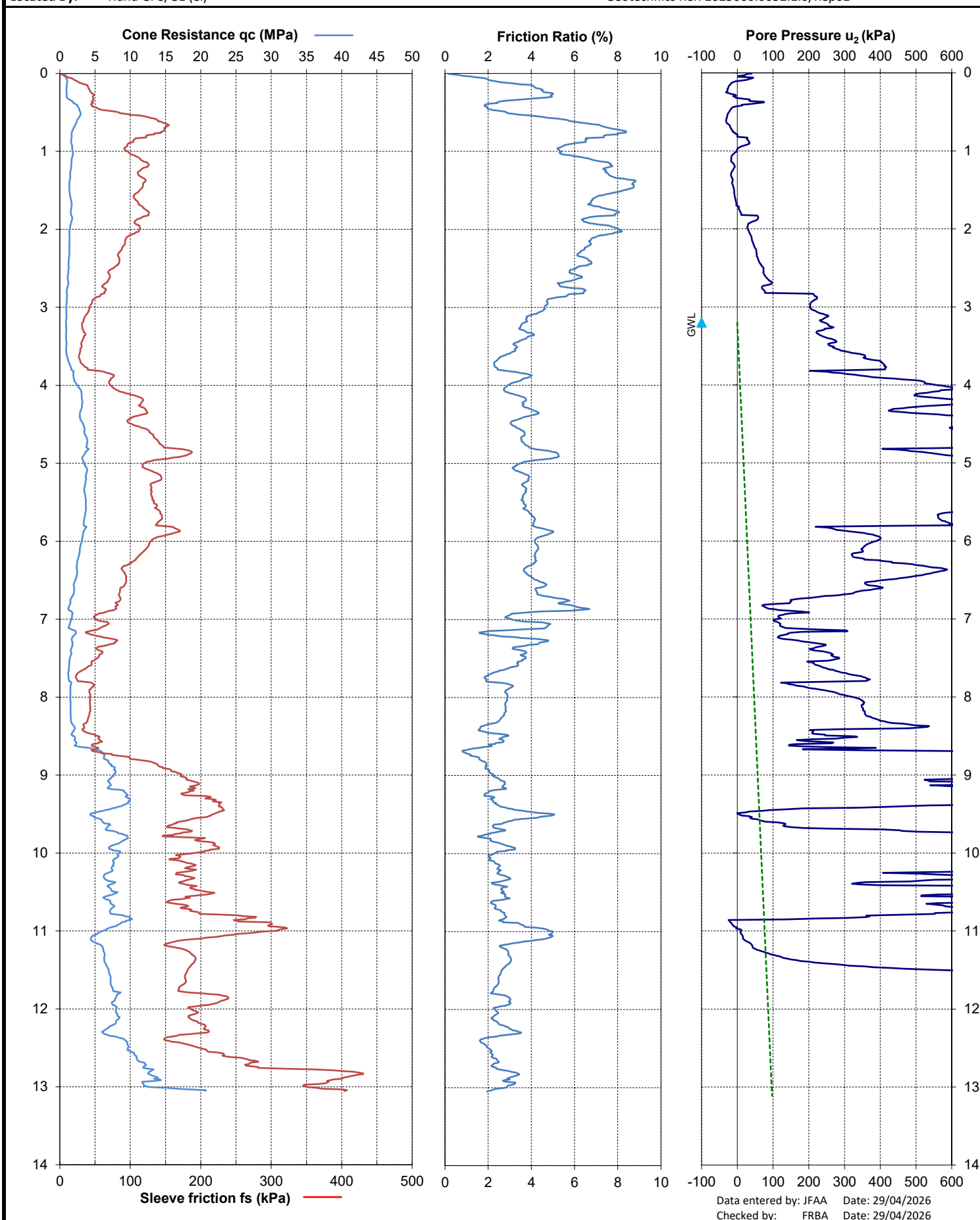
Assumed GWL: 3.2m (BGL) Other Tests: Hole collapsed (Dry) at 2.45 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 13.11 m > 20MPa, danger of overloading Pore Pressure (u_2) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-019 110 Jack Lachlan Drive, Beachlands - 20 April, 2026

Pre-Drill: 0m NZTM 1778083.3638mE 5914041.2268mN 47.1m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

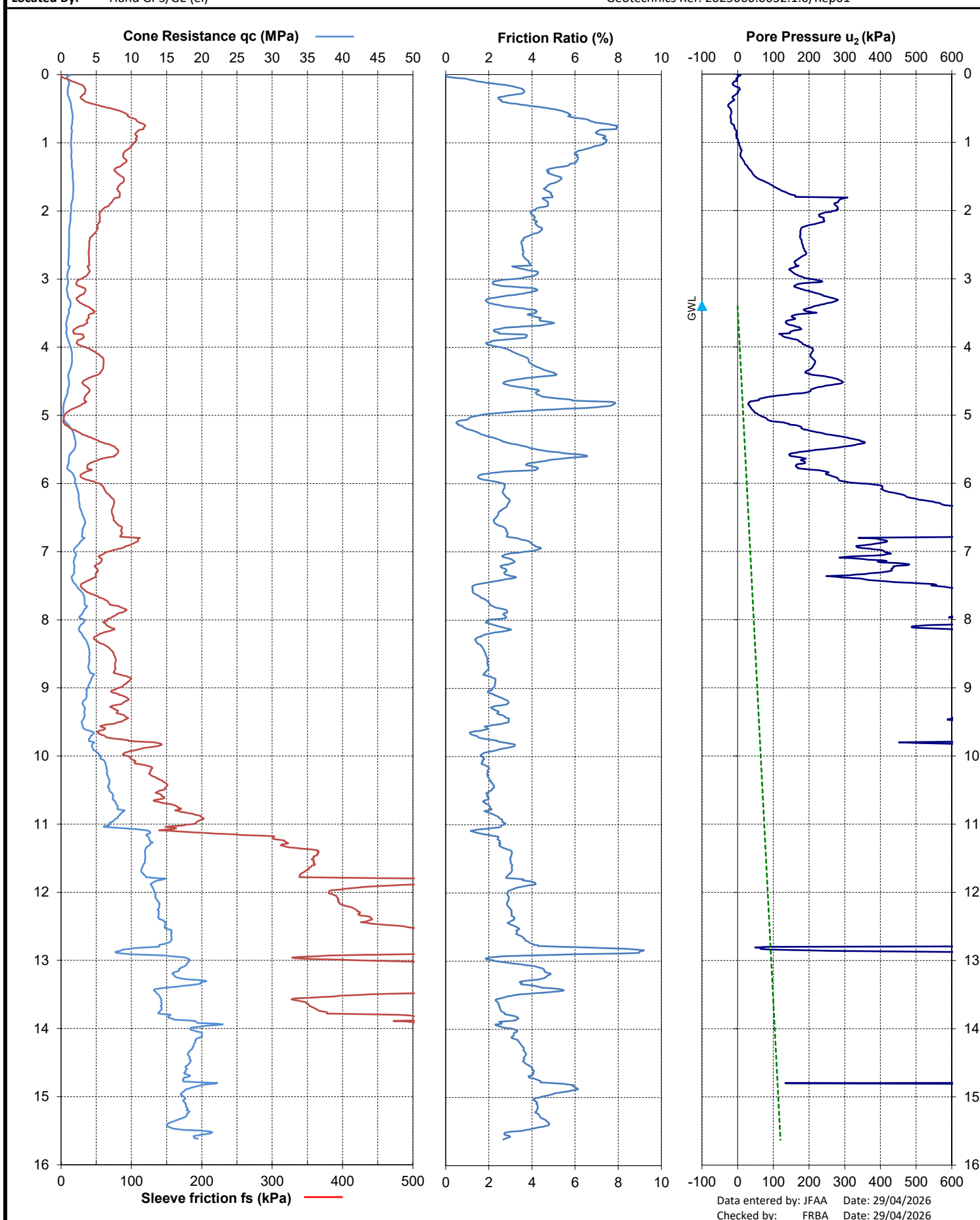
Assumed GWL: 3.4m (BGL) Other Tests: Hole collapsed (Dry) at 2.20 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 15.63 m > 20MPa, overloaded Pore Pressure (u2) transducer

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

**GEOTECHNICS**

CPT-020 110 Jack Lachlan Drive, Beachlands - 22 April, 2026

Pre-Drill: 0m NZTM 1778372.1354mE 5914762.6508mN 24.4m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

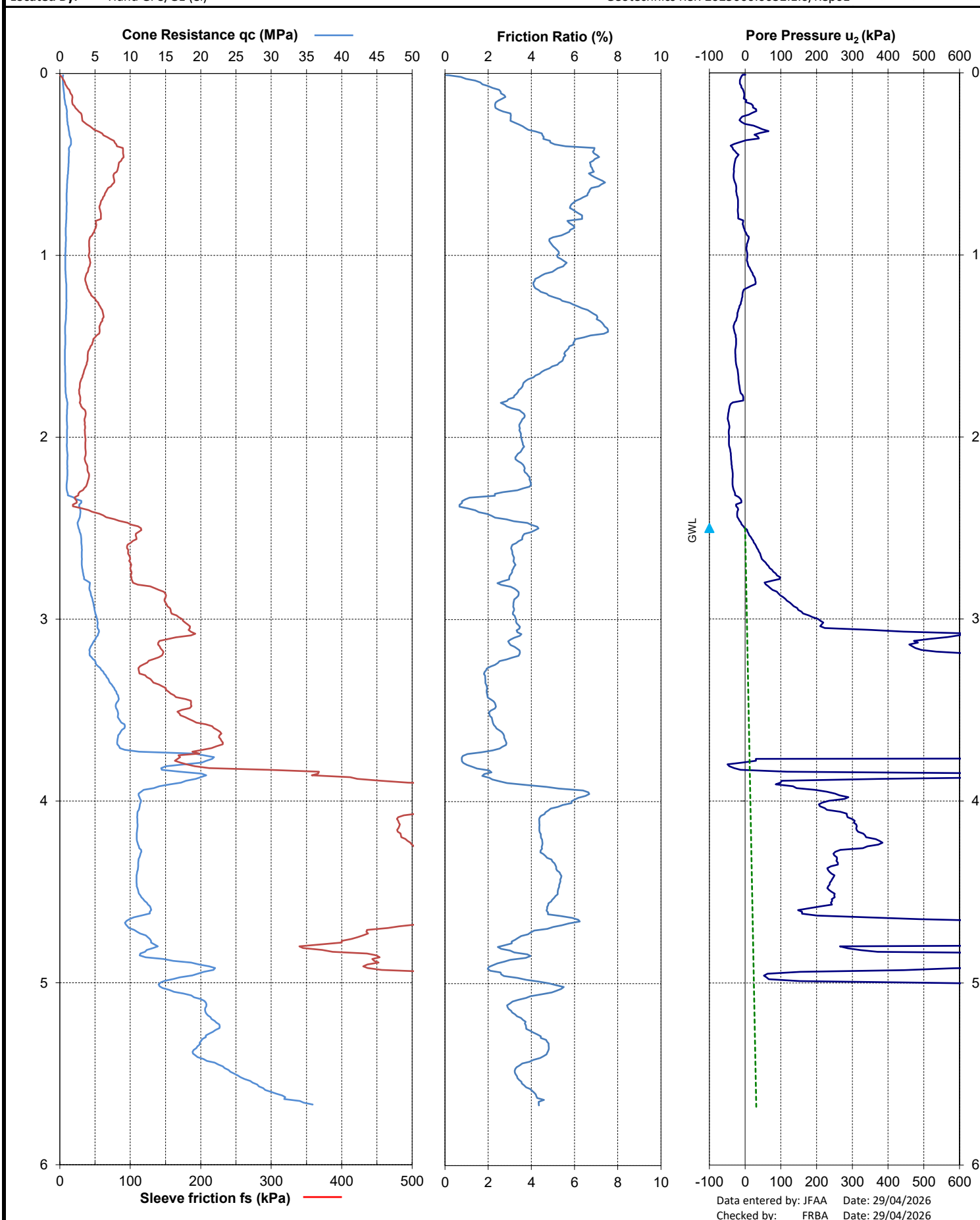
Assumed GWL: 2.5m (BGL) Other Tests: Hole collapsed (Dry) at 1.62 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 5.68 m > 35MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-021 110 Jack Lachlan Drive, Beachlands - 22 April, 2026

Pre-Drill: 0m NZTM 1779105.8324mE 5914636.5362mN 46.4m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

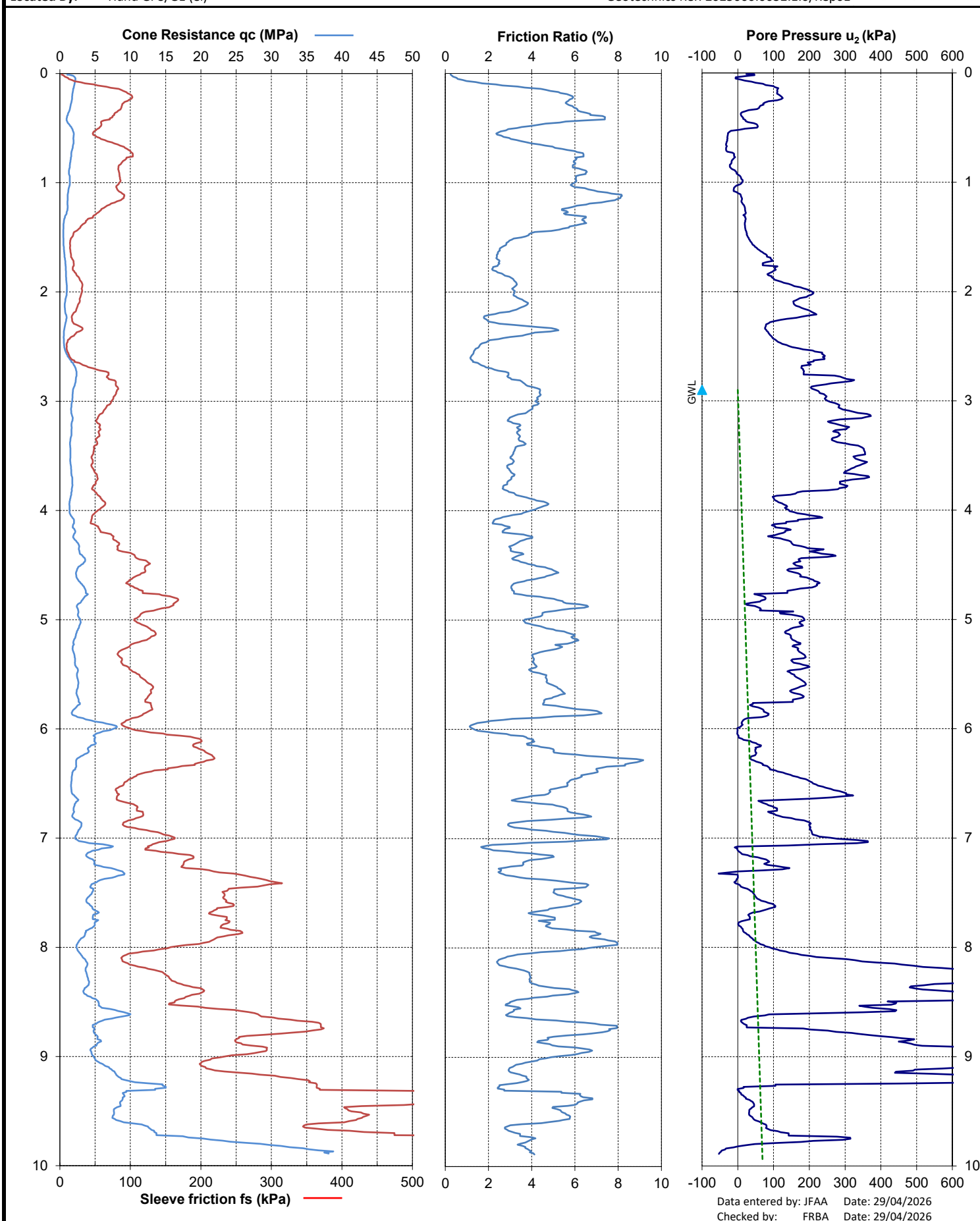
Assumed GWL: 2.9m (BGL) Other Tests: Hole collapsed (Dry) at 2.75 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 9.94 m > 35MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

CPT-022 110 Jack Lachlan Drive, Beachlands - 22 April, 2026

Pre-Drill: 0m NZTM 1779249.285mE 5914558.8846mN 56.8m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

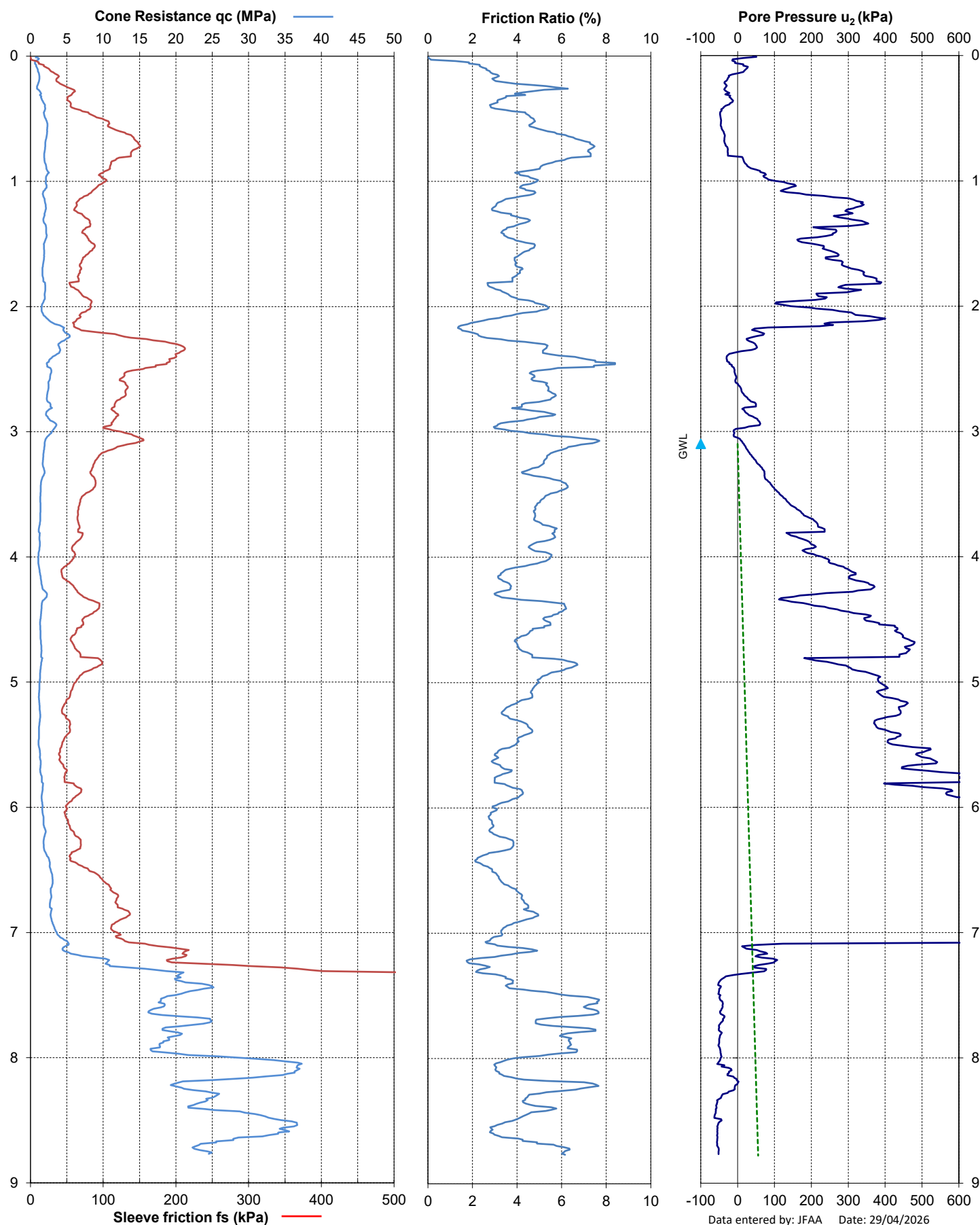
Assumed GWL: 3.1m (BGL) Other Tests: Hole collapsed (Dry) at 6.70 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 8.78 m > 25MPa, danger of overloading Local Friction (Fs) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01

GEOTECHNICS

Data entered by: JFAA Date: 29/04/2026

Checked by: FRBA Date: 29/04/2026

CPT-023 110 Jack Lachlan Drive, Beachlands - 22 April, 2026

Pre-Drill: 0m NZTM 1779223.953mE 5914371.876mN 50.05m(NZVD16)

1 Hill Street, Onehunga

e. auckland@geotechnics.co.nz

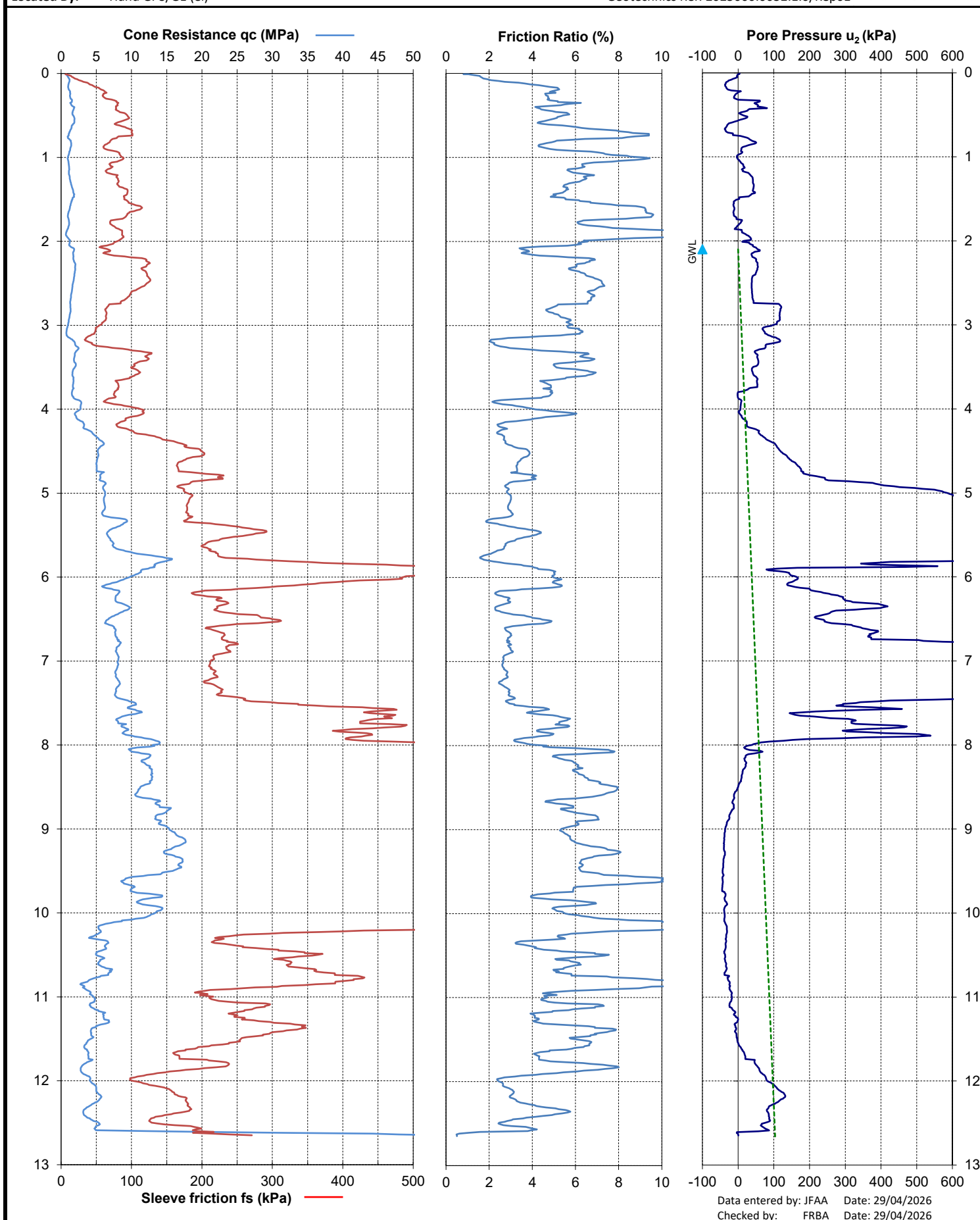
Assumed GWL: 2.1m (BGL) Other Tests: Hole collapsed (Dry) at 1.78 m

p. +64 9 356 3510

Operator: JFAA Comments: Test refusal at 12.75 m > 50MPa, danger of overloading Point Resistance (Qc) load cell

Located By: Hand GPS/GE (el)

Geotechnics Ref: 2025000.0032.1.0/Rep01





Loc. Campogrande , n° 26
29010 CALENDASCO (PC)
ITALY

www.pagani-geotechnical.com
info@pagani-geotechnical.com
Tel: +39 0523 771535 - Fax: +39 0523 773449

CONE CALIBRATION CERTIFICATE

N° **Z250/2025** **25/08/2025**

Calibrated system (Sistema tarato):

Type **P-TC**
Serial number **001226**
Sensor **TIP RESISTANCE**
Max. Capacity [MPa]: **100**
Scaling Factor: **184920**
Tip net area ratio (a_n): **0,79**
Sleeve net ratio (b_n): **0,00**

Addressee (destinatario):

Geotechnics Ltd - Auckland
1 Hill Street, Onehunga
Auckland 1061, Nuova Zelanda

Applied load measurement system:

(Sistema di rilevamento del carico applicato)

Load cell:

Manufacturer **AEP transducers**
Model **KAL 200 kN**
Serial Number **138913**

Power press:

Manufacturer **Easydur Italiana**
Model **Aura 20T**
Serial Number **29084**

The measurement system is periodically checked in a SIT calibration center. (Il sistema di rilevamento è sottoposto a verifica periodica presso un centro SIT)

Last verification date: **08/01/2025**

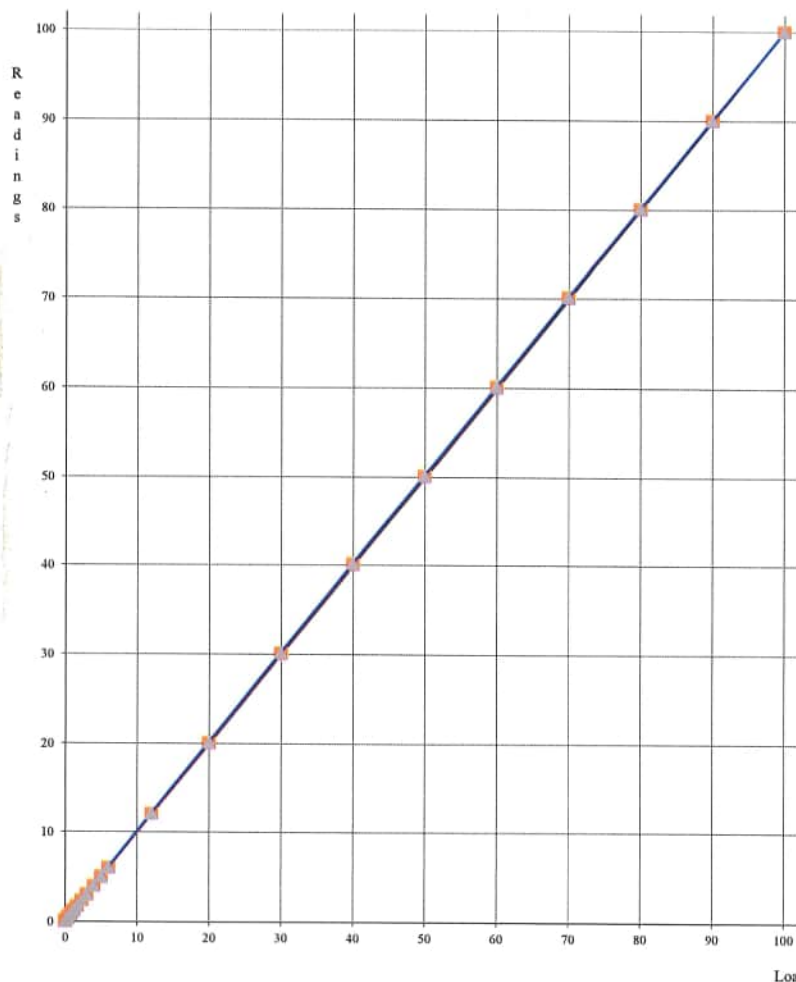
Certificate N. **LAT 091 2025-005**

Temperature of calibration **22°C**

Humidity **45%**

Factory calibration in accordance with:

ASTM D5778-12 Validity 12 Months



	Ascending		Descending	
	Load	Readings	Load	Readings
1	0,00	0,01	0,00	0,01
2	0,06	0,05	0,06	0,06
3	0,40	0,39	0,40	0,40
4	0,80	0,79	0,80	0,80
5	1,20	1,19	1,20	1,20
6	1,70	1,70	1,70	1,71
7	2,30	2,30	2,30	2,32
8	3,00	3,00	3,00	3,02
9	4,00	4,00	4,00	4,02
10	5,00	5,01	5,00	5,04
11	6,00	6,01	6,00	6,04
12	12,00	12,03	12,00	12,09
13	20,00	20,06	20,00	20,13
14	30,00	30,09	30,00	30,17
15	40,00	40,13	40,00	40,20
16	50,00	50,14	50,00	50,21
17	60,00	60,14	60,00	60,20
18	70,00	70,12	70,00	70,18
19	80,00	80,10	80,00	80,14
20	90,00	90,06	90,00	90,08
21	100,00	100,00	100,00	100,00

Unit: Mpa

Zero-load error:	=	0,000	% FSO
Zero-load thermal stability:	<=	1,000	% FSO
Nonlinearity:	=	0,141	% FSO
Hysteresis:	=	0,076	% FSO
Calibration error:	=	0,000	% MO
Apparent load:	=	0,005	% FSO

The adopted calibration procedure has been developed according to the suggestions given by Prof. Paul W. Mayne (Georgia Institute of technology) and Prof. Diego Lo Presti (University of Pisa)

Cone calibrated by

Date of issue **25/08/2025**



Loc. Campogrande , n° 26
29010 CALENDASCO (PC)
ITALY

www.pagani-geotechnical.com
info@pagani-geotechnical.com
Tel: +39 0523 771535 - Fax: +39 0523 773449

CONE CALIBRATION CERTIFICATE

N° **Z250/2025** **25/08/2025**

Calibrated system (Sistema tarato):

Type **P-TC**
Serial number **001226**
Sensor **SLEEVE FRICTION**
Max. Capacity [kPa]: **1600**
Scaling Factor: **31109**

Addressee (destinatario):

Geotechnics Ltd - Auckland
1 Hill Street, Onehunga
Auckland 1061, Nuova Zelanda

Applied load measurement system:

(Sistema di rilevamento del carico applicato)

Load cell:

Manufacturer **AEP transducers**
Model **KAL 50 kN**
Serial Number **65495**

Power press:

Manufacturer **Easydur Italiana**
Model **Aura 10T**
Serial Number **29002**

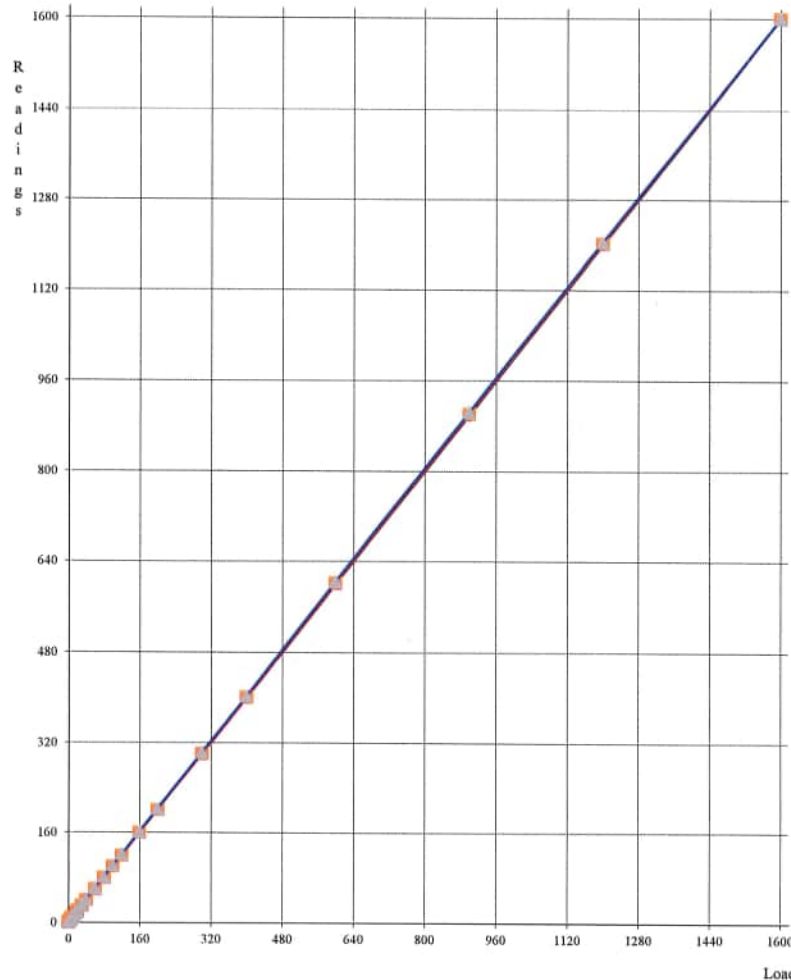
The measurement system is periodically checked in a SIT calibration center. (Il sistema di rilevamento è sottoposto a verifica periodica presso un centro SIT)

Last verification date: **08/01/2025**
Certificate N. **LAT 091 2025-005**

Temperature of calibration **22°C**
Humidity **45%**

Factory calibration in accordance with:

ASTM D5778-12 Validity 12 Months



	Ascending		Descending	
	Load	Readings	Load	Readings
1	0,00	0,13	0,00	0,73
2	2,00	1,60	2,00	2,47
3	5,00	4,87	5,00	5,67
4	7,00	6,73	7,00	7,53
5	10,00	9,47	10,00	10,40
6	16,00	15,53	16,00	16,47
7	20,00	19,27	20,00	20,27
8	30,00	29,13	30,00	30,27
9	40,00	39,13	40,00	40,33
10	60,00	59,00	60,00	60,40
11	80,00	79,00	80,00	80,40
12	100,00	99,40	100,00	101,00
13	120,00	119,47	120,00	121,13
14	160,00	159,53	160,00	161,40
15	200,00	199,80	200,00	201,60
16	300,00	300,47	300,00	302,40
17	400,00	400,80	400,00	402,73
18	600,00	601,33	600,00	603,87
19	900,00	901,93	900,00	904,80
20	1200,00	1201,60	1200,00	1204,00
21	1600,00	1600,00	1600,00	1600,53

Unit: kPa

Zero-load error:	=	0,038	% FSO
Zero-load thermal stability:	<=	1,000	% FSO
Nonlinearity:	=	0,121	% FSO
Hysteresis:	=	0,179	% FSO
Calibration error:	=	0,000	% MO
Apparent load:	=	0,096	% FSO

The adopted calibration procedure has been developed according to the suggestions given by Prof. Paul W. Mayne (Georgia Institute of technology) and Prof. Diego Lo Presti (University of Pisa)

Cone calibrated by

Date of issue **25/08/2025**



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CONE CALIBRATION CERTIFICATE

N° **Z250/2025** 25/08/2025

Calibrated system (Sistema tarato):

Type	P-TC
Serial number	001226
Sensor	PORE PRESSURE
Max. Capacity [kPa]:	2500
Scaling Factor:	10524
Sensor	TILT ANGLE
Max. Inclination [°]:	20
Scaling Factor:	332354

Addressee (destinatario):

Geotechnics Ltd - Auckland

1 Hill Street, Onehunga

Auckland 1061, Nuova Zelanda

Applied load measurement system:

(Sistema di rilevamento del carico applicato)

Pressure Generator:

Manufacturer	MENSOR
Model	CPC 4000
Serial Number	41000V56
Sensor Descr	Silicon Pressure Transducer
Sensor Serial Number	41000V3Y

The measurement system is periodically checked in a SIT calibration center. (Il sistema di rilevamento è sottoposto a verifica periodica presso un centro SIT)

Last verification date: 22/05/2025

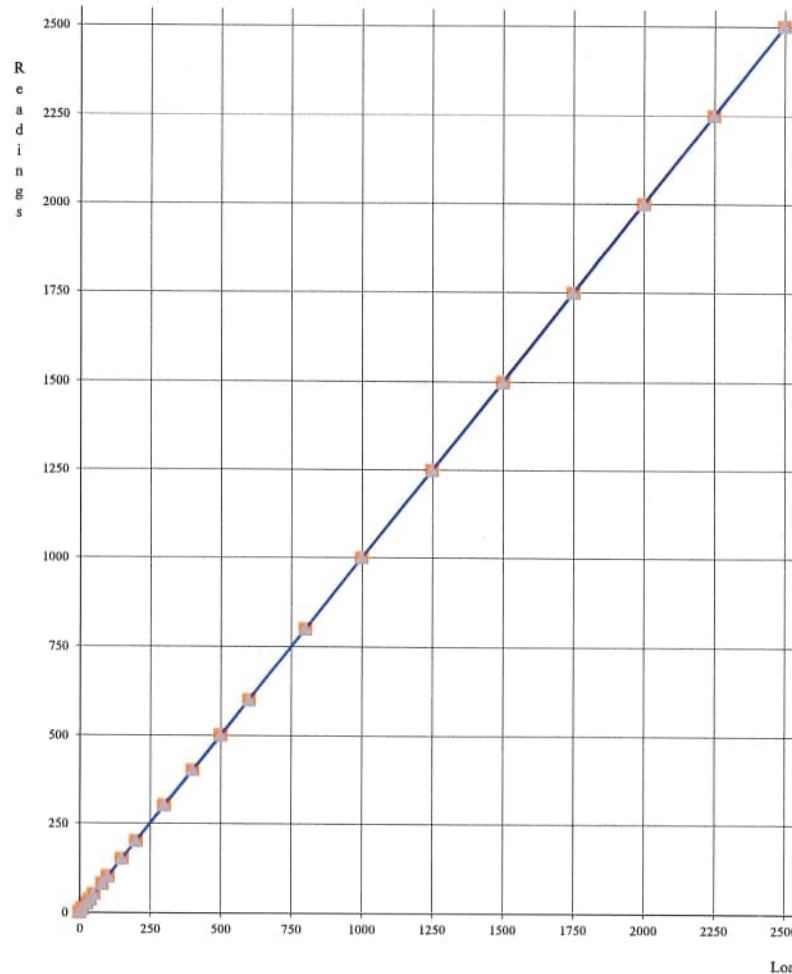
Certificate N. LAT 114 0434-SP-25

Temperature of calibration 22°C

Humidity 45%

Factory calibration in accordance with:

ASTM D5778-12 Validity 12 Months



	Ascending		Descending	
	Load	Readings	Load	Readings
1	0,20	0,00	0,20	0,10
2	10,00	9,90	10,00	10,00
3	25,00	25,00	24,90	25,00
4	35,00	35,10	35,00	35,10
5	50,00	50,20	50,00	50,30
6	80,00	80,30	80,00	80,40
7	100,00	100,40	99,90	100,40
8	150,00	150,50	150,00	150,70
9	200,00	200,70	199,90	200,80
10	300,00	300,70	300,00	300,70
11	400,00	400,60	399,90	400,60
12	500,00	500,50	499,90	500,40
13	600,00	600,10	600,00	600,10
14	800,00	799,80	800,00	799,70
15	1000,00	999,30	1000,00	999,10
16	1250,00	1248,90	1250,00	1248,70
17	1500,00	1498,80	1500,00	1498,50
18	1750,00	1748,80	1750,00	1748,60
19	2000,00	1999,00	1999,90	1998,80
20	2250,00	2249,50	2249,90	2249,20
21	2500,00	2500,00	2500,00	2500,20

Unit: kPa

Zero-load error:	=	0,004	% FSO
Nonlinearity:	=	0,048	% FSO

The adopted calibration procedure has been developed according to the suggestions given by Prof. Paul W. Mayne (Georgia Institute of technology) and Prof. Diego Lo Presti (University of Pisa)

Cone calibrated by

Date of issue 25/08/2025



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CONE CALIBRATION CERTIFICATE

N° **Z250/2025** **25/08/2025**

Calibrated system (Sistema tarato):

Type **P-TC**

Serial number **001226**

Tip net area ratio (a_n): **0,7935**

Sleeve net ratio (b_n): **0,0002**

Addressee (destinatario):

Geotechnics Ltd - Auckland

1 Hill Street, Onehunga

Auckland 1061, Nuova Zelanda

	u2 (kPa)	qc (kPa)	fs (kPa)	u2 (psi)	qc (psi)	fs (psi)
0 (0)	0,00	0,00	0,00	0,00	0,00	0,00
250 (36,26)	250,36	197,67	0,00	36,31	28,67	0,00
500 (72,52)	504,41	395,34	0,00	73,16	57,34	0,00
750 (108,78)	750,90	593,01	0,00	108,91	86,01	0,00
1000 (145,04)	999,46	790,68	0,00	144,96	114,68	0,00
1250 (181,30)	1261,88	1003,95	0,10	183,02	145,61	0,01
1500 (217,56)	1506,30	1196,42	0,10	218,47	173,53	0,01
1750 (253,82)	1760,08	1399,29	0,20	255,28	202,95	0,03
2000 (290,08)	2002,97	1591,76	0,20	290,51	230,87	0,03
2250 (326,33)	2257,65	1789,43	0,20	327,44	259,53	0,03
2500 (362,59)	2518,64	1997,50	0,20	365,30	289,71	0,03

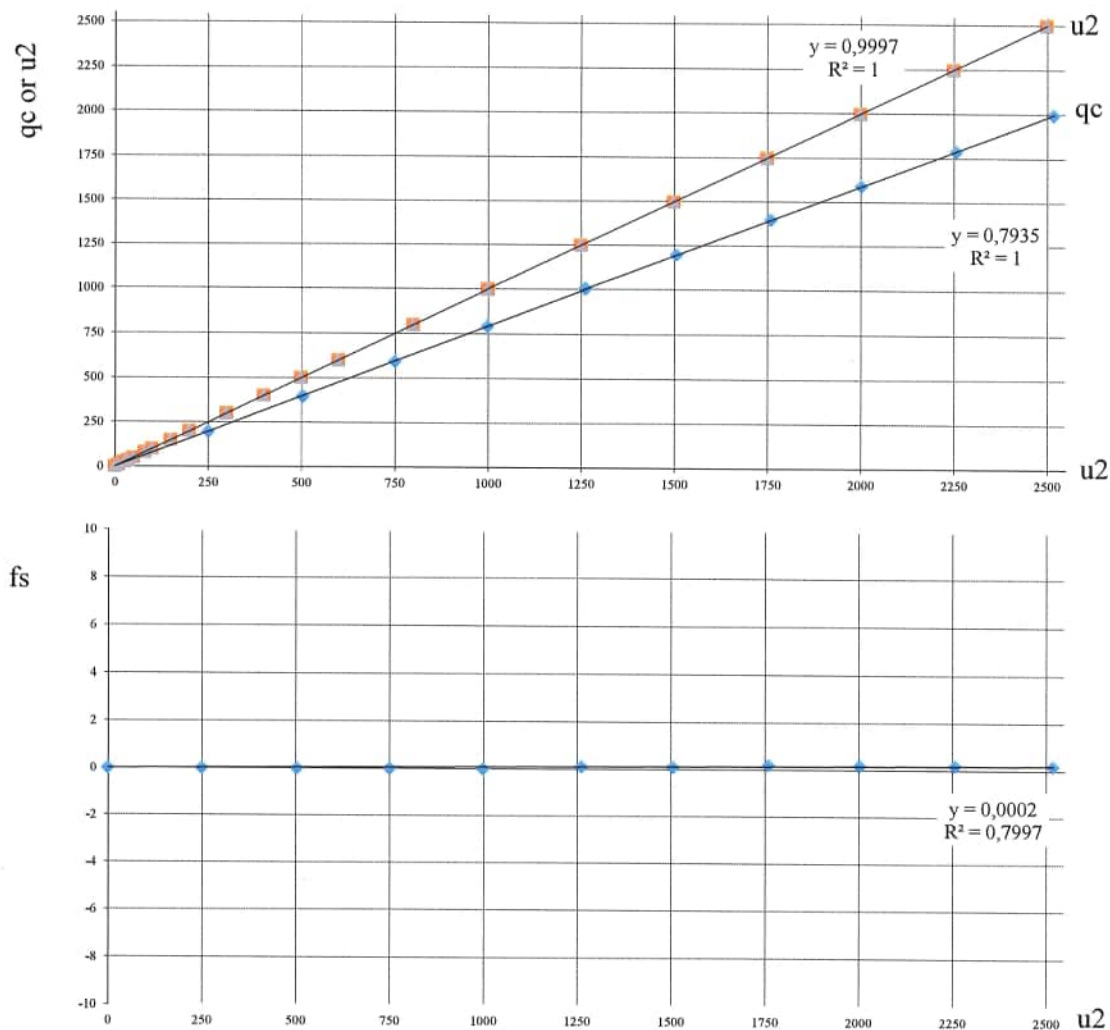
Unit: kPa - (psi)

Temperature of calibration 22°C

Humidity 45%

Factory calibration in accordance with:

ASTM D5778-12 Validity 12 Months



The adopted calibration procedure has been developed according to the suggestions given by Prof. Paul W. Mayne (Georgia Institute of technology) and Prof. Diego Lo Presti (University of Pisa)

Cone calibrated by

Date of issue

25/08/2025



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CONE CALIBRATION CERTIFICATE

N° **Z250/2025** 25/08/2025

Calibrated system (Sistema tarato):

Type **P-TC**
Serial number **001226**
Sensor **TEMPERATURE**
Max. Temperature [°C]: **50**
Scaling Factor: **499708**

Addressee (destinatario):

Geotechnics Ltd - Auckland
1 Hill Street, Onehunga
Auckland 1061, Nuova Zelanda

Psychrometric system:
(Sistema psicrometrico)

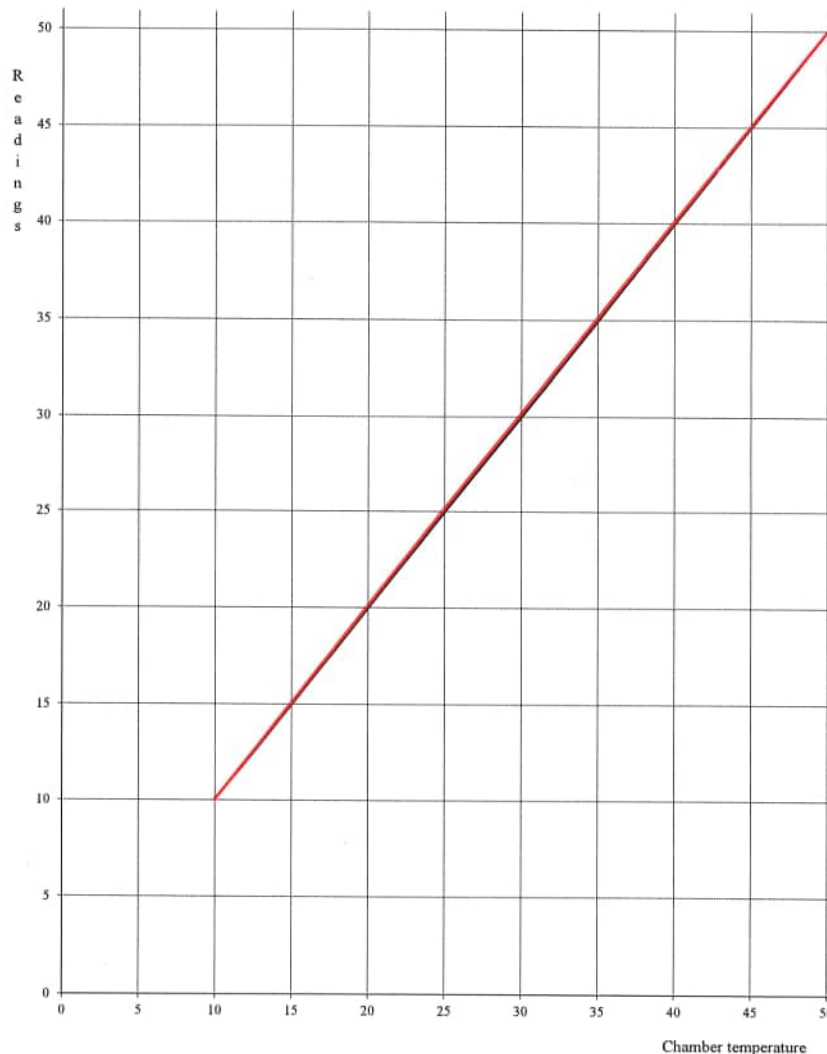
Manufacturer **ATT Angelantoni**
Model **DY340**
Serial Number **TT00210**

The measurement system is periodically checked in a SIT calibration center. (Il sistema di rilevamento è sottoposto a verifica periodica presso un centro SIT)

Last verification date: **22/05/2025**
Certificate N. **LAT 114 0434-SP-25**

Temperature of calibration

Humidity **52%**



	Ch temp	Readings
1	10,00	10,00
2	20,00	20,12
3	30,00	30,17
4	40,00	40,09
5	50,00	50,00

Unit: °C

Cone calibrated by

Date of issue

25/08/2025

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: (NZTM2000)		5915253 mN 1777427 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 14/04/2026							
R.L.:		25m		METHOD: Hand auger				HOLE FINISHED: 14/04/2026							
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd		LOGGED BY: MJLE					
								CHECKED: LIWI							
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION							
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (Su, kPa)	DESCRIPTION
					0 1 2 3 4 5 6 7 8 9										
Topsoil												M	VSt		0.00m: Clayey SILT; brown. Very stiff, moist, medium plasticity.
Fill						● 191/44 kPa							VSt-H		0.30m: CLAY, some silt; brown and orange streaked red. Very stiff to hard, moist, medium plasticity.
						● >206 kPa							H		0.70m: Silty CLAY; pinkish orange. Hard, moist, medium plasticity.
East Coast Bays Formation						● >206 kPa		24	1				VSt-H		1.00m: CLAY; grey streaked red. Very stiff to hard, moist, high plasticity.
						● 191/62 kPa									1.40 - 2.10m: Brown.
						● 203/82 kPa									
						● >206 kPa									
						● >206 kPa		23	2						2.10 - 2.60m: Grey streaked brown.
						● 176/103 kPa									2.20m: Sand.
						● >206 kPa									
						● >206 kPa		22	3						3.20 - 5.00m: Moist to wet.
						● 132/79 kPa							M-W		
						● 135/76 kPa									
						● 191/118 kPa		21	4						4.40 - 4.60m: Mottled yellow.
						● 176/106 kPa									
						● 176/118 kPa									
						● 179/121 kPa									
								20	5						5m: Target depth
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 4 m blank, 4 - 5 m screen.															
Hole Depth 5m															

HAND AUGER PHOTOS

BOREHOLE No.: **BH001**

Hole Location: 110 Jack Lachlan Drive,
Beachlands

SHEET: 1 OF 1

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5915253 mN 1777427 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 14/04/2026
R.L.:	25m	METHOD: Hand auger	HOLE FINISHED: 14/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: LIWI



0.00-5.00m

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5915238 mN 1777355 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 14/04/2026
R.L.:	16.5m	METHOD: Hand auger	HOLE FINISHED: 15/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: JOKO CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032													
CO-ORDINATES: 5915101 mN (NZTM2000) 1777459 mE				DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 14/04/2026													
R.L.: 27m				METHOD: Hand auger				HOLE FINISHED: 15/04/2026													
DATUM: NZVD2016								DRILLED BY: Geotechnics Ltd													
								LOGGED BY: GRVA													
								CHECKED: LIWI													
GEOLOGICAL		METHOD OBSERVATIONS								ENGINEERING DESCRIPTION											
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)				TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (Su, kPa)	DESCRIPTION			
					0	1	2	3	4	5	6	7	8	9							
Topsoil																		0.00m: Organic SILT; black. Stiff, moist, low to medium plasticity. Trace rootlets.			
East Coast Bays Formation		14/04/2026	100	HA70														0.25m: SILT, some clay; brown. Very stiff, moist, medium plasticity.			

COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen. Poor recovery from 3.4 m due to saturation of material.

Hole Depth
5m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5915101 mN 1777459 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 14/04/2026
R.L.:	27m	METHOD: Hand auger	HOLE FINISHED: 15/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA CHECKED: LIWI



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: 5915005 mN (NZTM2000) 1777384 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 14/04/2026									
R.L.: 23.5m		METHOD: Hand auger				HOLE FINISHED: 14/04/2026									
DATUM: NZVD2016						DRILLED BY: Geotechnics Ltd									
						LOGGED BY: GAAB		CHECKED: SHGU							
GEOLOGICAL	METHOD OBSERVATIONS					ENGINEERING DESCRIPTION									
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SILT SHEAR LENGTH (Su, kPa)	DESCRIPTION	
Topsoil				0 1 2 3 4 5 6 7 8 9										0.00m: Organic SILT, minor clay; dark brown. Stiff, moist, low plasticity.	
East Coast Bays Formation	14/04/2026	100	HA 70		● 137/54 kPa		23				M	St		0.10m: Silty CLAY; brownish yellow streaked grey. Very stiff, moist, medium plasticity.	
					● 164/42 kPa						VSt			0.65m: SILT, minor clay; yellow. Very stiff to hard, moist, low plasticity.	
					● >209 kPa		1				VSt-H			0.80 - 1.30m: Grey.	
					● 95/30 kPa						St			1.20 - 1.30m: Stiff.	
					● 125/80 kPa		22				VSt-H			1.30m: Silty CLAY; greyish yellow. Very stiff to hard, moist, medium plasticity.	
					● >209 kPa									1.40m: SILT, minor clay and minor sand; grey. Very stiff to hard, moist, low plasticity.	
					● >209 kPa		2				H			1.70 - 1.90m: Yellowish grey.	
					● >209 kPa									1.90m: Clayey SILT, minor sand; greyish yellow. Hard, moist, medium plasticity.	
					● >209 kPa		21								
					● UTP										
					● UTP		3			M-W	TP		2.75m: Silty fine SAND; light grey mottled orange. Tightly packed, moist to wet, poorly graded.		
							20								
							19								
							5								
							18							5m: Target depth	

COMMENTS: Shear vanes stopped at 3.0 m due to granular material.

Hole Depth
5m

Scale 1:30

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5915005 mN 1777384 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 14/04/2026
R.L.:	23.5m	METHOD: Hand auger	HOLE FINISHED: 14/04/2026
DATUM:	NZVD2016	LOGGED BY: GAAB	CHECKED: SHGU



0.00-5.00m



SHEET: 1 OF 1

TTNZ 20210729 - HandAugerLog - 11/06/2026 4:19:12 pm - Produced with Core-GS by GeRoc

0.0-5.0m

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914920 mN 1777478 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 15/04/2026
R.L.:	28m	METHOD: Hand auger	HOLE FINISHED: 15/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
CO-ORDINATES: 5914799 mN (NZTM2000) 1777225 mE				DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 15/04/2026																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
R.L.: 21m				METHOD: Hand auger				HOLE FINISHED: 15/04/2026																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)										TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (Su, kPa)										DESCRIPTION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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5195	5200	5205	5210	5215	5220	5225	5230	5235	5240	5245	5250	5255	5260	5265	5270	5275	5280	5285	5290	5295	5300	5305	5310	5315	5320	5325	5330	5335	5340	5345	5350	5355	5360	5365	5370	5375	5380	5385	5390	5395	5400	5405	5410	5415	5420	5425	5430	5435	5440	5445	5450	5455	5460	5465	5470	5475	5480	5485	5490	5495	5500	5505	5510	5515	5520	5525	5530	5535	5540	5545	5550	5555	5560	5565	5570	5575	5580	5585	5590	5595	5600	5605	5610	5615	5620	5625	5630	5635	5640	5645	5650	5655	5660	5665	5670	5675	5680	5685	5690	5695	5700	5705	5710	5715	5720	5725	5730	5735	5740	5745	5750	5755	5760	5765	5770	5775	5780	5785	5790	5795	5800	5805	5810	5815	5820	5825	5830	5835	5840	5845	5850	5855	5860	5865	5870	5875	5880	5885	5890	5895	5900	5905	5910	5915	5920	5925	5930	5935	5940	5945	5950	5955	5960	5965	5970	5975	5980	5985	5990	5995	6000	6005	6010	6015	6020	6025	6030	6035	6040	6045	6050	6055	6060	6065	6070	6075	6080	6085	6090	6095	6100	6105	6110	6115	6120	6125	6130	6135	6140	6145	6150	6155	6160	6165	6170	6175	6180	6185	6190	6195	6200	6205	6210	6215	6220	6225	6230	6235	6240	6245	6250	6255	6260	6265	6270	6275	6280	6285	6290	6295	6300	6305	6310	6315	6320	6325	6330	6335	6340	6345	6350	6355	6360	6365	6370	6375	6380	6385	6390	6395	6400	6405	6410	6415	6420	6425	6430	6435	6440	6445	6450	6455	6460	6465	6470	6475	6480	6485	6490	6495	6500	6505	6510	6515	6520	6525	6530	6535	6540	6545	6550	6555	6560	6565	6570	6575	6580	6585	6590

PROJECT: Beachlands South HAs and CPTs

LOCATION: 110 Jack Lachlan Drive, Beachlands **JOB No.:** 2025000.0032

CO-ORDINATES: 5914799 mN
(NZTM2000) 1777225 mE

DRILL TYPE: 70 mm Hand Auger

HOLE STARTED: 15/04/2026

R.L.: 21m

METHOD: Hand auger

HOLE FINISHED: 15/04/2026

DATUM: NZVD2016

DRILLED BY: Geotechnics Ltd

LOGGED BY: GAAB

CHECKED: SHGU


0.00-5.00m



SHEET: 1 OF 1

TTNZ_20210729 - HandAugerLog - 11/06/2026 4:19:26 pm - Produced with Core-GS by GeRoc

Rev.: A	0.0-5.0m
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PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914622 mN 1777243 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 15/04/2026
R.L.:	21m	METHOD: Hand auger	HOLE FINISHED: 15/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA CHECKED: SHGU



0.00-5.00m



SHEET: 1 OF 1

TNZ_20210729 - HandAugerLog - 11/06/2026 4:19:35 pm - Produced with Core-GS by GeRoc

Scale 1:30

Rev.: A

HAND AUGER PHOTOS

BOREHOLE No.: **BH008**

Hole Location: 110 Jack Lachlan Drive,
Beachlands

SHEET: 1 OF 1

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands		JOB No.: 2025000.0032	
CO-ORDINATES: 5914551 mN (NZTM2000) 1777128 mE		DRILL TYPE: 70 mm Hand Auger		HOLE STARTED: 15/04/2026	
R.L.: 21m		METHOD: Hand auger		HOLE FINISHED: 15/04/2026	
DATUM: NZVD2016				DRILLED BY: Geotechnics Ltd	
				LOGGED BY: MJLE	
				CHECKED: LIWI	



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032													
CO-ORDINATES: (NZTM2000)		5914502 mN 1777284 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 16/04/2026													
R.L.:		19m		METHOD: Hand auger				HOLE FINISHED: 16/04/2026													
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd													
								LOGGED BY: MJLE		CHECKED: SHGU											
GEOLOGICAL		METHOD OBSERVATIONS										ENGINEERING DESCRIPTION									
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR LENGTH (Su, kPa)	DESCRIPTION							
Topsoil	16/04/2026	100	HA70	0 1 2 3 4 5 6 7 8 9					TS		W	VST- H	50 100 150 200 H	0.00m: SILT, minor clay; dark brown. Very stiff to hard, wet, low plasticity.							
Fill					● >206 kPa									0.20m: Silty CLAY; light brown. Very stiff to hard, wet, medium plasticity.							
East Coast Bays Formation					● 162/59 kPa																
					● 118/44 kPa		18	1						0.70m: CLAY; light brown mottled orange brown. Very stiff to hard, wet, high plasticity.							
					● 103/44 kPa																
					● UTP																
					● UTP									1.70m: CLAY, some silt; orange brown and pink. Hard, wet, medium to high plasticity.							
					● UTP		17	2													
					● UTP																
					● UTP									2.50m: Clayey SILT; grey mottled orange. Hard, wet, medium plasticity.							
					● UTP		16	3													
					● UTP									3.30 - 3.80m: Orange mottled grey.							
				● UTP																	
						15	4														

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands		JOB No.: 2025000.0032	
CO-ORDINATES: 5914502 mN (NZTM2000) 1777284 mE		DRILL TYPE: 70 mm Hand Auger		HOLE STARTED: 16/04/2026	
R.L.: 19m		METHOD: Hand auger		HOLE FINISHED: 16/04/2026	
DATUM: NZVD2016				DRILLED BY: Geotechnics Ltd	
				LOGGED BY: MJLE	
				CHECKED: SHGU	



0.00-4.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032									
CO-ORDINATES: (NZTM2000)		5914400 mN 1777201 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 16/04/2026									
R.L.:		23m		METHOD: Hand auger				HOLE FINISHED: 16/04/2026									
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd									
								LOGGED BY: JOKO		CHECKED: SHGU							
GEOLOGICAL	METHOD OBSERVATIONS							ENGINEERING DESCRIPTION									
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm)				TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR LENGTH (S _u kPa)	DESCRIPTION
Topsoil				0 1 2 3 4 5 6 7 8 9													0.00m: SILT; brown. Very stiff to hard, moist, medium plasticity.
Fill								● 180/66 kPa									0.15m: Clayey SILT; brownish orange. Very stiff, moist, medium plasticity.
East Coast Bays Formation								● >200 kPa									0.40m: Silty CLAY; orange pink, streaked white. Hard, moist, medium plasticity.
								● 109/40 kPa		22	1						0.70m: Clayey SILT; greyish white. Very stiff, moist, medium plasticity.
								● >200 kPa									1.10m: Clayey SILT; yellowish brown. Very stiff to hard, moist, medium plasticity.
								● 177/49 kPa									
								● 180/46 kPa									
								● 146/34 kPa		21	2						
								● 63/29 kPa									2.40 - 2.60m: Stiff.
								● UTP									2.60m: Silty CLAY; orange brown. Hard, saturated, medium to high plasticity.
								● UTP		20	3						2.60 - 2.80m: Some gravel; gravel, fine, sub-angular.
								● 129/49 kPa									3.00 - 3.60m: Trace gravel; gravel, fine, sub-angular.
								● UTP									3.30 - 3.60m: Very stiff.
								● UTP									3.60m: Silty CLAY, some gravel; orange brown. Hard, saturated, medium plasticity; gravel, fine to coarse, up to 30mm, sub-angular.
										19	4						4m: Refusal

COMMENTS:
Hole Depth
4m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914400 mN 1777201 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 16/04/2026
R.L.:	23m	METHOD: Hand auger	HOLE FINISHED: 16/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: JOKO CHECKED: SHGU



0.00-4.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032																		
CO-ORDINATES: 5914329 mN (NZTM2000) 1777305 mE				DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 16/04/2026																		
R.L.: 21.5m				METHOD: Hand auger				HOLE FINISHED: 16/04/2026																		
DATUM: NZVD2016								DRILLED BY: Geotechnics Ltd																		
								LOGGED BY: MJLE																		
								CHECKED: SHGU																		
GEOLOGICAL	METHOD OBSERVATIONS										ENGINEERING DESCRIPTION															
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm)										TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOL SHEAR LENGTH (S _u , kPa)	DESCRIPTION			
Topsoil														● >206 kPa									0.00m: Silty CLAY, some rootlets; dark brown. Very stiff to hard, moist, low to medium plasticity.			
Fill														1 @ 0.50m		21							0.30m: Silty CLAY; orange brown. Very stiff to hard, moist, low to medium plasticity.			
														● 176/62 kPa									0.50m: CLAY; orange brown mottled dark brown. Very stiff, moist, high plasticity.			
East Coast Bays Formation														● 162/59 kPa		1								1.10m: Silty CLAY; pink and orange. Very stiff, moist, medium plasticity.		
														● 176/74 kPa									1.20 - 1.40m: Trace gravel; dark grey mottled orange; gravel, fine.			
														● 191/103 kPa		20								1.40m: CLAY; orange brown mottled grey. Very stiff, moist, high plasticity.		
														● 147/74 kPa		2								2.00 - 3.20m: Wet.		
														● 176/56 kPa		19								2.60 - 3.00m: Trace gravel; gravel, fine.		
														● 176/59 kPa										2.90 - 3.20m: Grey mottled pink.		
														● 103/35 kPa		3									3.20m: Silty CLAY; pink mottled light grey. Very stiff to hard, wet, medium plasticity.	
														● 100/32 kPa		4									3.80 - 3.90m: Orange.	
														● 162/74 kPa		18									4.20 - 4.30m: Orange.	
														● >206 kPa												
														● >206 kPa												
														● >206 kPa												
														● >206 kPa												

COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 2.3 m blank, 2.3 - 4.3 m screened.

Hole Depth
4.3m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands		JOB No.: 2025000.0032	
CO-ORDINATES: 5914329 mN (NZTM2000) 1777305 mE		DRILL TYPE: 70 mm Hand Auger		HOLE STARTED: 16/04/2026	
R.L.: 21.5m		METHOD: Hand auger		HOLE FINISHED: 16/04/2026	
DATUM: NZVD2016				DRILLED BY: Geotechnics Ltd	
				LOGGED BY: MJLE	
				CHECKED: SHGU	



0.00-4.30m



SHEET: 1 OF 1

TTNZ_20210729 - HandAugerLog - 11/06/2026 4:20:14 pm - Produced with Core-GS by GeRoc

Rev: A	0.0-5.0m
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PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914218 mN 1777355 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 17/04/2026
R.L.:	19m	METHOD: Hand auger	HOLE FINISHED: 17/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands		JOB No.: 2025000.0032	
CO-ORDINATES: 5914317 mN (NZTM2000) 1777498 mE		DRILL TYPE: 70 mm Hand Auger		HOLE STARTED: 17/04/2026	
R.L.: 22m		METHOD: Hand auger		HOLE FINISHED: 17/04/2026	
DATUM: NZVD2016				DRILLED BY: Geotechnics Ltd	
				LOGGED BY: MJLE	
				CHECKED: SHGU	



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands		JOB No.: 2025000.0032																		
CO-ORDINATES: (NZTM2000) 5914368 mN 1777578 mE		DRILL TYPE: 70 mm Hand Auger		HOLE STARTED: 20/04/2026																		
R.L.: 31m		METHOD: Hand auger		HOLE FINISHED: 20/04/2026																		
DATUM: NZVD2016				DRILLED BY: Geotechnics Ltd																		
				LOGGED BY: GRVA CHECKED: SHGU																		
GEOLOGICAL		METHOD OBSERVATIONS				ENGINEERING DESCRIPTION																
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)					TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL STRENGTH SHEAR (kPa)	DESCRIPTION			
					0	1	2	3	4											5	6	7
Topsoil																			0.00m: Clayey SILT, trace rootlets; dark brown. Very stiff, dry, low to medium plasticity.			
East Coast Bays Formation		20/04/2026	100	HA 70															0.28m: Clayey SILT, trace rootlets; light grey mottled orange. Very stiff, dry to moist, medium plasticity.			
																			1.40m: Silty CLAY; brown and orange mottled dark grey. Very stiff, moist, medium plasticity.			
																			2.35m: CLAY; brown and orange mottled light grey. Very stiff to hard, moist to wet, high plasticity.			
																		2.80 - 3.00m: Brown and orange.				
																		3.00m: CLAY, minor silt; light grey mottled orange. Very stiff, wet, high plasticity.				
																		3.80m: Silty CLAY, minor sand; light grey mottled orange. Very stiff, wet, medium plasticity; sand, fine to medium.				
																		4.70m: Silty CLAY, minor sand; orange mottled light grey. Very stiff, saturated, medium plasticity; sand, fine to medium.				
																		5m: Target depth				

COMMENTS:

 Hole Depth
5m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914368 mN 1777578 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 20/04/2026
R.L.:	31m	METHOD: Hand auger	HOLE FINISHED: 20/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032											
CO-ORDINATES: (NZTM2000)		5914282 mN 1777622 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 20/04/2026											
R.L.:		33m		METHOD: Hand auger				HOLE FINISHED: 20/04/2026											
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd											
								LOGGED BY: MJLE		CHECKED: SHGU									
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION											
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)		TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (S _u kPa)	DESCRIPTION			
					0	1	2	3	4	5	6	7	8	9					
Topsoil		20/04/2026 moisture on shear vane ↓	100	HA70												0.00m: SILT, minor clay, trace rootlets; dark brown. Very stiff to hard, moist, low plasticity.			
East Coast Bays Formation																			0.30m: Silty CLAY, trace rootlets; orange brown mottled grey. Hard, moist, medium plasticity.
																			0.60m: CLAY, minor silt, trace rootlets; orange brown mottled grey. Very stiff to hard, moist, high plasticity.
																			0.60 - 2.00m: Trace rootlets.
																			1.20 - 1.90m: Hard.
																			1.90m: SILT, trace clay; grey mottled orange brown. Hard, moist, non-plastic.
																			3.10m: SILT, some clay; orange and brownish grey. Hard, moist, low to medium plasticity.
																			3.60 - 3.90m: Very stiff.
																	4.40m: SILT; bluish grey. Hard, moist, non-plastic.		
		DRY: 20/04/2026 at completion														5m: Target depth			
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 2 m blank, 2 - 4 m screened, 4 - 5 m blank.																			
Hole Depth 5m																			

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914282 mN 1777622 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 20/04/2026
R.L.:	33m	METHOD: Hand auger	HOLE FINISHED: 20/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: (NZTM2000)		5914501 mN 1777626 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 20/04/2026							
R.L.:		36m		METHOD: Hand auger				HOLE FINISHED: 20/04/2026							
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd		LOGGED BY: GAAB		CHECKED: SHGU			
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION							
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (Su, kPa)	DESCRIPTION
Topsoil					0 1 2 3 4 5 6 7 8 9										0.00m: SILT, some organics, minor clay; dark brown. Stiff, moist, low plasticity.
East Coast Bays Formation						● 194/48 kPa							St-Vst		0.10m: SILT, minor clay; brown mottled orange and streaked yellow. Stiff to very stiff, moist, low plasticity.
						● 200/80 kPa							Vst		0.55m: Silty CLAY; yellow streaked grey and mottled orange. Very stiff, moist, medium to high plasticity.
						● 173/72 kPa		35	1						
						● 146/54 kPa									
						● 119/66 kPa									
						● 134/54 kPa						W			1.65 - 3.25m: Grey streaked yellow. 1.70 - 3.25m: Wet.
						● 128/60 kPa		34	2						
						● 149/80 kPa									
						● 104/60 kPa									2.75 - 3.10m: Carbonaceous material present.
						● 72/39 kPa		33	3				St		3.00 - 3.25m: Stiff.
						● 140/48 kPa						W-S	Vst		3.25m: SILT, minor clay; yellow. Very stiff, wet to saturated, low plasticity.
						● 149/45 kPa									
						● >209 kPa		32	4			S	Vst-H		3.70m: Sandy SILT; grey streaked yellow. Very stiff to hard, saturated, non-plastic; sand, fine.
						● UTP							TP		4.00m: Silty fine SAND; grey. Tightly packed, saturated, poorly graded.
						● UTP									
						● UTP									
							31	5				H		4.85m: Sandy SILT; grey. Hard, saturated, non-plastic; sand, fine.	
															5m: Target depth
COMMENTS:															
Hole Depth 5m															

PROJECT: Beachlands South HAs and CPTs

LOCATION: 110 Jack Lachlan Drive, Beachlands **JOB No.:** 2025000.0032

CO-ORDINATES: 5914501 mN
(NZTM2000) 1777626 mE

DRILL TYPE: 70 mm Hand Auger

HOLE STARTED: 20/04/2026

R.L.: 36m

METHOD: Hand auger

HOLE FINISHED: 20/04/2026

DATUM: NZVD2016

DRILLED BY: Geotechnics Ltd

LOGGED BY: GAAB

CHECKED: SHGU


0.00-5.00m

PROJECT: Beachlands South HAs and CPTs					LOCATION: 110 Jack Lachlan Drive, Beachlands					JOB No.: 2025000.0032								
CO-ORDINATES: (NZTM2000)		5914609 mN 1777634 mE			DRILL TYPE: 70 mm Hand Auger					HOLE STARTED: 20/04/2026								
R.L.:		33m			METHOD: Hand auger					HOLE FINISHED: 20/04/2026								
DATUM:		NZVD2016								DRILLED BY: Geotechnics Ltd								
										LOGGED BY: JOKO								
										CHECKED: SHGU								
GEOLOGICAL		METHOD OBSERVATIONS							ENGINEERING DESCRIPTION									
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)			TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (Su, kPa)	DESCRIPTION	
Topsoil					0	1	2	3	4	5	6	7	8	9				
East Coast Bays Formation	100	HA70	17/04/2026					● 162/76 kPa		32	1		M	VSI		0.00m: SILT, minor clay, trace rootlets; dark brown. Very stiff, moist, medium plasticity. 0.05m: Silty CLAY; light grey mottled orange. Very stiff, moist, high plasticity. 0.20 - 0.80m: Light grey, streaked red, mottled orange.		
								● 132/74 kPa										
								● 100/65 kPa										
								● 121/65 kPa										
								● 159/38 kPa										
								● >206 kPa		31	2			W	H		1.60m: Sandy SILT, minor clay; light orange brown. Hard, wet, low to medium plasticity; sand, fine.	
								● >206 kPa									2.30m: Clayey sandy SILT; light grey. Hard, wet, medium plasticity; sand, fine.	
								● >206 kPa										
								● UTP						W-S	TP		2.60m: Fine to medium SAND, some clay and some silt; dark grey. Tightly packed, wet to saturated, low plasticity.	
								● UTP		30	3							
										29	4					3.7m: Collapse		
										28	5							
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 3.3 m blank.																		
Hole Depth 3.7m																		

COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 3.3 m blank.

Hole Depth
3.7m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914609 mN 1777634 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 20/04/2026
R.L.:	33m	METHOD: Hand auger	HOLE FINISHED: 20/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: JOKO CHECKED: SHGU



0.00-3.70m

PROJECT: Beachlands South HAs and CPTs			LOCATION: 110 Jack Lachlan Drive, Beachlands			JOB No.: 2025000.0032																					
CO-ORDINATES: 5914498 mN (NZTM2000) 1777709 mE			DRILL TYPE: 70 mm Hand Auger			HOLE STARTED: 20/04/2026																					
R.L.: 39m			METHOD: Hand auger			HOLE FINISHED: 20/04/2026																					
DATUM: NZVD2016						DRILLED BY: Geotechnics Ltd																					
						LOGGED BY: MJLE																					
						CHECKED: SHGU																					
GEOLOGICAL	METHOD OBSERVATIONS										ENGINEERING DESCRIPTION																
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)									TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (Su, kPa)	DESCRIPTION					
				0 1 2 3 4 5 6 7 8 9																							
Topsoil																							0.00m: SILT, some clay; dark brown mottled brown and orange. Very stiff, moist, low plasticity.				
Fill													● 168/74 kPa 1 @ 0.30m										0.20m: Silty CLAY; grey mottled orange. Very stiff, moist, medium plasticity.				
East Coast Bays Formation													● 165/71 kPa											0.40m: CLAY, minor silt; grey mottled orange . Very stiff, moist, high plasticity.			
													● 118/50 kPa											0.90 - 1.30m: Streaked red.			
													● 132/68 kPa														
													● 115/56 kPa													1.30m: Silty CLAY; grey mottled orange and speckled red. Very stiff, moist, medium plasticity.	
													● 109/56 kPa														
													● 82/35 kPa														2.10 - 2.30m: Stiff.
													● 88/44 kPa														2.30m: Clayey SILT; orange mottled grey. Stiff, moist, low plasticity.
													● 88/44 kPa														
													● 65/26 kPa														3.00 - 5.00m: Saturated.
													● 76/41 kPa														
												● 103/59 kPa															3.60 - 5.00m: Very stiff.
												● 103/44 kPa															
												● 103/59 kPa															
												● 106/47 kPa															
												● 100/50 kPa															
																											5m: Target depth
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.																											
Hole Depth 5m																											

COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.

Hole Depth
5m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914498 mN 1777709 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 20/04/2026
R.L.:	39m	METHOD: Hand auger	HOLE FINISHED: 20/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032												
CO-ORDINATES: (NZTM2000)		5914308 mN 1777724 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 20/04/2026												
R.L.:		37.5m		METHOD: Hand auger				HOLE FINISHED: 20/04/2026												
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd												
								LOGGED BY: GAAB		CHECKED: SHGU										
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION												
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)		TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (Su, kPa)	DESCRIPTION				
					0	1	2	3	4	5	6	7	8	9						
Topsoil		20/04/2026 at completion ▼	100	HA70						37			M	VSt		0.00m: SILT, some clay, minor organics; dark brown. Very stiff, moist, low plasticity.				
Fill															M	VSt		0.10m: Clayey SILT, some gravel; yellowish brown streaked grey, mottled orange and spotted black. Very stiff, moist, medium plasticity.		
East Coast Bays Formation													1						0.25m: Silty CLAY; yellow streaked grey mottled reddish orange. Very stiff, moist, medium to high plasticity.	

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914308 mN 1777724 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 20/04/2026
R.L.:	37.5m	METHOD: Hand auger	HOLE FINISHED: 20/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GAAB CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: (NZTM2000)		5914187 mN 1777774 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 20/04/2026							
R.L.:		35m		METHOD: Hand auger				HOLE FINISHED: 20/04/2026							
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd							
								LOGGED BY: GRVA		CHECKED: SHGU					
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION							
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (Su, kPa)	DESCRIPTION
					0 1 2 3 4 5 6 7 8 9										
Topsoil						● 160/61 kPa						D	VSI		0.00m: SILT, minor clay, trace rootlets; dark brown speckled orange. Very stiff, dry, low plasticity.
Fill						● 148/44 kPa						D-M			0.30m: CLAY, minor sand; light grey mottled orange. Very stiff, dry to moist, low plasticity; sand, fine. 0.40m: Clayey SILT; light brownish grey mottled orange. Very stiff, dry to moist, medium to high plasticity.
Topsoil						● 131/35 kPa		34	1			M			0.70m: CLAY, some silt, trace organics; dark brown. Very stiff, moist, medium to high plasticity.
East Coast Bays Formation						● 140/58 kPa									0.60m: Trace gravel; gravel, medium to coarse, up to 30mm, sub-angular, singular stone.
						● 148/73 kPa									1.20m: CLAY, minor silt; brown mottled orange and light grey. Very stiff, moist, high plasticity.
						● 154/87 kPa									
						● 148/84 kPa		33	2						
						● 191/90 kPa							M-W		2.20m: Sandy CLAY, some silt; light grey mottled orange. Very stiff, moist to wet, medium plasticity; sand, fine.
						● 172/90 kPa									
						● 148/99 kPa		32	3						
						● 150/84 kPa									
						● 143/76 kPa									
						● 122/70 kPa		31	4						
						● 128/71 kPa									
						● 146/81 kPa						S		4.30m: Sandy CLAY; orange mottled light grey. Very stiff, saturated, medium plasticity; sand, fine.	
						● 143/76 kPa									
								30	5						5m: Target depth
COMMENTS: Piezometer installed: No Toby, 32 mm dia. 0.3 m stick-up agl, 0 - 2 m blank, 2 - 4 m screen, 4 - 5 m blank.															
Hole Depth 5m															

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914187 mN 1777774 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 20/04/2026
R.L.:	35m	METHOD: Hand auger	HOLE FINISHED: 20/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA
			CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs			LOCATION: 110 Jack Lachlan Drive, Beachlands			JOB No.: 2025000.0032																								
CO-ORDINATES: 5914404 mN (NZTM2000) 1777811 mE			DRILL TYPE: 70 mm Hand Auger			HOLE STARTED: 21/04/2026																								
R.L.: 41.5m			METHOD: Hand auger			HOLE FINISHED: 21/04/2026																								
DATUM: NZVD2016						DRILLED BY: Geotechnics Ltd																								
						LOGGED BY: GAAB																								
						CHECKED: SHGU																								
GEOLOGICAL		METHOD OBSERVATIONS										ENGINEERING DESCRIPTION																		
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)										TESTS		SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION		MOISTURE CLASSIFICATION		CONSISTENCY / DENSITY CLASSIFICATION		ESTIMATED SHEAR STRENGTH (Su, kPa)		DESCRIPTION	
					0	1	2	3	4	5	6	7	8	9																
Topsoil																												0.00m: SILT, some sand, minor clay; brown. Very stiff, moist, low plasticity; sand, fine.		
Fill																												0.25m: Clayey SILT, minor gravel; brownish yellow streaked grey, mottled orange and spotted black. Hard, moist, medium plasticity; gravel, fine, basalt.		
																												0.60 - 0.90m: Stiff.		
																												0.90m: Gravelly SILT, minor clay, trace cobbles; yellow streaked grey and reddish orange, spotted black. Very stiff to hard, moist, low plasticity; gravel, fine and coarse, scoria; cobbles, basalt.		
																												1.30m: Clayey SILT, trace organics and trace gravel; yellow streaked grey and reddish orange. Hard, moist, medium plasticity; organics partially decomposed wood fragments; gravel, fine, basalt.		
East Coast Bays Formation																												1.80m: Gravelly SILT, minor clay; yellow streaked grey and reddish orange, spotted black. Hard, moist, low plasticity; gravel, fine to coarse, basalt.		
																												2.10m: Shear vane: UTP on gravel.		
																												2.15m: Silty CLAY; light grey with reddish orange. Stiff to very stiff, moist, medium plasticity.		
																												3.20m: SILT, some clay; yellow streaked grey with some reddish orange. Stiff grading to Hard, moist to wet, low to medium plasticity.		
																												4.15m: Sandy SILT; light yellowish grey. Stiff to very stiff, wet to saturated, non-plastic, dilatant; sand, fine.		
																												4.50 - 4.60m: Yellow mottled orange.		
																												4.65m: SILT, minor clay and minor sand; bluish grey mottled orange. Hard, wet, low plasticity; sand, fine.		
																												5m: Target depth		
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.																														
Hole Depth 5m																														

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914404 mN 1777811 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	41.5m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GAAB CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: (NZTM2000)		5914657 mN 1777952 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 21/04/2026							
R.L.:		37m		METHOD: Hand auger				HOLE FINISHED: 21/04/2026							
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd							
								LOGGED BY: MJLE		CHECKED: SHGU					
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION							
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	R _L (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SLOPE SHEAR STRENGTH (c_u , kPa)	DESCRIPTION
					0 1 2 3 4 5 6 7 8 9										
Topsoil												M	H		0.00m: Clayey SILT, trace rootlets; dark brown speckled orange. Hard, moist, low plasticity.
						● UTP									0.30m: Silty CLAY; brown. Hard, moist, low to medium plasticity.
						● >206 kPa									
						● 162/74 kPa		36	1				VSt		0.80m: CLAY, minor silt; brown and grey mottled orange. Very stiff, moist, high plasticity.
						● 109/62 kPa									
						● 132/76 kPa									
						● 121/59 kPa									
						● 100/41 kPa		35	2			W			2.00 - 2.70m: Wet.
						● >206 kPa									2.40 - 2.70m: Hard.
						● UTP									
						● 197/59 kPa		34	3				VSt-H		2.70m: CLAY, minor silt; orange mottled grey. Hard grading to Very stiff, wet, medium plasticity.
						● 132/44 kPa									2.70 - 2.80m: Trace gravel; gravel, fine to medium.
						● UTP							VSt		3.35 - 3.40m: Trace gravel.
						● UTP									3.40m: CLAY; orange. Very stiff, wet, high plasticity.
						● UTP		33	4				H		3.60m: Sandy SILT, minor clay; bluish grey. Hard, wet, low plasticity; sand, fine.
						● UTP									
						● UTP									
						● UTP									
						● UTP		32	5						
															5m: Target depth
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 5 m blank.															
Hole Depth 5m															

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914657 mN 1777952 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	37m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs			LOCATION: 110 Jack Lachlan Drive, Beachlands			JOB No.: 2025000.0032																					
CO-ORDINATES: (NZTM2000)		5914303 mN 1777912 mE		DRILL TYPE: 70 mm Hand Auger			HOLE STARTED: 21/04/2026																				
R.L.:		46.5m		METHOD: Hand auger			HOLE FINISHED: 21/04/2026																				
DATUM:		NZVD2016					DRILLED BY: Geotechnics Ltd																				
							LOGGED BY: PEFE																				
							CHECKED: SHGU																				
GEOLOGICAL		METHOD OBSERVATIONS							ENGINEERING DESCRIPTION																		
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		21/04/2026 CORE RECOVERY (%)		METHOD		SCALA PENETROMETER (Blows/100mm)		TESTS		SAMPLES		RL (m)		DEPTH (m)		GRAPHIC LOG		WEATHERING CLASSIFICATION		MOISTURE CLASSIFICATION		CONSISTENCY / DENSITY CLASSIFICATION		ESTIMATED SHEAR STRENGTH (Su, kPa)		DESCRIPTION	
		21/04/2026		100		HA70						46						M		St						0.00m: Silty CLAY, some organics and rootlets less than 3mm diameter; dark brown mottled orange brown. Stiff, moist, medium plasticity.	
Topsoil								● 97/34 kPa																			
Fill		21/04/2026		100		HA70		● >235 kPa										W-S		H						0.50m: Silty CLAY, minor rootlets less than 1mm diameter; orange brown mottled light grey. Hard, wet to saturated, high plasticity.	
								● 151/17 kPa				1						S		VSt						0.90m: Silty CLAY; reddish brown and light grey. Very stiff, saturated, high plasticity.	
								● 201/84 kPa												VSt-H						1.20m: CLAY, some silt; light grey mottled orange brown. Very stiff to hard, saturated, high plasticity.	
								● 147/25 kPa				45														1.20 - 1.50m: Trace rootlets less than 1 mm.	
								● >235 kPa				2															
								● 164/84 kPa																		2.30m: Pink banding.	
								● 117/67 kPa				44															
								● 111/59 kPa																		2.80m: Becoming more silty.	
								● 92/50 kPa				3															
								● 97/50 kPa																			
								● 117/50 kPa				43								St-VSt						3.50m: SILT, some clay; light grey mottled orange brown and pink. Stiff to very stiff, saturated, non-plastic to low plasticity. Note: material logged from residual coating on hand auger blades. No recovery due to saturated material.	
								● 87/34 kPa				4															
								● 126/37 kPa																		4.20m: Silty CLAY; light grey mottled orange brown and pink. Very stiff grading to Hard, saturated, high plasticity.	
								● 142/50 kPa				42															
								● 201/50 kPa																		4.80m: Becoming less silty.	
												5														5m: Target depth	

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914303 mN 1777912 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	46.5m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: PEFE CHECKED: SHGU



0.00-5.00m



SHEET: 1 OF 1

TTNZ 20210729 - HandAugerLog - 11/06/2026 4:21:51 pm - Produced with Core-GS by GeRoc

Rev.: A	0.0-5.0m
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PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914476 mN 1778059 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	43m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: JALI
			CHECKED: SHGU



0.00-5.00m



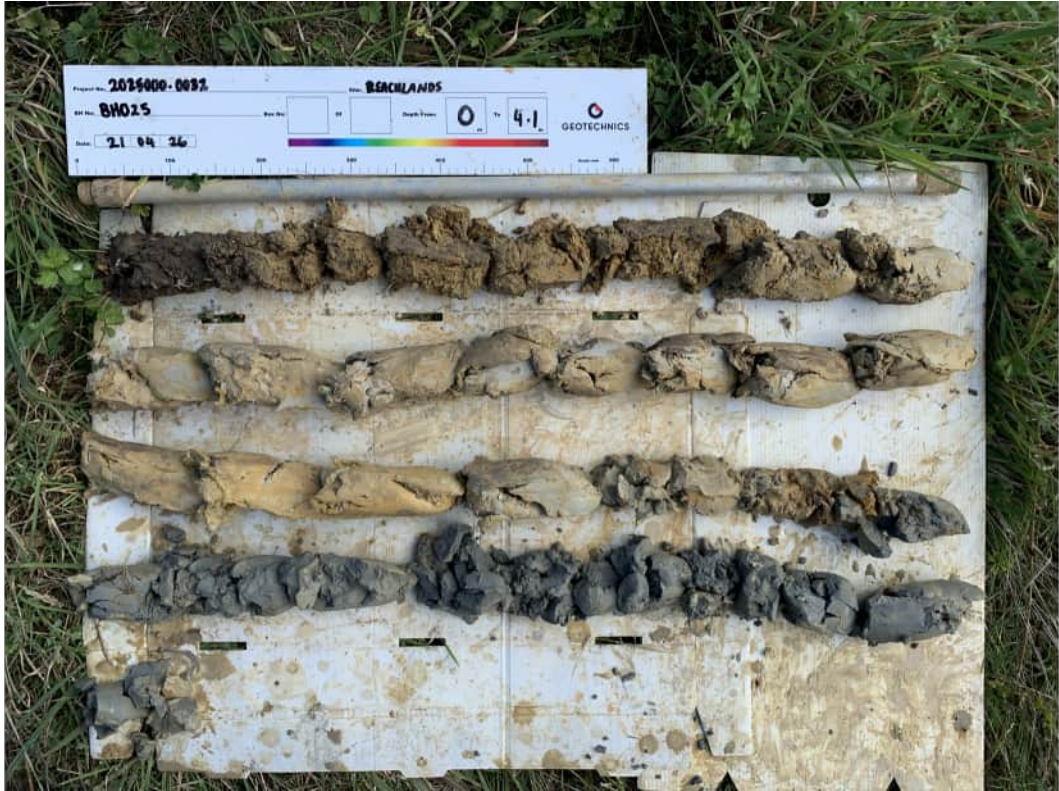
Hole Location: 110 Jack Lachlan Drive,
Beachlands

SHEET: 1 OF 1

TTNZ_20210729 - HandAugerLog - 11/06/2026 4:22:03 pm - Produced with Core-GS by GeRoc

Rev.: A

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914650 mN 1778222 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	25m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA CHECKED: SHGU



0.00-4.10m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032											
CO-ORDINATES: (NZTM2000)		5914139 mN 1778061 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 21/04/2026											
R.L.:		47m		METHOD: Hand auger				HOLE FINISHED: 21/04/2026											
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd											
								LOGGED BY: MJLE		CHECKED: SHGU									
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION											
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)		TESTS	SAMPLES	R _L (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (S _u kPa)	DESCRIPTION			
					0	1	2	3	4	5	6	7	8	9					
Topsoil		21/04/2026														0.00m: SILT, trace rootlets and trace clay; dark brown. Stiff, moist, non-plastic.			
East Coast Bays Formation																			0.15m: Clayey SILT; orange brown. Stiff, moist, low plasticity.
																			0.30m: Silty CLAY; orangish brown. Stiff to very stiff, moist, medium plasticity.
																			0.90m: CLAY, minor silt; brown mottled orange. Very stiff, moist, high plasticity.
																			1.40 - 2.10m: Grey mottled brown.
																			1.50 - 1.80m: Hard.
																			1.80 - 2.10m: Wet.
																			2.10m: Silty CLAY; grey mottled orange. Stiff, wet, medium plasticity.
																			3.60m: Silty CLAY; grey. Very stiff, wet, medium plasticity.
																			3.90 - 5.00m: Hard.
													</						

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914139 mN 1778061 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	47m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: (NZTM2000)		5914240 mN 1778103 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 21/04/2026							
R.L.:		50m		METHOD: Hand auger				HOLE FINISHED: 21/04/2026							
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd							
								LOGGED BY: PEFE		CHECKED: SHGU					
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION							
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (S_u , kPa)	DESCRIPTION
					0 1 2 3 4 5 6 7 8 9										
Topsoil						109/25 kPa						M	VSt		0.00m: SILT, some organics and rootlets less than 2mm in diameter and some clay and some sand; dark brown mottled orange brown. Very stiff, moist, non-plastic to low plasticity; sand, fine, quartz.
Fill						>235 kPa 1 @ 0.30m						D-M	H		0.30m: Clayey SILT, some organics; dark brown and mottled orange brown. Very stiff, moist, non-plastic to low plasticity; sand, fine, quartz. Occasional rootlets less than 1mm diameter.
						>235 kPa									
						>235 kPa									1.20m: Clayey SILT; orange brown mottled reddish brown. Hard, moist, non-plastic to low plasticity.
						>235 kPa									
						>235 kPa									2.00m: Clayey SILT; light grey mottled orange brown. Hard, moist, non-plastic to low plasticity.
						>235 kPa									
						>235 kPa									
						>235 kPa									
						176/109 kPa							VSt		2.50m: CLAY, minor silt; light grey mottled orange brown and pink. Very stiff, moist, high plasticity.
						126/84 kPa									
						131/84 kPa									
						121/75 kPa									
						101/50 kPa									
						92/67 kPa							St		4.00m: Silty CLAY; light grey mottled orange brown and pink. Stiff, moist, high plasticity.
						84/59 kPa									
						80/54 kPa							W		4.50 - 5.00m: Wet.
						75/47 kPa									

HAND AUGER PHOTOS

BOREHOLE No.: **BH027**

Hole Location: 110 Jack Lachlan Drive,
Beachlands

SHEET: 1 OF 1

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914240 mN 1778103 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	50m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: PEFE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032													
CO-ORDINATES: (NZTM2000)		5914274 mN 1778122 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 22/04/2026													
R.L.:		50m		METHOD: Hand auger				HOLE FINISHED: 22/04/2026													
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd													
								LOGGED BY: PEFE		CHECKED: SHGU											
GEOLOGICAL	METHOD OBSERVATIONS								ENGINEERING DESCRIPTION												
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blower 100mm)				TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (S _u kPa)				DESCRIPTION	
				0 1 2 3 4 5 6 7 8 9												12 6 3 1.5 0.75 0.375 0.19 0.1 0.05 0.025					
Topsoil								● 104/34 kPa						M	VSI					0.00m: SILT, some organics and rootlets less than 2 mm diameter and some clay; dark brown. Very stiff, moist, non-plastic to low plasticity.	
Fill								● >235 kPa							H					0.30m: Silty CLAY, some organics and rootlets less than 1 mm diameter; orange brown mottled light grey and dark brown. Hard, moist, high plasticity.	
								● >235 kPa									0.80m: Clayey SILT, some organics and rootlets less than 1 mm diameter; orange brown mottled reddish brown light grey and dark brown. Hard, moist, medium to high plasticity.				
								● >235 kPa									1.00m: Silty CLAY, some organics; orange brown mottled reddish brown light grey and dark brown. Hard, moist, high plasticity.				
								● >235 kPa													
East Coast Bays Formation								● 109/34 kPa						W	VSI					1.50m: CLAY, some silt; light grey mottled orange brown. Very stiff, wet, high plasticity.	
								● 168/25 kPa													
								● 168/34 kPa													
								● 126/17 kPa													
								● 117/34 kPa													
								● 142/75 kPa													
								● 109/50 kPa													
								● 117/37 kPa													
								● 87/34 kPa													
								● 134/50 kPa													
								● 210/59 kPa							S	H					4.50m: SILT, some clay and some sand; bluish grey. Hard, saturated, non-plastic to low plasticity; sand, fine, quartz.
								● >235 kPa													
								● >235 kPa													
								● >235 kPa										5m: Target depth			
COMMENTS: Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 5 m blank.																					
Hole Depth 5m																					

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914274 mN 1778122 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 22/04/2026
R.L.:	50m	METHOD: Hand auger	HOLE FINISHED: 22/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: PEFE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914197 mN 1778045 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 21/04/2026
R.L.:	47m	METHOD: Hand auger	HOLE FINISHED: 21/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: JALI
			CHECKED: SHGU



0.00-5.00m



SHEET: 1 OF 1

TTNZ 20210729 - HandAugerLog - 11/06/2026 4:22:46 pm - Produced with Core-GS by GeRoc

0.5 0m

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914788 mN 1778369 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 22/04/2026
R.L.:	27.5m	METHOD: Hand auger	HOLE FINISHED: 22/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032																														
CO-ORDINATES: (NZTM2000)		5914706 mN 1778493 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 22/04/2026																														
R.L.:		32m		METHOD: Hand auger				HOLE FINISHED: 22/04/2026																														
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd		LOGGED BY: PEFE		CHECKED: SHGU																										
GEOLOGICAL		METHOD OBSERVATIONS								ENGINEERING DESCRIPTION																												
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)				TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (Su, kPa)				DESCRIPTION																	
					0	1	2	3	4	5	6	7	8	9				0.5	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60	70	80	90	100	
Topsoil																M	St																					0.00m: Clayey SILT, some organics and rootlets less than 2 mm diameter; dark brown. Stiff, moist, non-plastic to low plasticity.
Fill																	H																				0.20m: Silty CLAY, some organics and rootlets less than 1 mm diameter; orange brown mottled dark brown. Hard, moist, medium plasticity.	
																																						0.80m: CLAY, some silt; light grey mottled orange brown. Hard, moist, high plasticity.
																																						2.00m: Becoming more silty. 2.10 - 2.60m: Very stiff.
																																						2.60m: Silty CLAY; light grey mottled orange brown. Very stiff, moist, medium to high plasticity.
East Coast Bays Formation																																						3.60m: Clayey SILT; light grey mottled orange brown. Very stiff, wet, non-plastic to low plasticity. 3.70m: No recovery due to saturation.
																																						4.00m: Silty CLAY; light grey mottled orange brown. Hard, saturated, high plasticity.
																																						4.60m: Silty CLAY, minor sand; light grey mottled orange brown. Hard, saturated, medium to high plasticity; sand, fine, quartz.
																																						5m: Target depth
COMMENTS:																																						
Hole Depth 5m																																						

COMMENTS:
Hole Depth
5m

Scale 1:30

Rev.: A

HAND AUGER PHOTOS

BOREHOLE No.: **BH031**

Hole Location: 110 Jack Lachlan Drive,
Beachlands

SHEET: 1 OF 1

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914706 mN 1778493 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 22/04/2026
R.L.:	32m	METHOD: Hand auger	HOLE FINISHED: 22/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: PEFE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032																																																																																																																																																																																																																																																																																																																																																																																																																													
CO-ORDINATES: (NZTM2000)		5914676 mN 1779230 mE		DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 22/04/2026																																																																																																																																																																																																																																																																																																																																																																																																																													
R.L.:		53m		METHOD: Hand auger				HOLE FINISHED: 22/04/2026																																																																																																																																																																																																																																																																																																																																																																																																																													
DATUM:		NZVD2016						DRILLED BY: Geotechnics Ltd		LOGGED BY: GRVA																																																																																																																																																																																																																																																																																																																																																																																																																											
								CHECKED: SHGU																																																																																																																																																																																																																																																																																																																																																																																																																													
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION																																																																																																																																																																																																																																																																																																																																																																																																																													
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SILT SHEAR LENGTH (Su, kPa)	DESCRIPTION																																																																																																																																																																																																																																																																																																																																																																																																																						
Topsoil		100	HA 70	0 1 2 3 4 5 6 7 8 9		● >204 kPa		52	1			M	VSt		0.00m: SILT, minor clay, trace roots; black. Very stiff to hard, moist, medium plasticity.																																																																																																																																																																																																																																																																																																																																																																																																																						
Fill															0.10m: SILT, some clay; brown speckled black mottled orange. Hard, moist, medium plasticity.																																																																																																																																																																																																																																																																																																																																																																																																																						
															0.90 - 1.10m: Very stiff.																																																																																																																																																																																																																																																																																																																																																																																																																						
															1.10m: SILT, minor organics and trace rootlets and minor clay; blackish brown mottled orange. Stiff, moist, medium plasticity.																																																																																																																																																																																																																																																																																																																																																																																																																						
Topsoil															East Coast Bays Formation		● 95/32 kPa		51	2			H			1.30m: CLAY, minor silt; brown mottled orange. Very stiff, moist, high plasticity.																																																																																																																																																																																																																																																																																																																																																																																																											
																										1.70m: CLAY; light grey mottled orange. Very stiff to hard, moist, high plasticity.																																																																																																																																																																																																																																																																																																																																																																																																											
																										2.50m: Clayey SILT, minor sand; light grey streaked light pink. Very stiff to hard, moist, medium plasticity.																																																																																																																																																																																																																																																																																																																																																																																																											
																										3.90m: SILT, some clay; orange slightly mottled light grey. Hard, moist, low plasticity, friable.																																																																																																																																																																																																																																																																																																																																																																																																											
																										4.00m: Clayey SILT, minor sand; light grey streaked light pink. Hard, moist, medium plasticity; sand, fine.																																																																																																																																																																																																																																																																																																																																																																																																											
																										4.20m: Sandy SILT, minor clay; light grey mottled light pink. Very stiff to hard, moist to wet, low plasticity; sand, fine.																																																																																																																																																																																																																																																																																																																																																																																																											
																												● 132/70 kPa		50	3			VSt																																																																																																																																																																																																																																																																																																																																																																																																			
																																					1.92/102 kPa		49	4		H																																																																																																																																																																																																																																																																																																																																																																																											
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COMMENTS: Piezometer installed: No Toby, 32 mm dia. 0.5 m stick-up agl, 0 - 3 m blank, 3 - 5 m screen.

Hole Depth
5m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914676 mN 1779230 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 22/04/2026
R.L.:	53m	METHOD: Hand auger	HOLE FINISHED: 22/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: GRVA CHECKED: SHGU



0.00-5.00m



Hole Location: 110 Jack Lachlan Drive,
Beachlands

SHEET: 1 OF 1

TTNZ_20210729 - HandAugerLog - 11/06/2026 4:23:21 pm - Produced with Core-GS by GeRoc

Rev: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands		JOB No.: 2025000.0032	
CO-ORDINATES: 5914571 mN (NZTM2000) 1779219 mE		DRILL TYPE: 70 mm Hand Auger		HOLE STARTED: 22/04/2026	
R.L.: 51m		METHOD: Hand auger		HOLE FINISHED: 22/04/2026	
DATUM: NZVD2016				DRILLED BY: Geotechnics Ltd	
				LOGGED BY: MJLE	
				CHECKED: SHGU	



0.00-2.30m

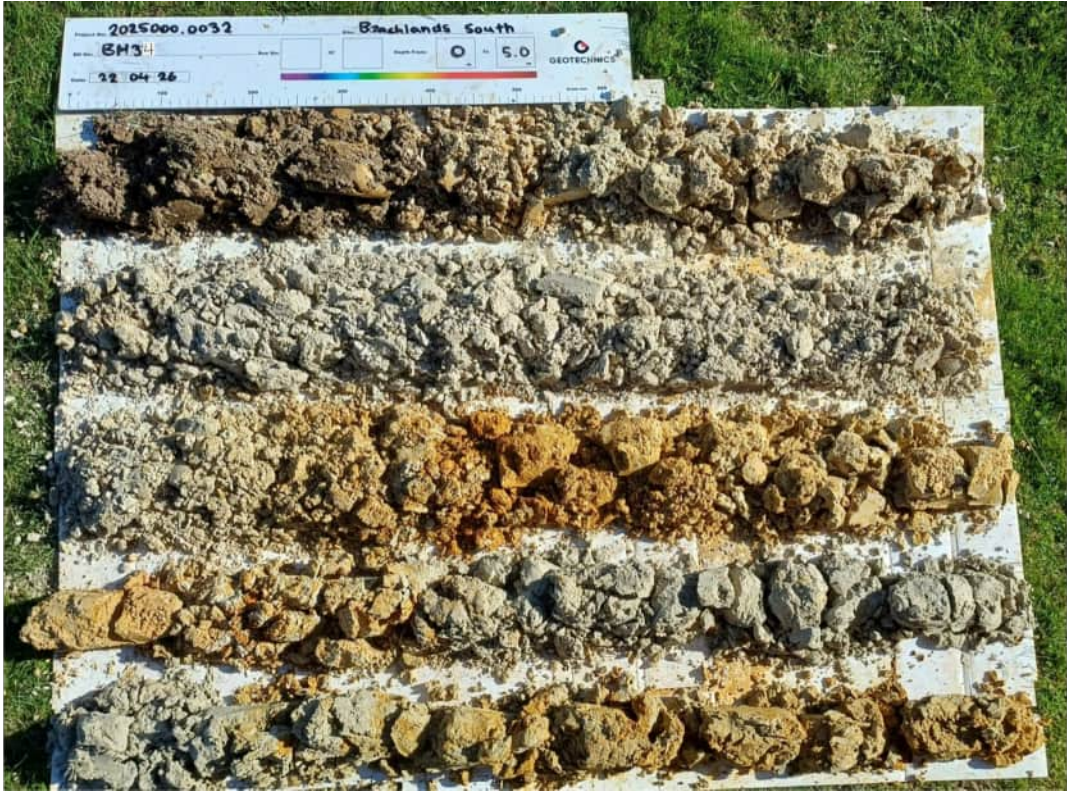


SHEET: 1 OF 1

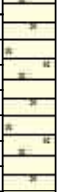
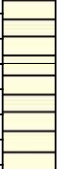
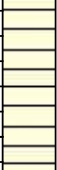
TTNZ 20210729 - HandAugerLog - 11/06/2026 4:23:31 pm - Produced with Core-GS by GeRoc

Rev : A	0.0-5.0m
---------	----------

PROJECT: Beachlands South HAS and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914509 mN 1779145 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 22/04/2026
R.L.:	48m	METHOD: Hand auger	HOLE FINISHED: 22/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

PROJECT: Beachlands South HAs and CPTs				LOCATION: 110 Jack Lachlan Drive, Beachlands				JOB No.: 2025000.0032							
CO-ORDINATES: 5914458 mN (NZTM2000) 1779257 mE				DRILL TYPE: 70 mm Hand Auger				HOLE STARTED: 22/04/2026							
R.L.: 55m				METHOD: Hand auger				HOLE FINISHED: 22/04/2026							
DATUM: NZVD2016								DRILLED BY: Geotechnics Ltd							
								LOGGED BY: MJLE CHECKED: SHGU							
GEOLOGICAL		METHOD OBSERVATIONS						ENGINEERING DESCRIPTION							
STRATIGRAPHY / ENG GEOLOGICAL UNIT / ADDITIONAL OBSERVATIONS		WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blow/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	WEATHERING CLASSIFICATION	MOISTURE CLASSIFICATION	CONSISTENCY / DENSITY CLASSIFICATION	ESTIMATED SOIL SHEAR STRENGTH (S_u , kPa)	DESCRIPTION
Fill	22/04/2026			HA	0	118/29 kPa		54	1		M	VST-H		0.00m: Clayey SILT; brown speckled light brown. Very stiff to hard, moist, low to medium plasticity.	
					1	>206 kPa								0.60m: SILT, trace clay; grey speckled light brown. Very stiff to hard, moist, non-plastic.	
Alluvial Deposits	22/04/2026			HA	2	>206 kPa		53	2		W	St-Vst		1.20m: Clayey SILT; brown and orange brown mottled grey. Very stiff, moist, low plasticity.	
					3	123/50 kPa								1.40m: Silty CLAY; grey mottled orange. Stiff to very stiff, wet, medium plasticity.	
East Coast Bays Formation	22/04/2026			HA	4	103/44 kPa		52	3			VST		2.05 - 2.15m: Thick root.	
					5	74/106 kPa								2.20m: CLAY, some organics; black and brown. Very stiff, wet, medium plasticity.	
					6	121/47 kPa								2.50m: CLAY; grey mottled orange. Very stiff, wet, high plasticity.	
					7	176/29 kPa									
					8	162/68 kPa									
					9	132/74 kPa									
					10	132/74 kPa									
					11	176/82 kPa									
					12	176/79 kPa									
					13	173/65 kPa									
	22/04/2026			HA	14	147/76 kPa		51	4					4.10m: CLAY, some silt; grey and orange. Very stiff, wet, medium plasticity.	
					15	150/71 kPa									
					16										
								50	5					5m: Target depth	

COMMENTS:
Hole Depth
5m

Scale 1:30

Rev.: A

PROJECT: Beachlands South HAs and CPTs		LOCATION: 110 Jack Lachlan Drive, Beachlands	JOB No.: 2025000.0032
CO-ORDINATES: (NZTM2000)	5914458 mN 1779257 mE	DRILL TYPE: 70 mm Hand Auger	HOLE STARTED: 22/04/2026
R.L.:	55m	METHOD: Hand auger	HOLE FINISHED: 22/04/2026
DATUM:	NZVD2016		DRILLED BY: Geotechnics Ltd
			LOGGED BY: MJLE CHECKED: SHGU



0.00-5.00m

Standpipe Piezometer Installation Records

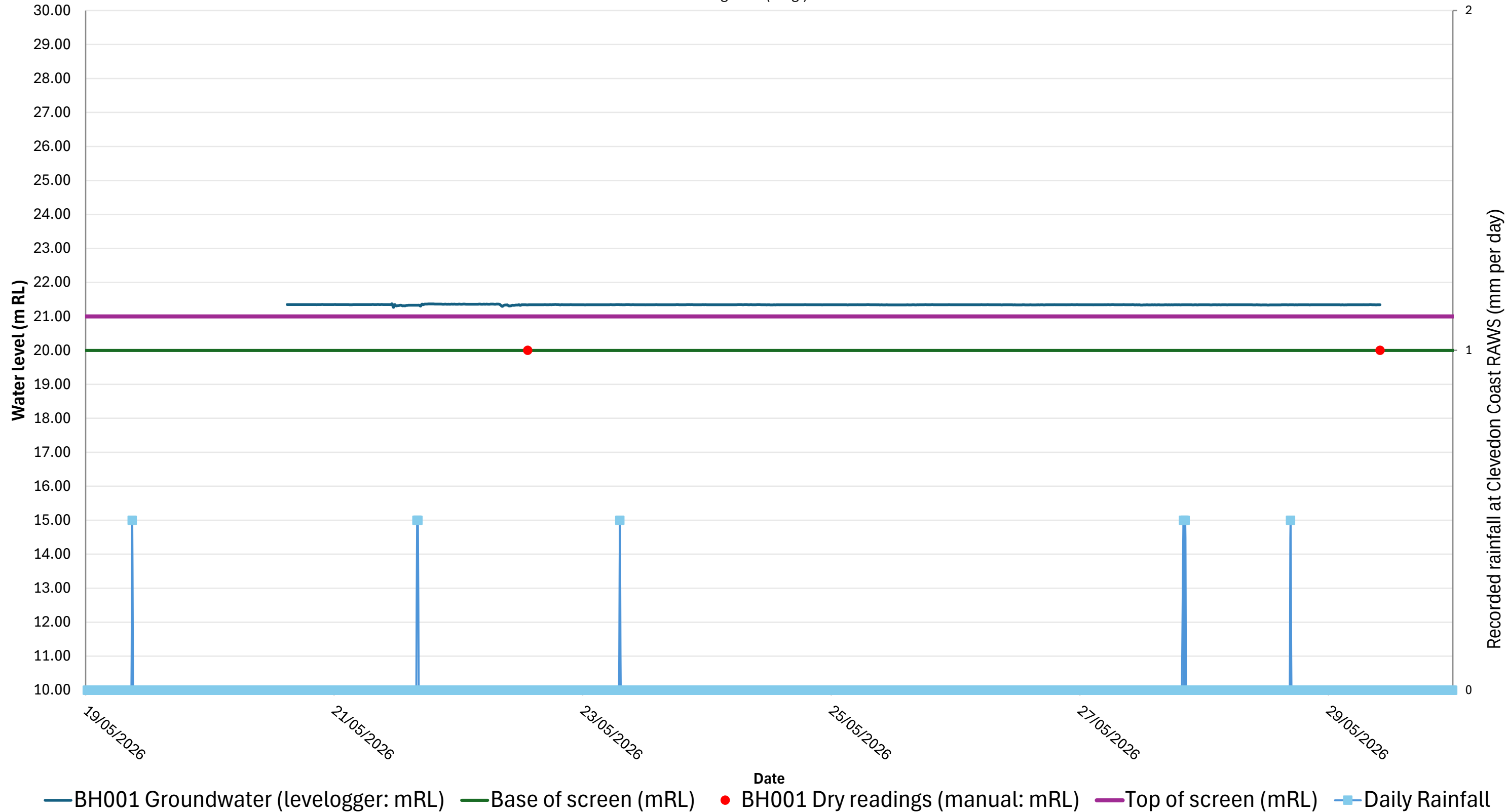
HA_ID	HoleDepth(m)	Remarks	StartDate	EndDate	Machine	LoggedBy	LoggedDate
BH001	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 4 m blank, 4 - 5 m screen.	14/04/2026	14/04/2026	70 mm Hand Auger	MJLE	14/04/2026
BH002	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 1.5 m blank, 1.5 - 3.5 m screen (cased shallower due to hole collapse).	14/04/2026	15/04/2026	70 mm Hand Auger	JOKO	14/04/2026
BH003	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen. Poor recovery from 3.4 m due to saturation of material.	14/04/2026	15/04/2026	70 mm Hand Auger	GRVA	14/04/2026
BH005	3.9	Piezometer installed: Flush toby, 32 mm dia. 0 - 1.5 m blank, 1.5 - 3.5 m screen.	15/04/2026	15/04/2026	70 mm Hand Auger	MJLE	15/04/2026
BH006	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.	15/04/2026	15/04/2026	70 mm Hand Auger	GAAB	15/04/2026
BH007	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.	15/04/2026	15/04/2026	70 mm Hand Auger	GRVA	15/04/2026
BH008	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screen, 3 - 5 m blank.	15/04/2026	15/04/2026	70 mm Hand Auger	MJLE	15/04/2026
BH009	4	Piezometer installed: No Toby, 32 mm dia. 0.7 m stick- up agl, 0 - 1 m blank, 1 - 3 m screen, 3 - 4 blank.	16/04/2026	16/04/2026	70 mm Hand Auger	MJLE	16/04/2026
BH011	4.3	Piezometer installed: Flush toby, 32 mm dia. 0 - 2.3 m blank, 2.3 - 4.3 m screened.	16/04/2026	16/04/2026	70 mm Hand Auger	MJLE	16/04/2026
BH015	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 2 m blank, 2 - 4 m screened, 4 - 5 m blank.	20/04/2026	20/04/2026	70 mm Hand Auger	MJLE	20/04/2026
BH017	3.7	Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 3.3 m blank.	20/04/2026	20/04/2026	70 mm Hand Auger	JOKO	20/04/2026
BH018	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.	20/04/2026	20/04/2026	70 mm Hand Auger	MJLE	20/04/2026
BH020	5	Piezometer installed: No Toby, 32 mm dia. 0.3 m stick- up agl, 0 - 2 m blank, 2 - 4 m screen, 4 - 5 m blank.	20/04/2026	20/04/2026	70 mm Hand Auger	GRVA	20/04/2026
BH021	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 3 m blank, 3 - 5 m screen.	21/04/2026	21/04/2026	70 mm Hand Auger	GAAB	21/04/2026
BH022	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 5 m blank.	21/04/2026	21/04/2026	70 mm Hand Auger	MJLE	21/04/2026
BH025	4.1	Piezometer installed: No toby, 32 mm dia. 0.3 stick-up agl, 0 - 1 m blank, 1 - 3 m screened, 3 - 4.1 m blank.	21/04/2026	21/04/2026	70 mm Hand Auger	GRVA	21/04/2026
BH026	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 2.5 m blank, 2.5 - 4.5 m screened, 4.5 - 5 m blank.	21/04/2026	21/04/2026	70 mm Hand Auger	MJLE	21/04/2026
BH028	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 5 m blank.	22/04/2026	22/04/2026	70 mm Hand Auger	PEFE	22/04/2026
BH030	5	Piezometer installed: No Toby, 32 mm dia. 0.3 m stick- up agl, 0 - 3 m blank, 3 - 5 m screen.	22/04/2026	22/04/2026	70 mm Hand Auger	GRVA	22/04/2026
BH032	5	Piezometer installed: No Toby, 32 mm dia. 0.5 m stick- up agl, 0 - 3 m blank, 3 - 5 m screen.	22/04/2026	22/04/2026	70 mm Hand Auger	GRVA	22/04/2026
BH034	5	Piezometer installed: Flush toby, 32 mm dia. 0 - 1 m blank, 1 - 3 m screened, 3 - 5 m blank.	22/04/2026	22/04/2026	70 mm Hand Auger	MJLE	22/04/2026

Beachlands South - Balance Live-Zone – TT 1014358.3200

BH001 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 25

Screening Zone (mbgl): 4.00 - 5.00

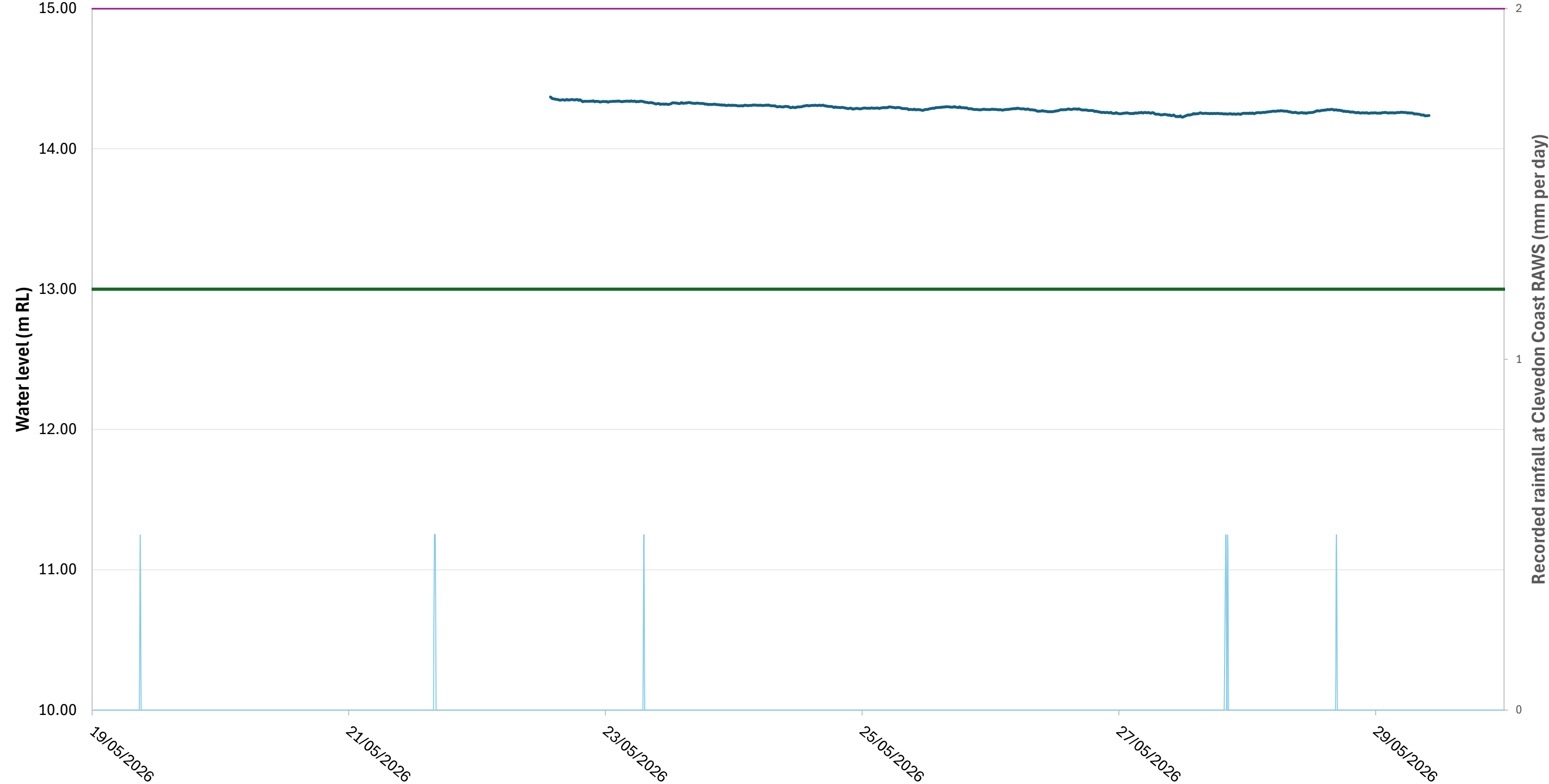


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH002 (19/05/2026 - 30/05/2026)

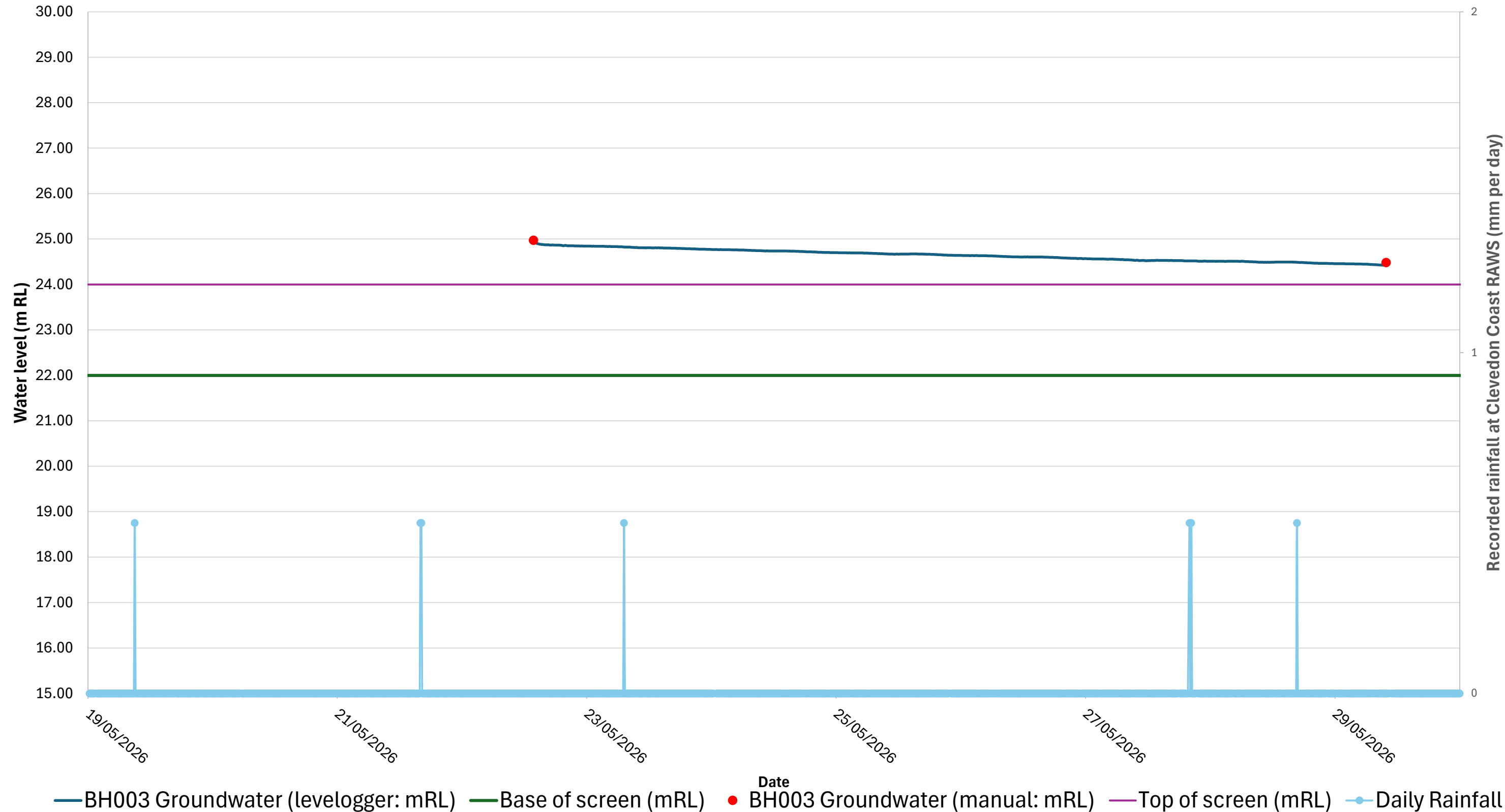
Ground Elevation (m RL, NZVD2016): 16.5

Screening Zone (mbgl): 1.50 - 3.50



Beachlands South - Balance Live-Zone – TT 1014358.3200
BH003 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 27
Screening Zone (mbgl): 3.00 - 5.00

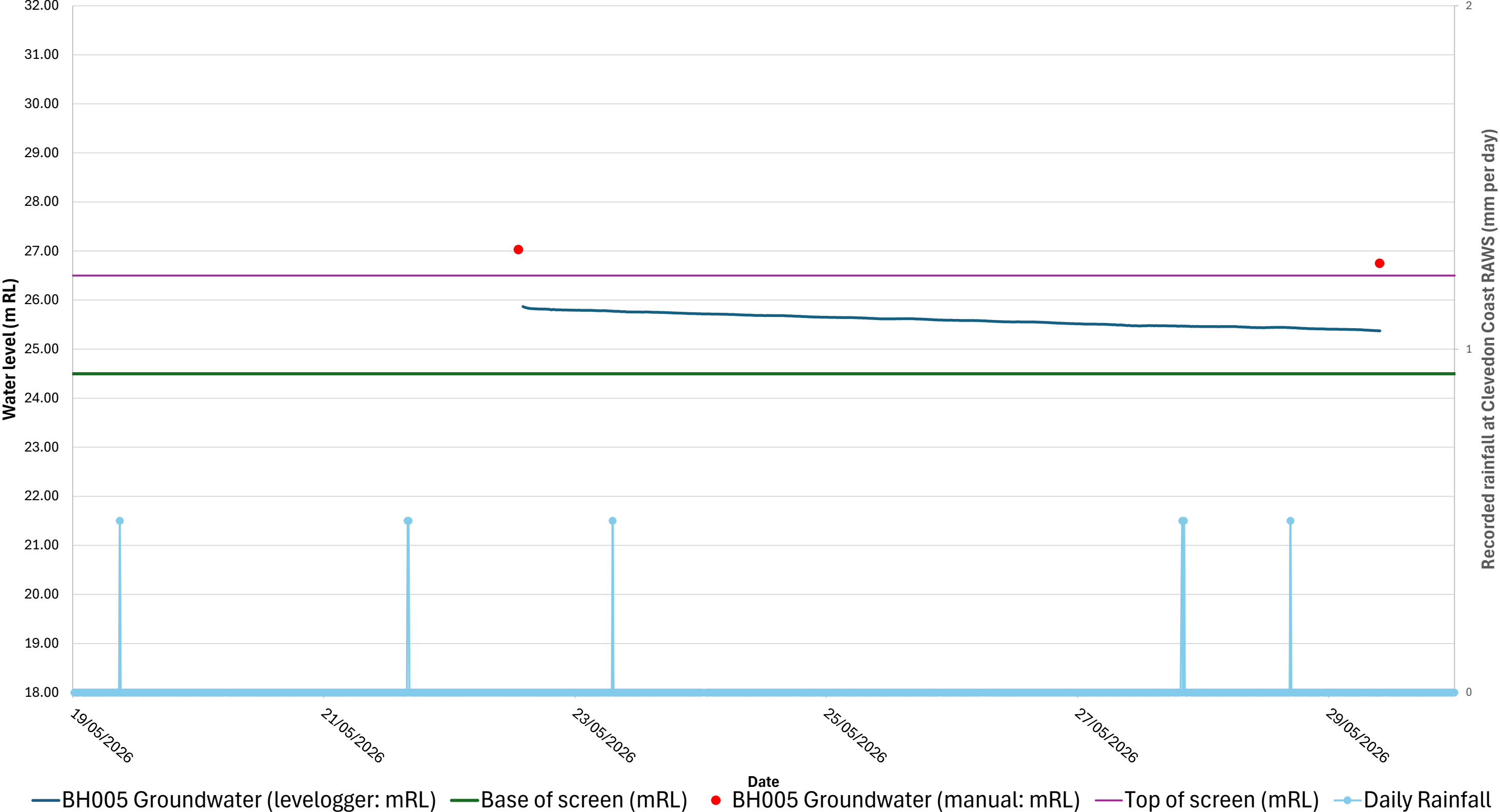


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH005 (19/05/2026 - 30/05/2026)

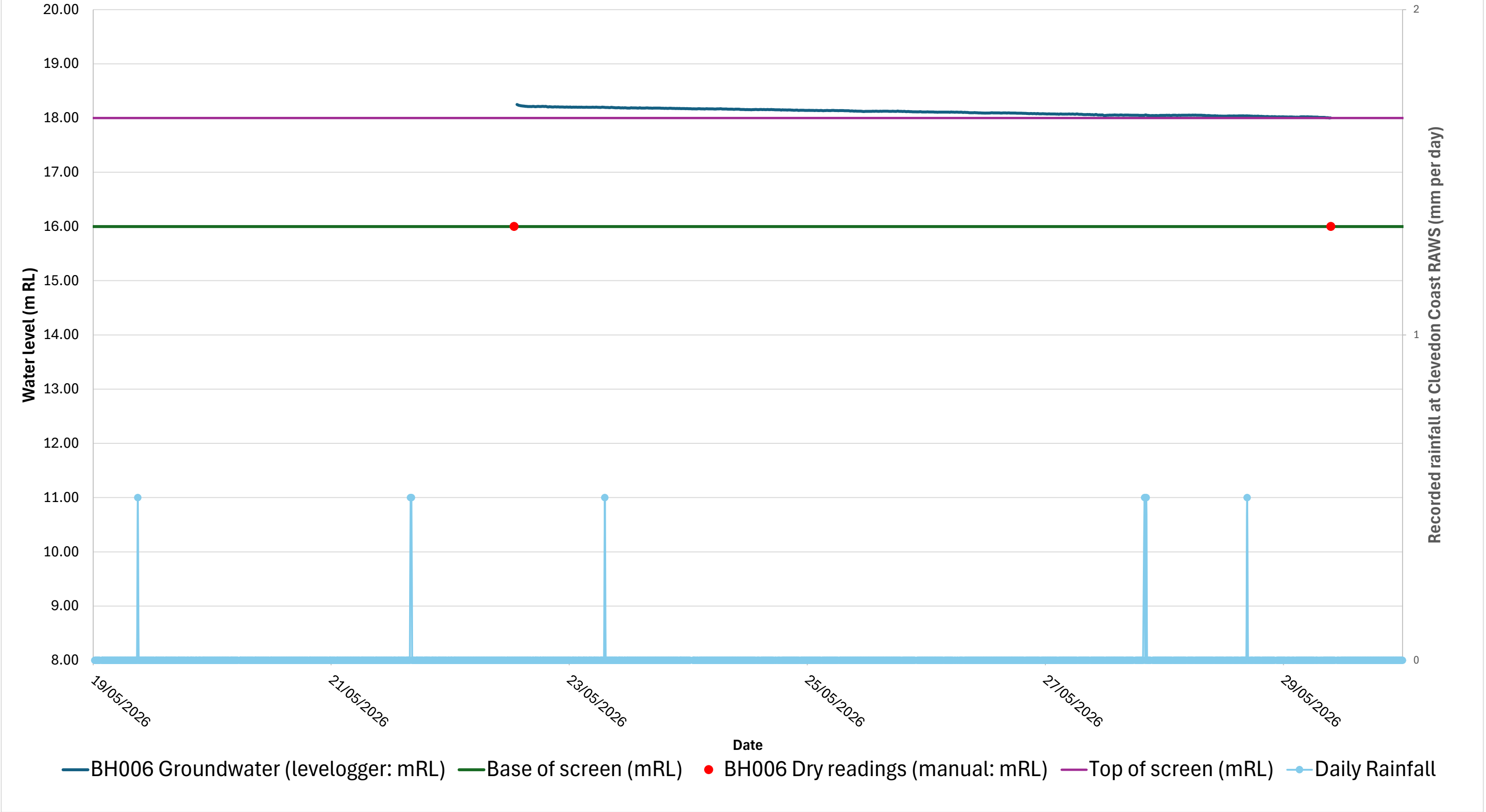
Ground Elevation (m RL, NZVD2016): 28

Screening Zone (mbgl): 1.50 - 3.50



Beachlands South - Balance Live-Zone – TT 1014358.3200
BH006 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 21
Screening Zone (mbgl): 3.00 - 5.00
Levellogger installed, dry piezometer

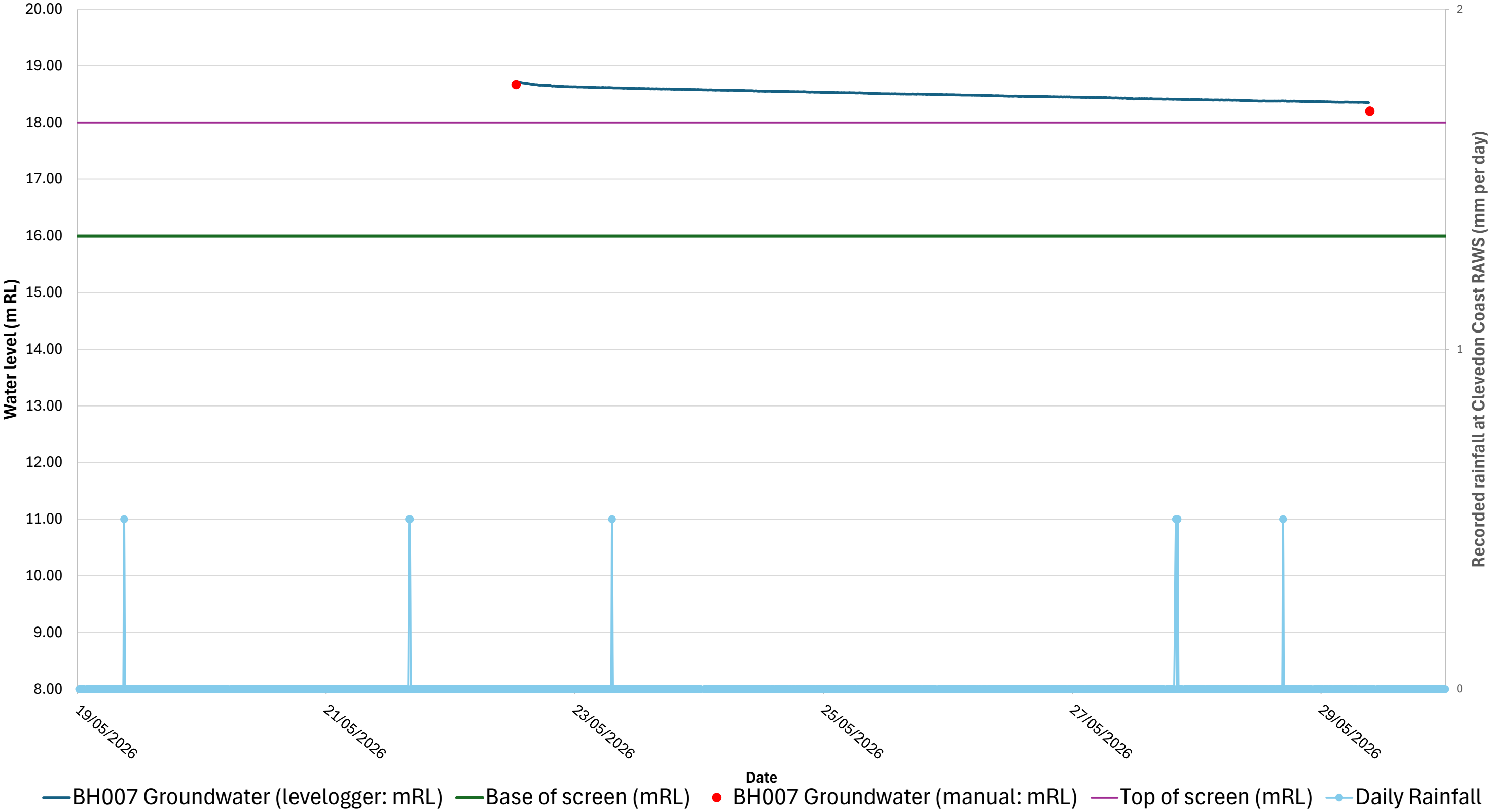


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH007 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 21

Screening Zone (mbgl): 3.00 - 5.00

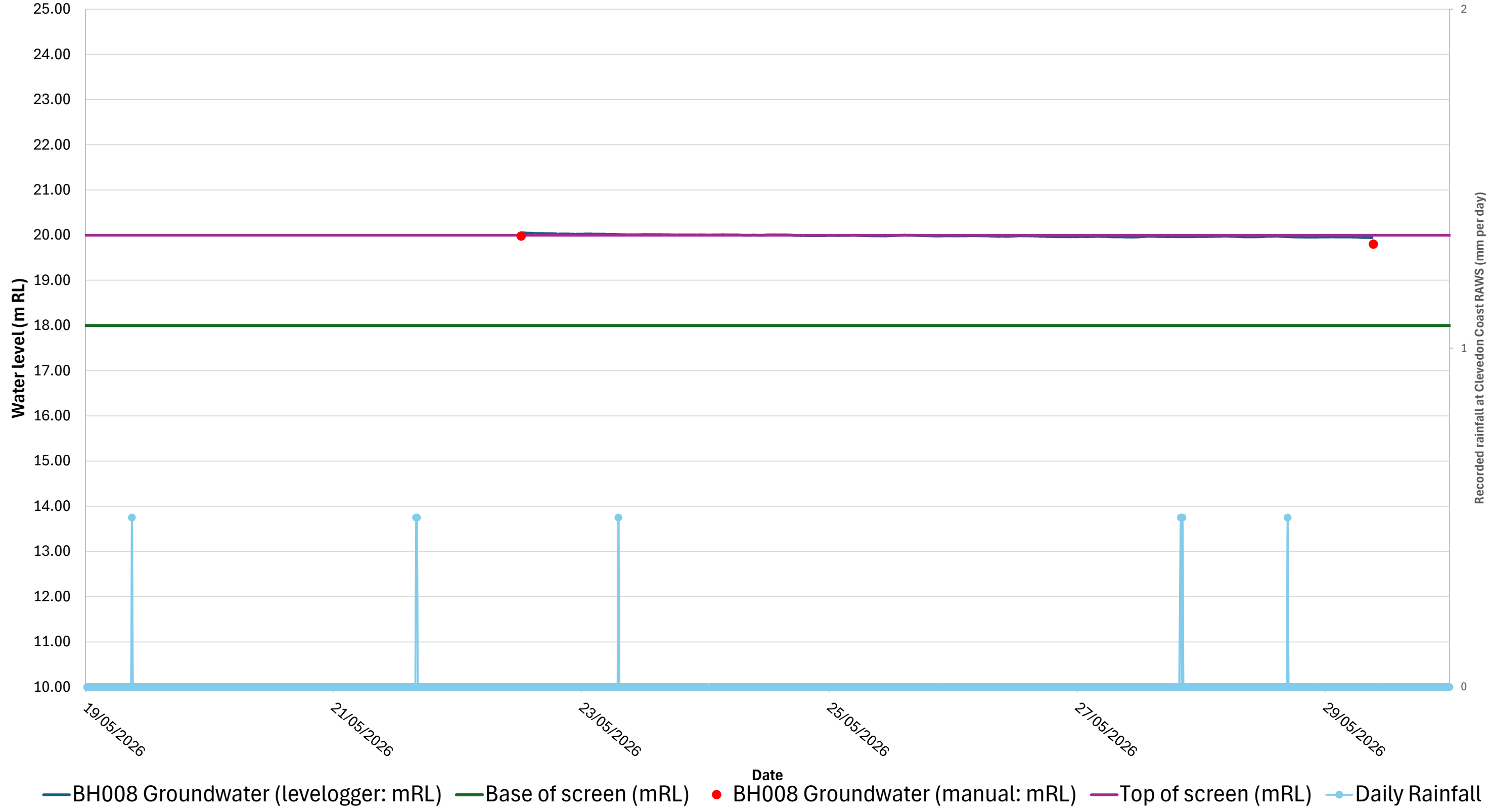


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH008 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 21

Screening Zone (mbgl): 1.00 - 3.00

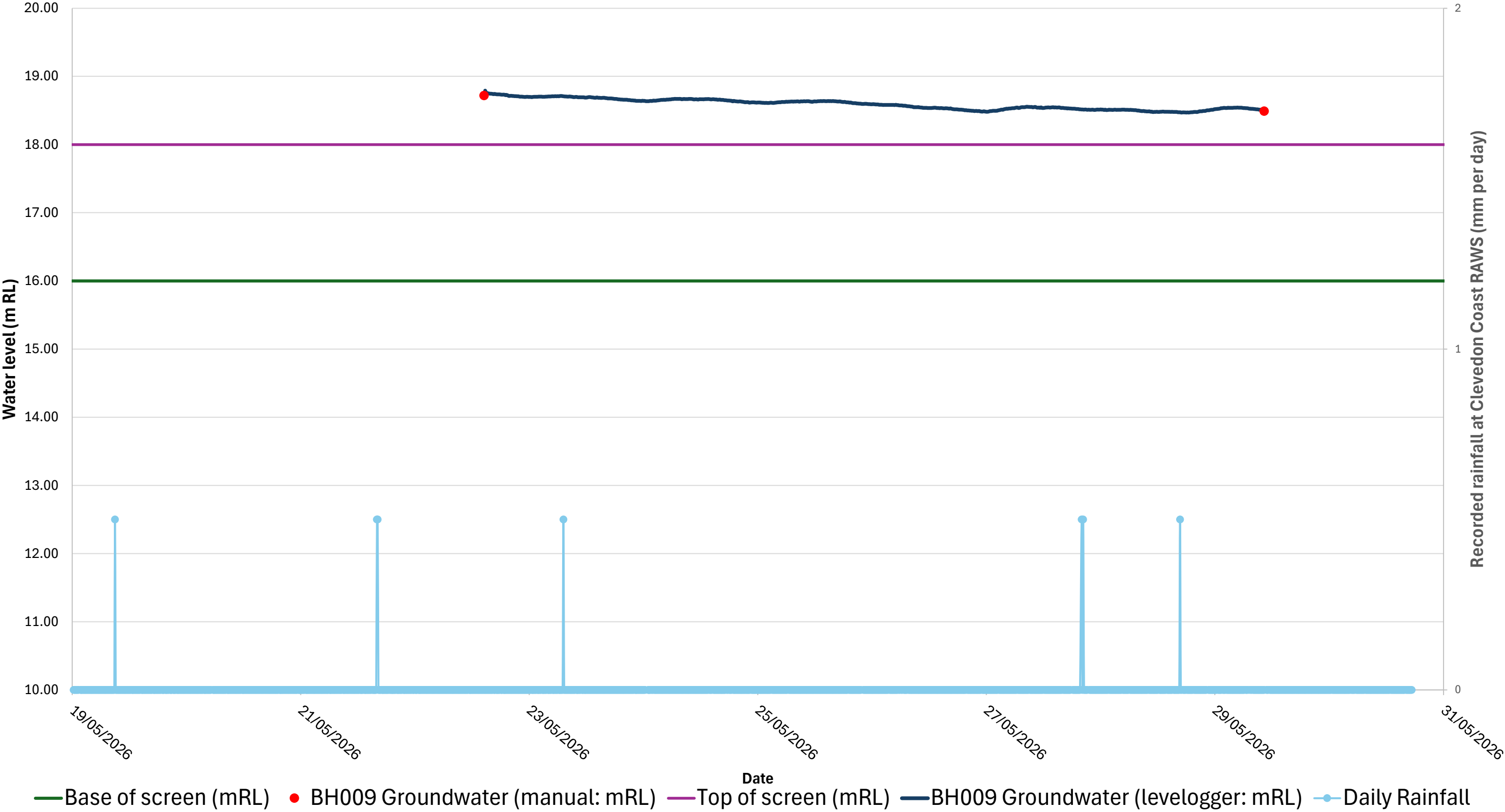


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH009 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 19

Screening Zone (mbgl): 1.00 - 3.00

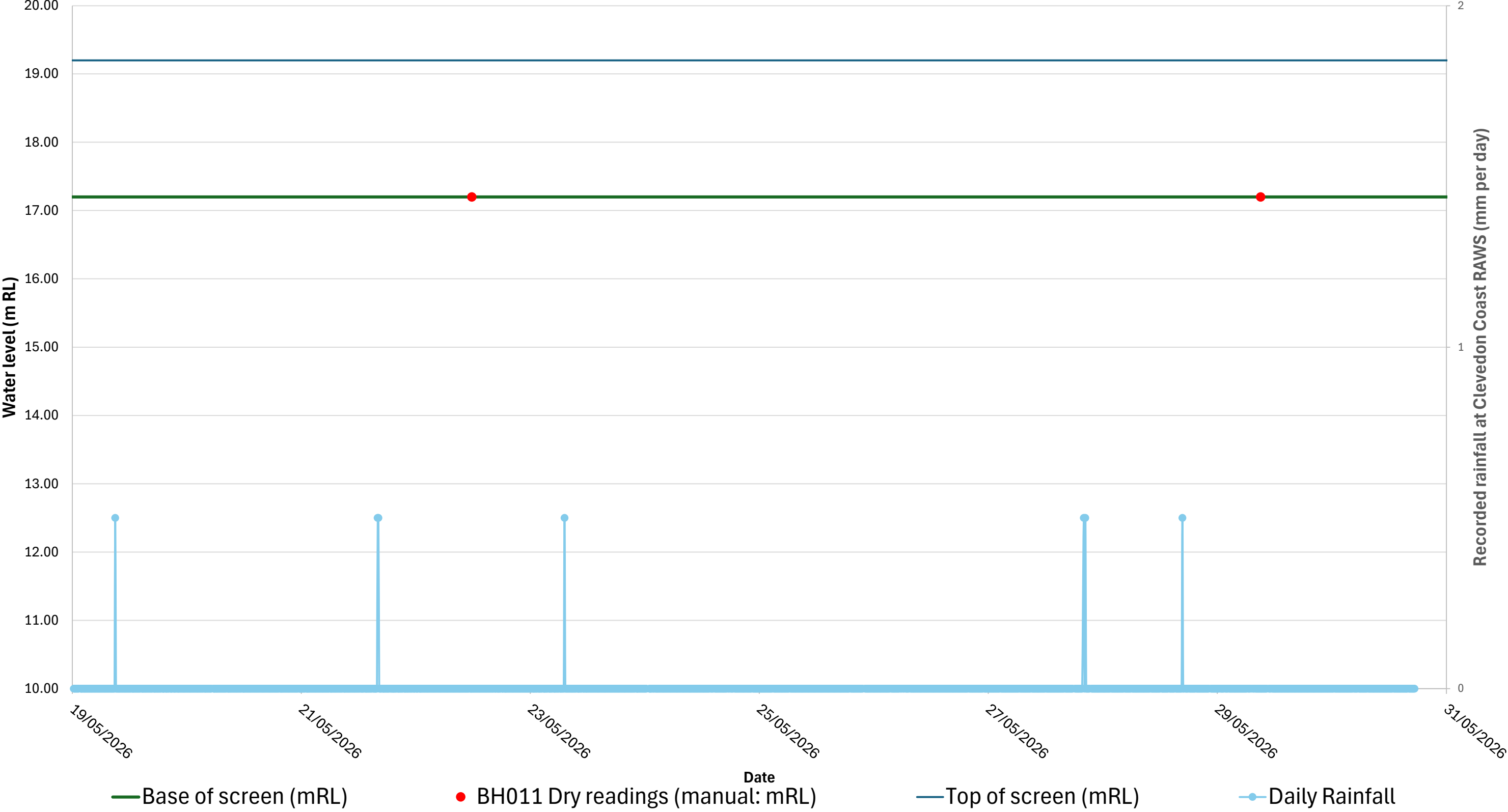


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH011 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 21.5

Screening Zone (mbgl): 2.30 - 4.30

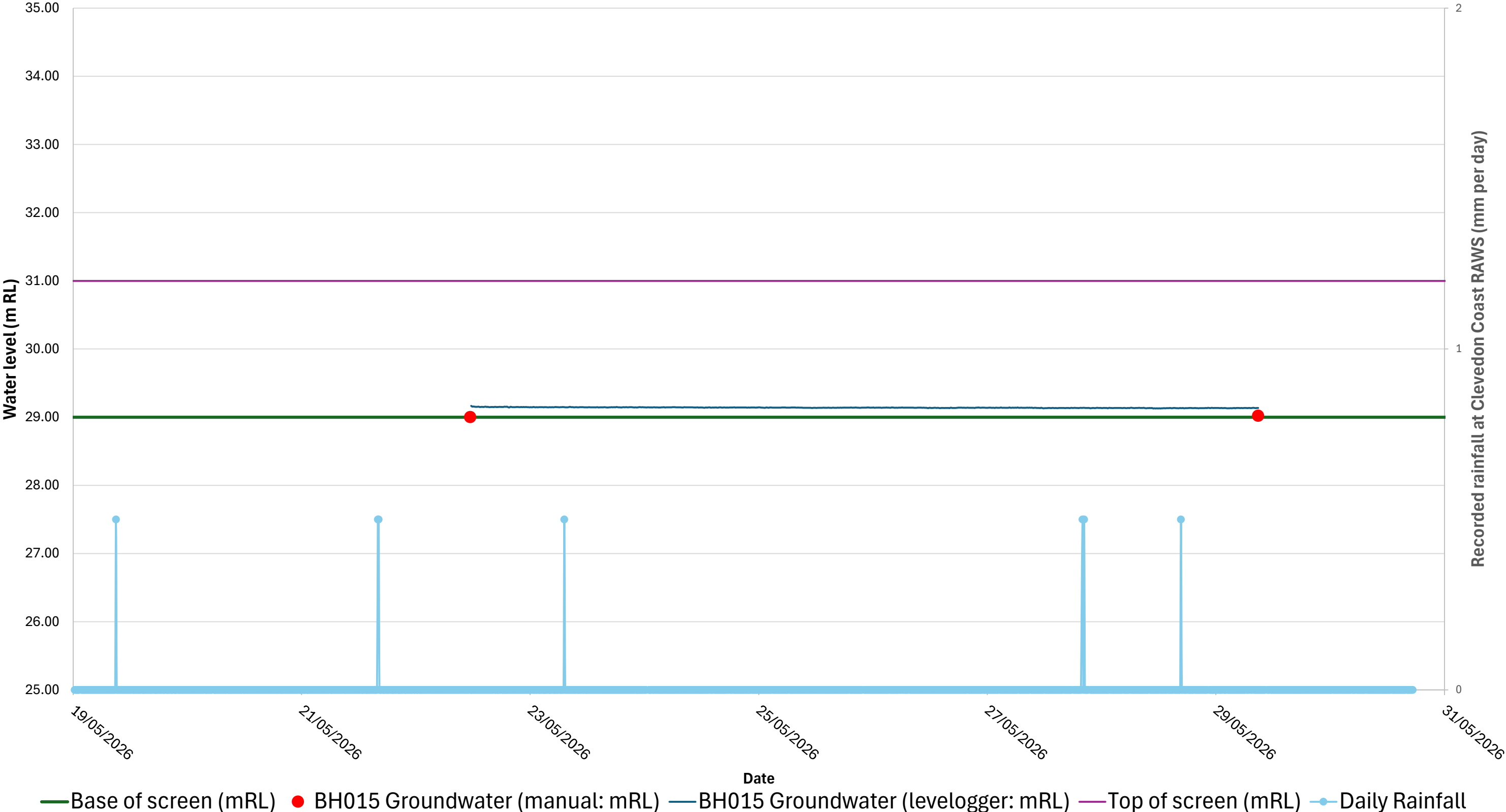


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH015 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 33

Screening Zone (mbgl): 2.00 - 4.00

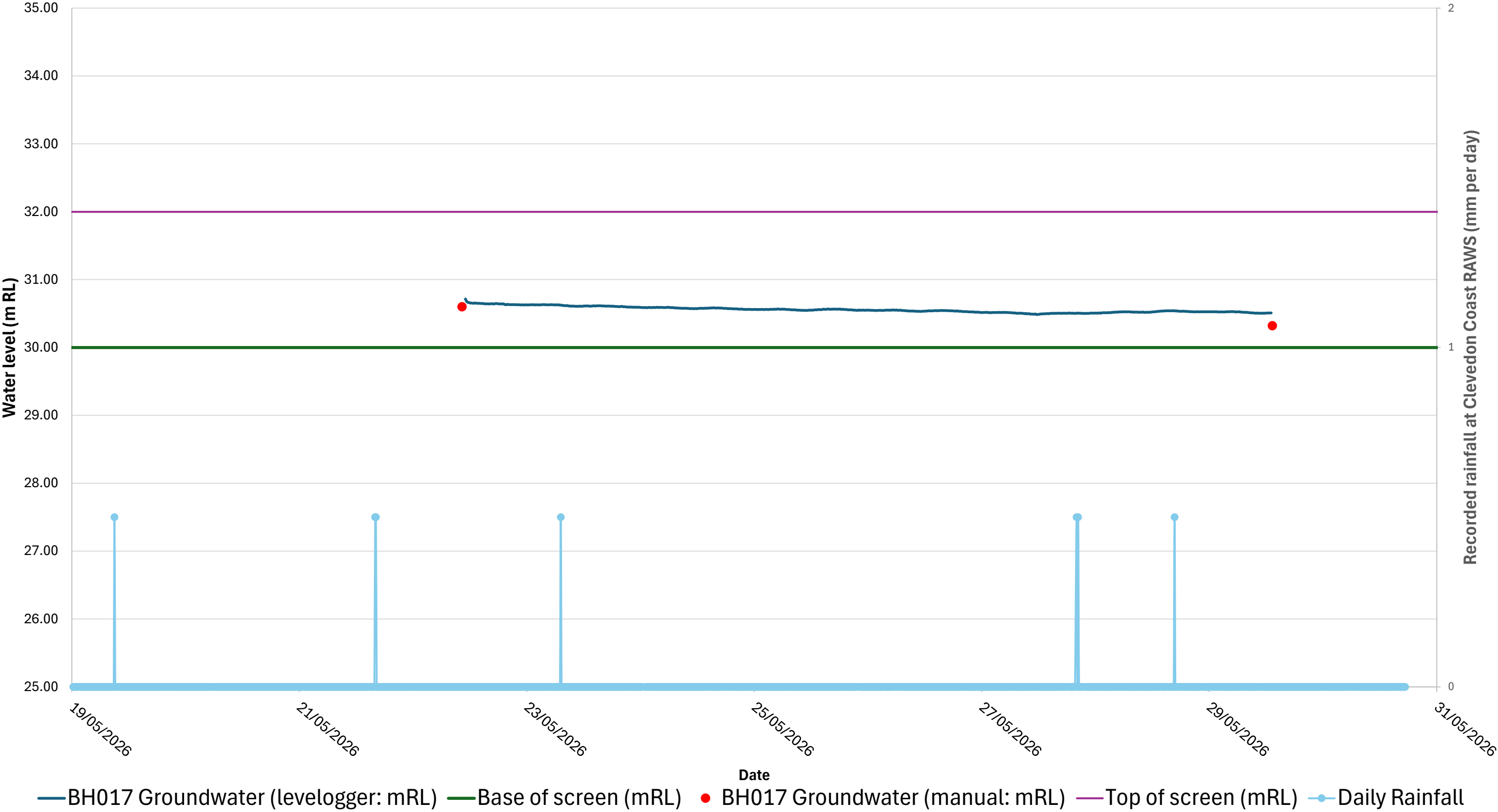


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH017 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 33

Screening Zone (mbgl): 1.00 - 3.00

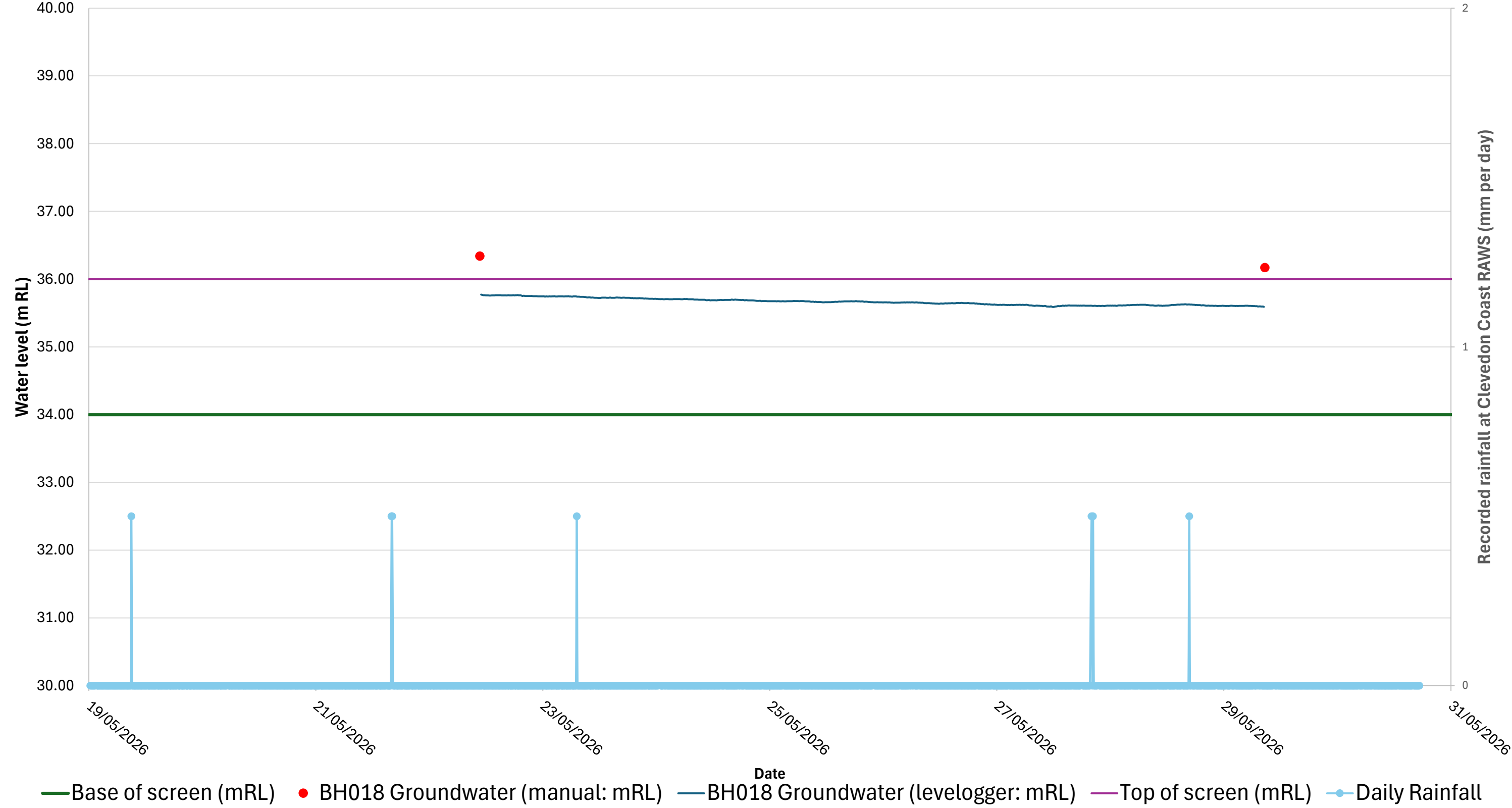


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH018 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 39

Screening Zone (mbgl): 3.00 - 5.00

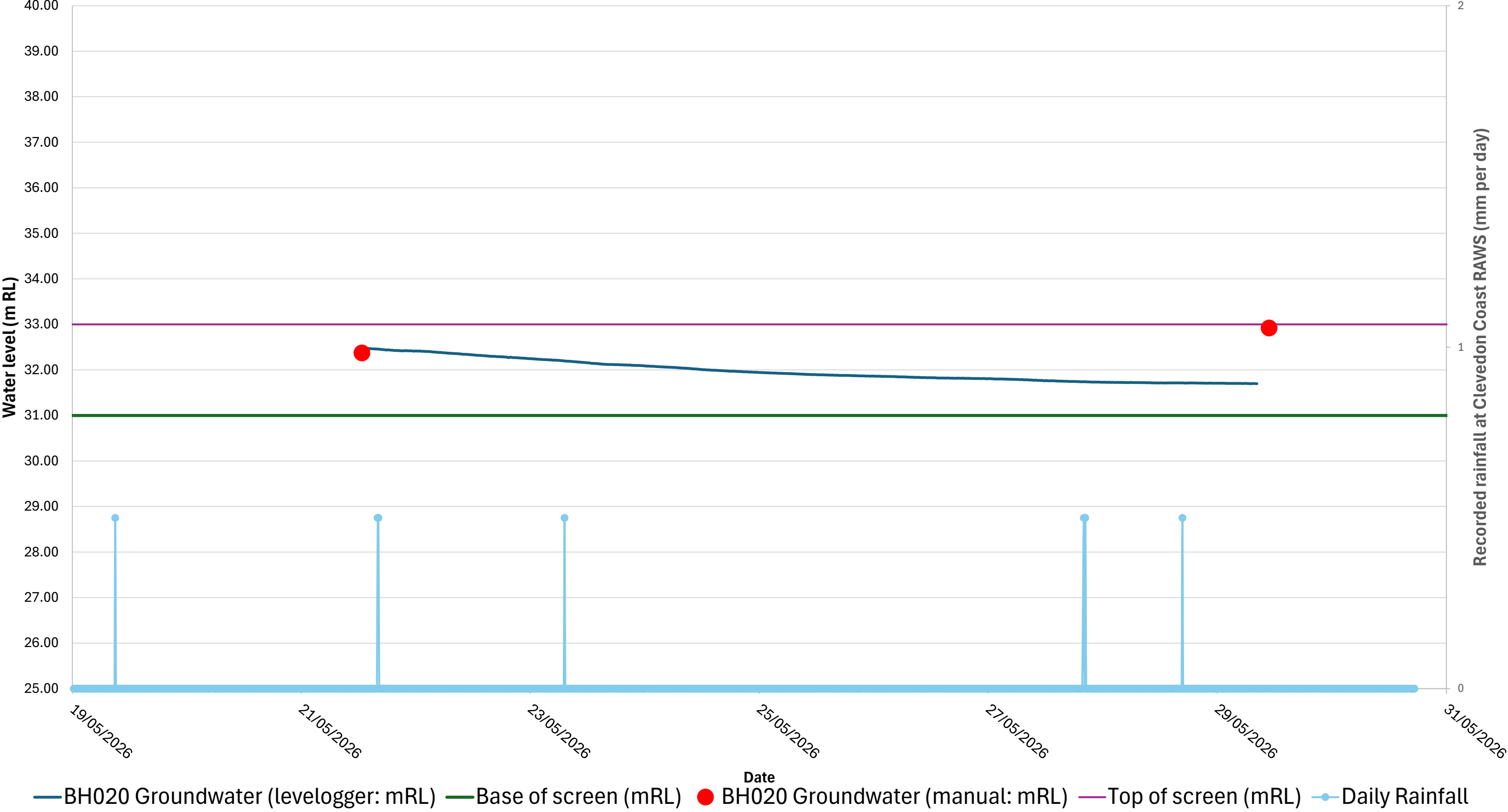


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH020 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 35

Screening Zone (mbgl): 2.00 - 4.00

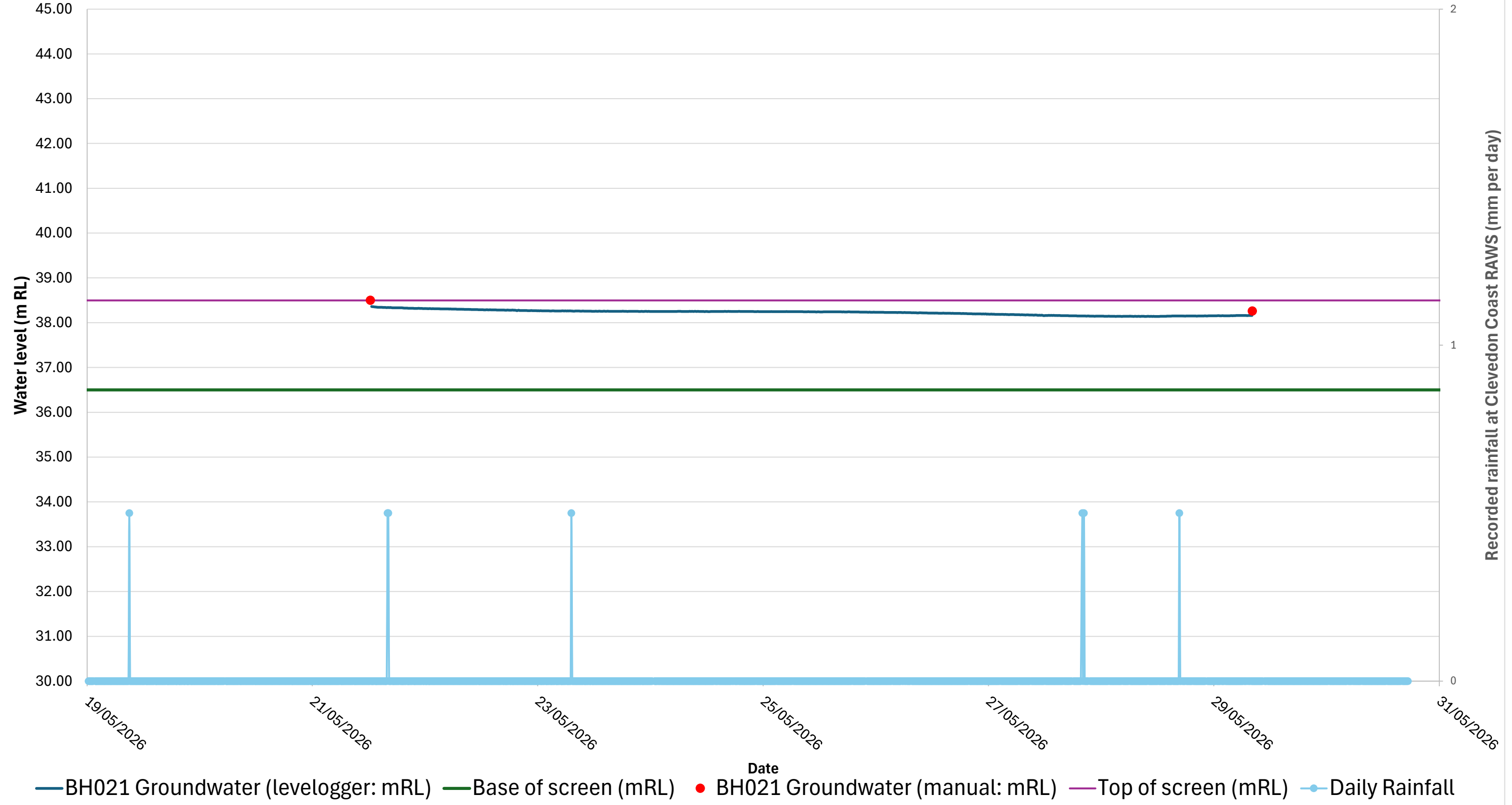


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH021 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 41.5

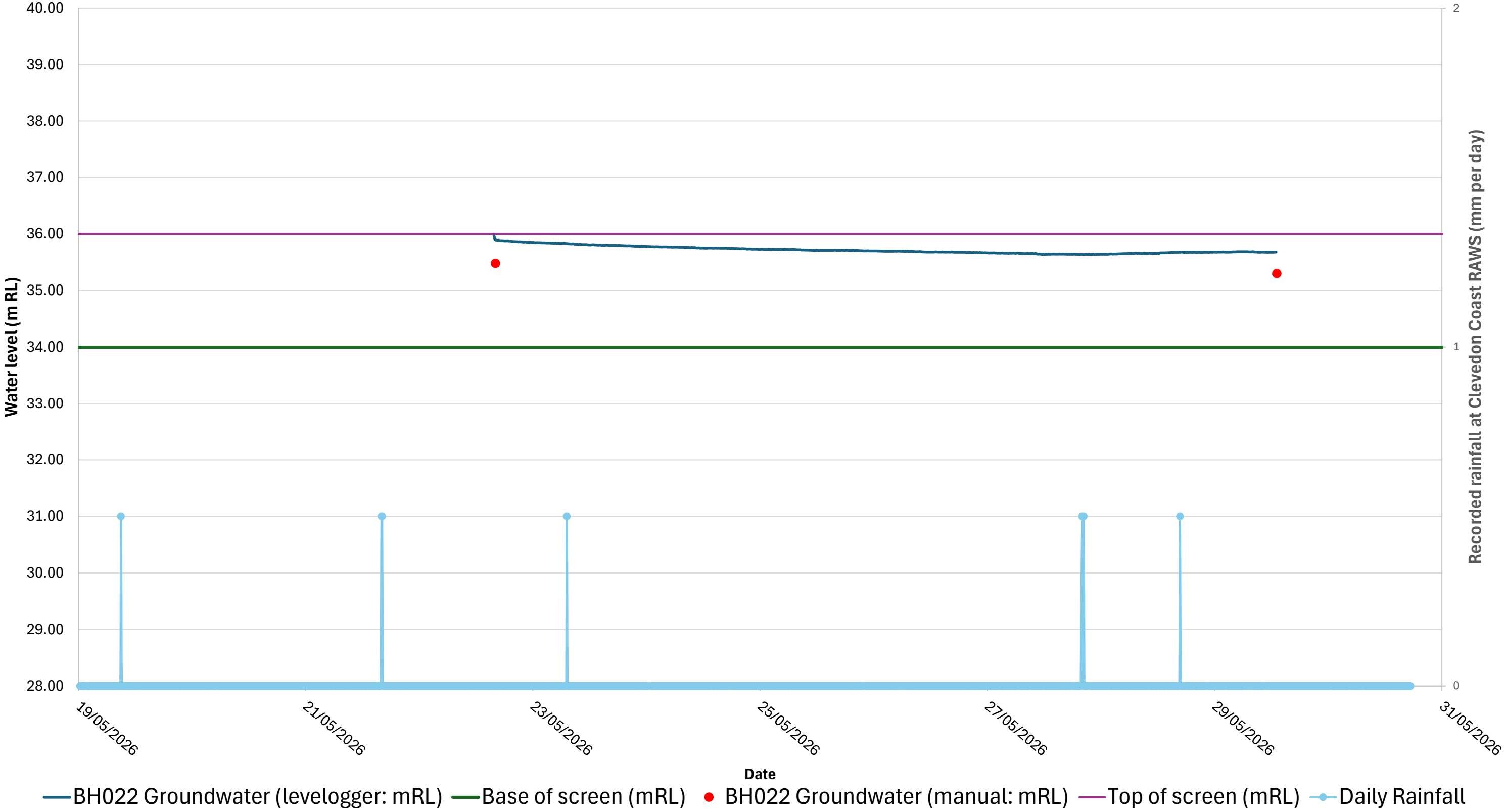
Screening Zone (mbgl): 3.00 - 5.00



Beachlands South - Balance Live-Zone – TT 1014358.3200
BH022 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 37
Screening Zone (mbgl): 1.00 - 3.00

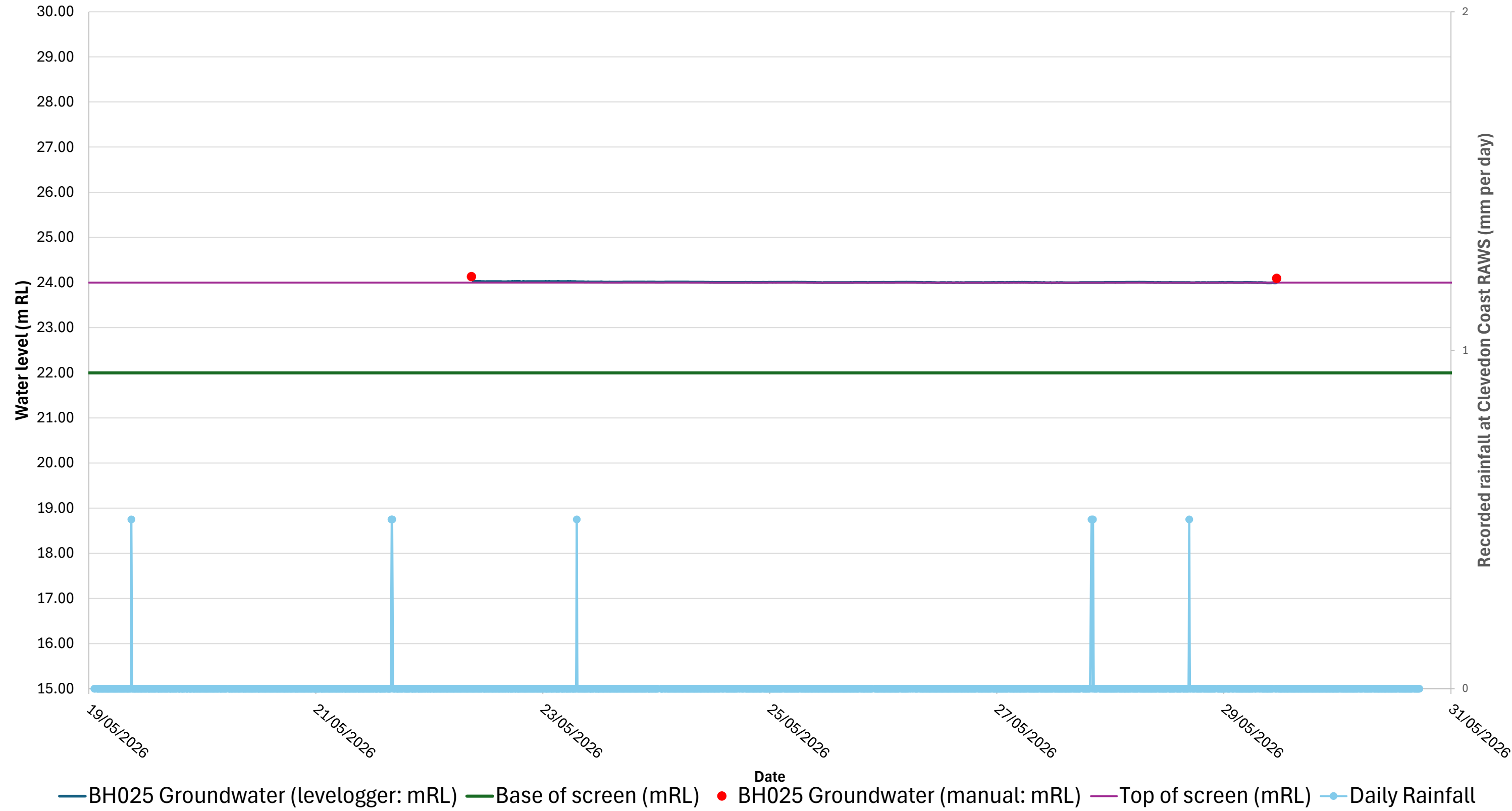


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH025 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 25

Screening Zone (mbgl): 1.00 - 3.00

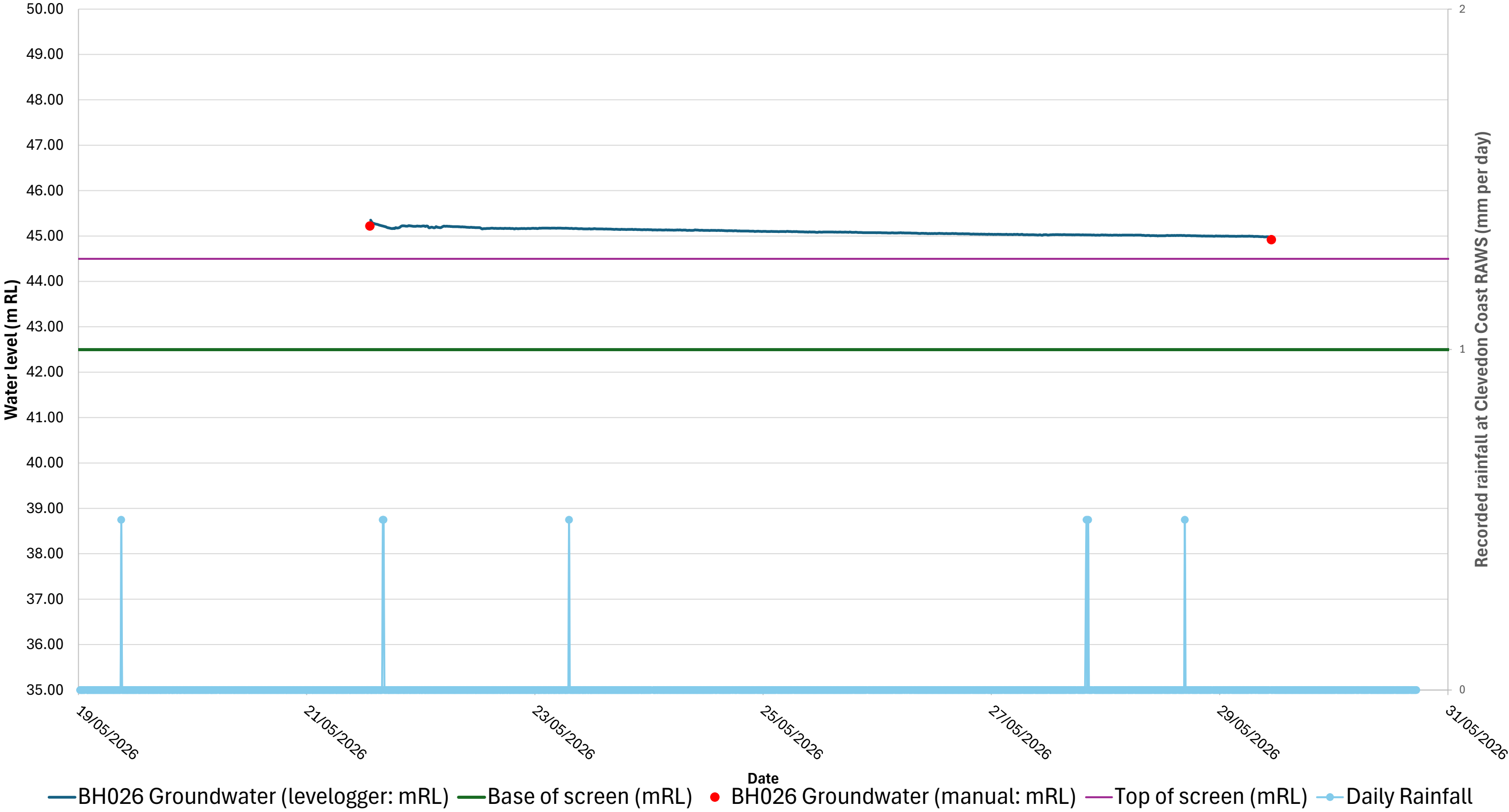


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH026 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 47

Screening Zone (mbgl): 2.50 - 4.50

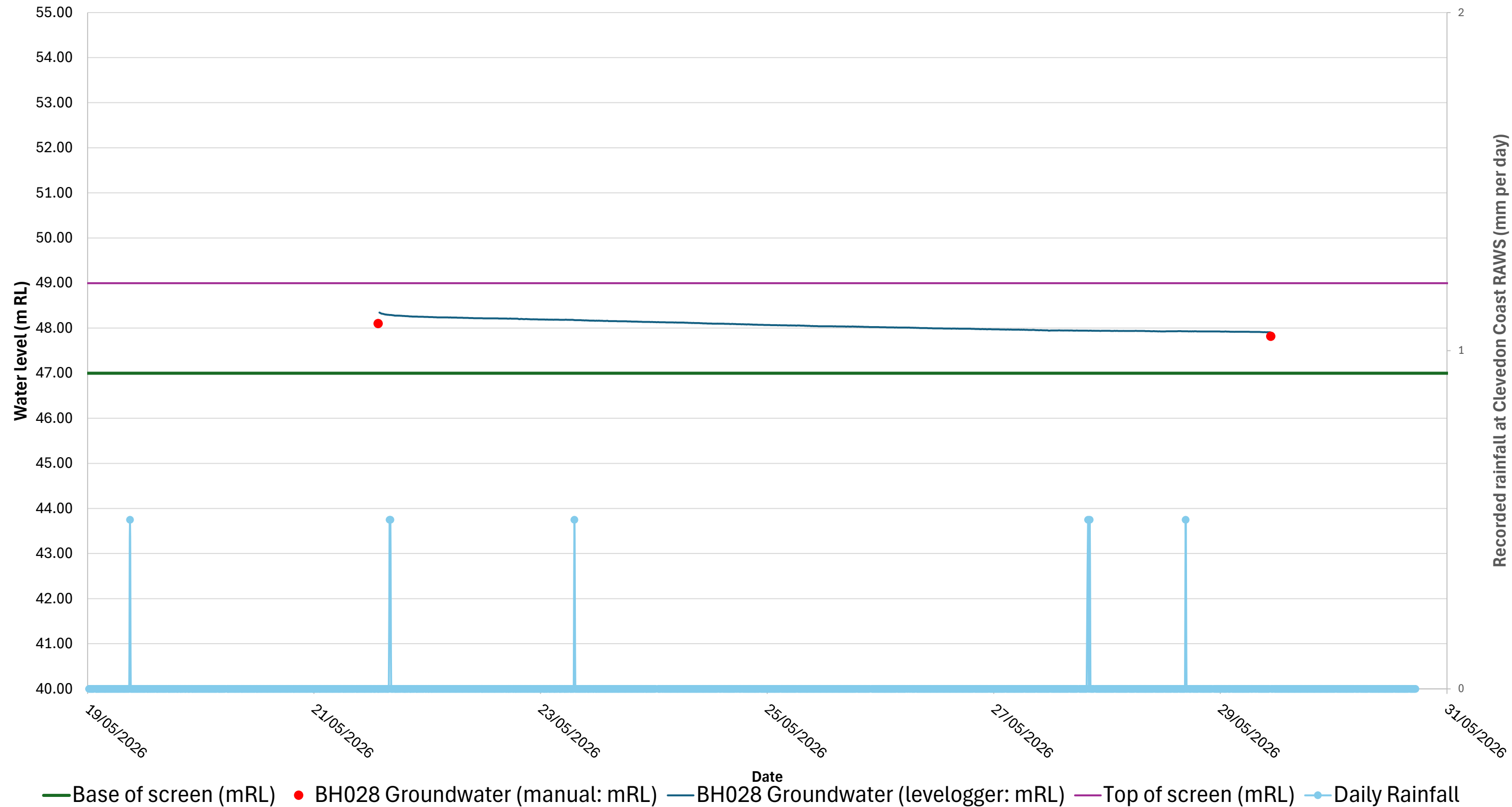


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH028 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 50

Screening Zone (mbgl): 1.00 - 3.00

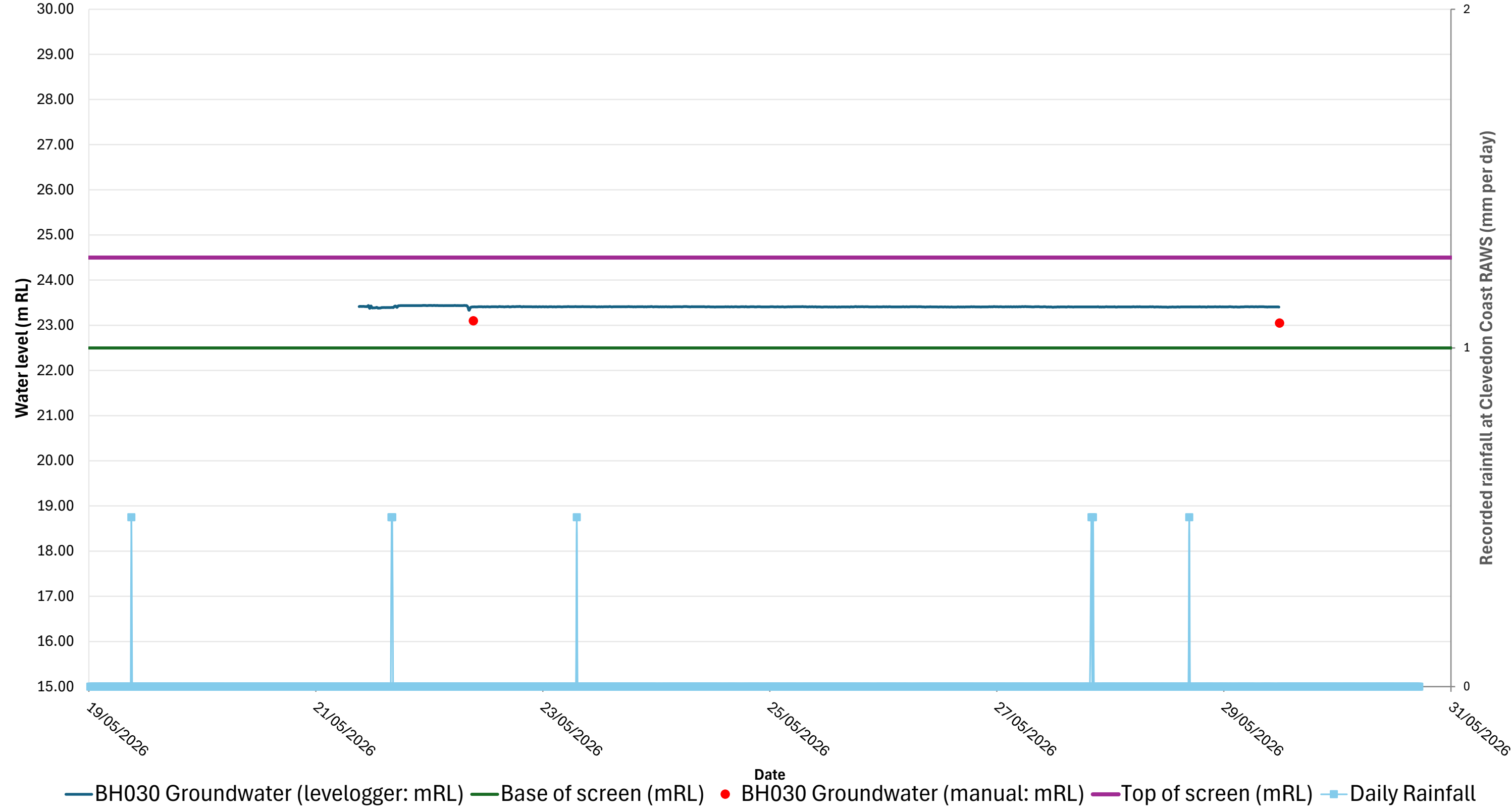


Beachlands South - Balance Live-Zone – TT 1014358.3200
BH030 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 27.5

Screening Zone (mbgl): 3.00 - 5.00

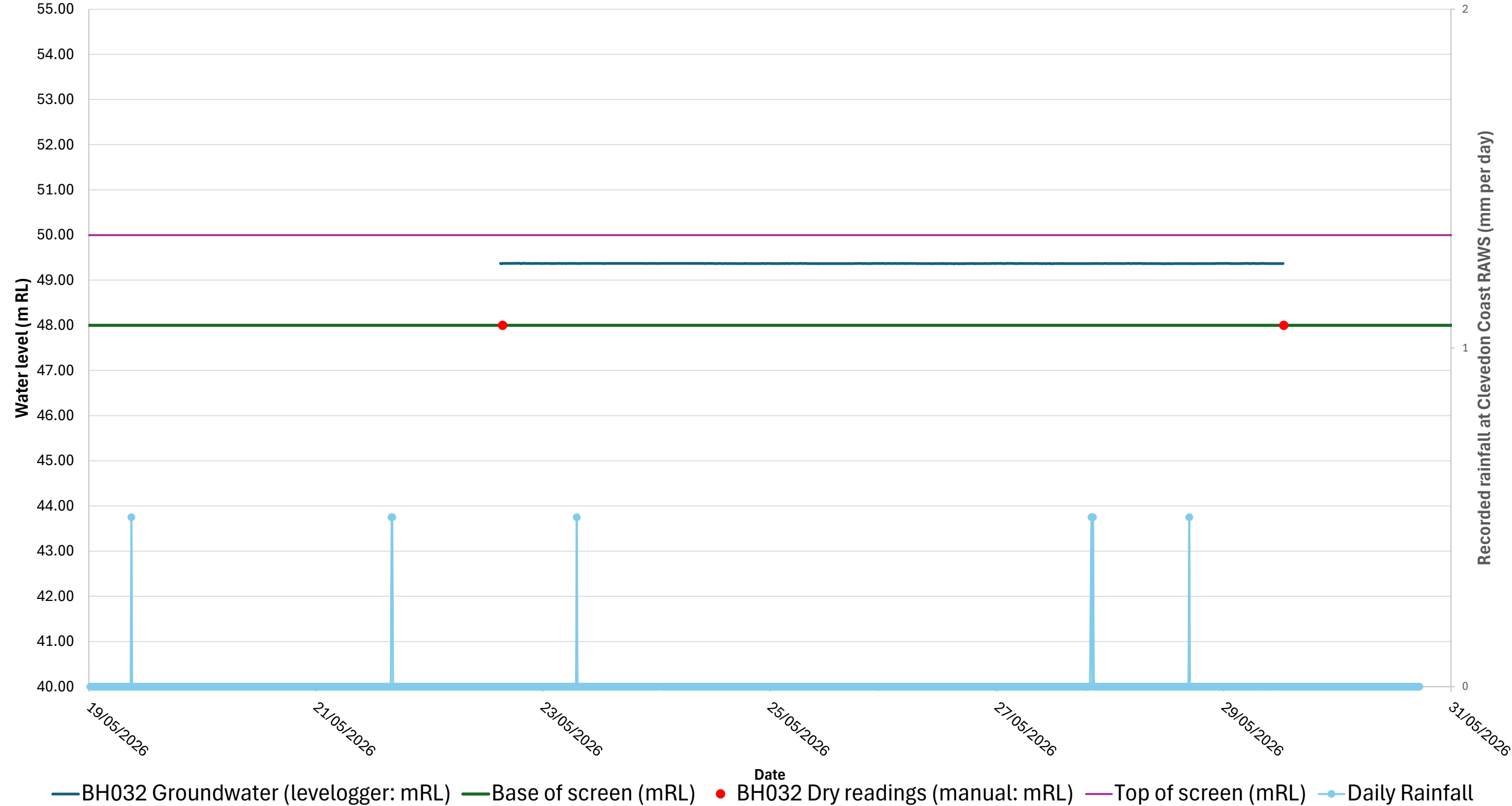


Beachlands South - Balance Live-Zone – TT 1014358.3200

BH032 (19/05/2026 - 30/05/2026)

Ground Elevation (m RL, NZVD2016): 53

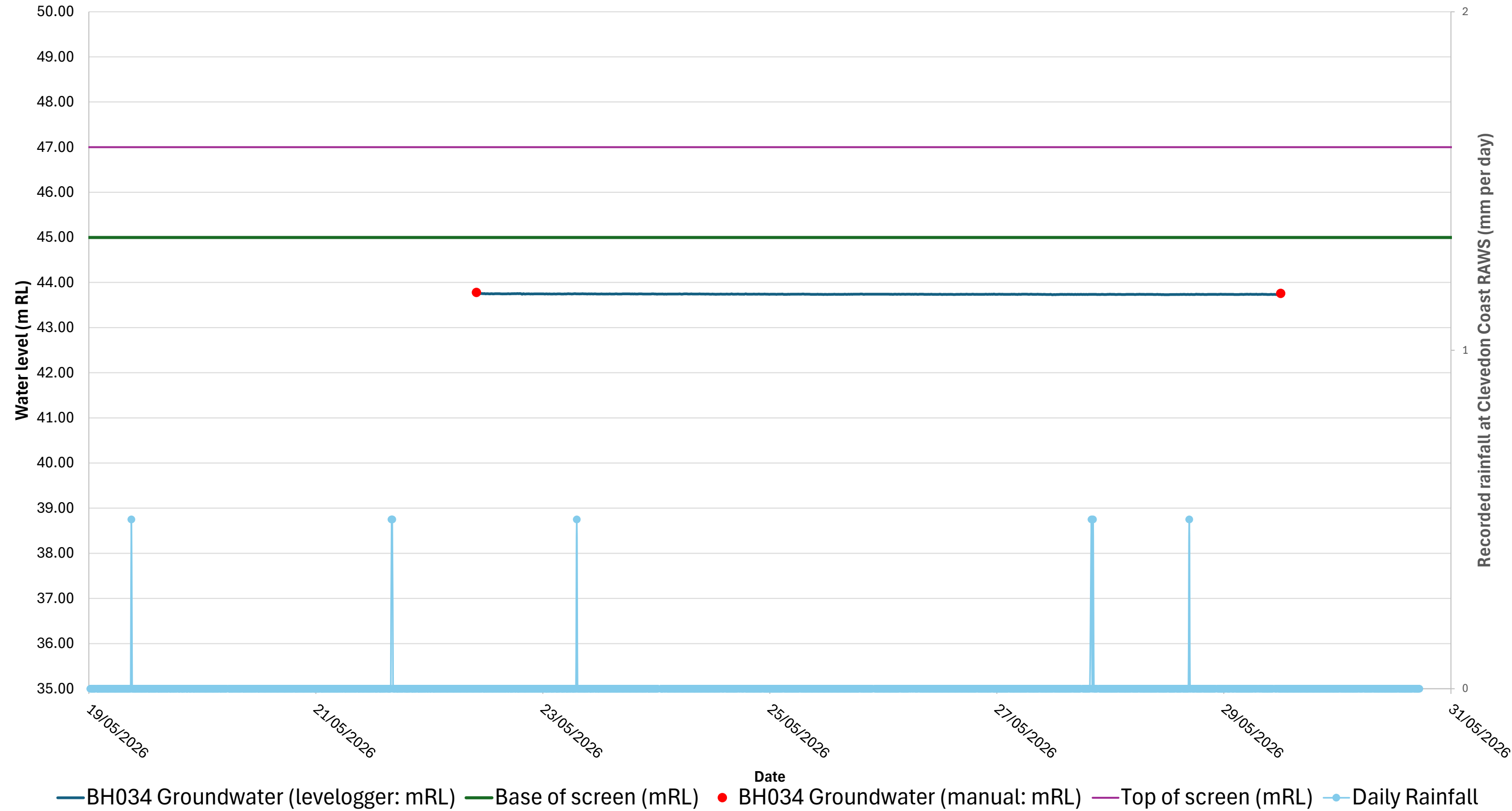
Screening Zone (mbgl): 3.00 - 5.00



Beachlands South - Balance Live-Zone – TT 1014358.3200
BH034 (19/05/2026 - 30/05/2026)



Ground Elevation (m RL, NZVD2016): 48
Screening Zone (mbgl): 1.00 - 3.00





18 May 2026

Our Ref: 2025000.0032.3.0/Rep1

Customer Ref: 1014358.3100

Tonkin & Taylor Limited
PO BOX 5271
AUCKLAND 1141

Attention: James Lee

Dear James

Beachlands South Laboratory Test Report

Samples from the above-mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.

Descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Tonkin & Taylor Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report approved by:



.....
Eliza Morton
Laboratory Manager
Key Technical Person

Authorised for Geotechnics by:



Digitally signed by
Anthony Gilliland
Date: 18.05.2026

.....
Anthony Gilliland
Project Director



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

18-May-26

\\\\ttgroup.local\\corporate\\GeotechnicsGroup\\Projects\\2025000\\2025000.0032 - Beachland South, HA & CPTs\\IssuedDocuments\\Report 1

	1 Hill Street	Geotechnics Project ID	2025000.0032.03.0
	Onehunga	Customer Project ID	1014358.31
	Auckland		
	New Zealand		
	p. +64 9 356 3510		

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.1, 2.2 (4 Point), 2.3 & 2.4

Determination of the Water Content - NZS 4402:1986 Test 2.1

TEST DETAILS			
LOCATION	ID	BH003	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.1	
	Reference	-	Depth 1.0 - 1.1m
	Description	Silty CLAY, with some sand; greyish brown. Very soft, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	
TEST RESULTS			
Liquid Limit	56		
Plastic Limit	24		
Plasticity Index	32		
Natural Water Content	22.2 %		
TEST REMARKS			
The material used for testing was natural, fraction passing a 425um sieve.			
Date Tested: 08/05/2026			
This test result is IANZ accredited.			
Approved by KTP	ELMO	Date	18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



1 Hill Street
 Onehunga
 Auckland 1061
 New Zealand
 p. +64 9 356 3510

Geotechnics Project ID

2025000.0032.03.0

Customer Project ID

1014358.31

Determination of Linear Shrinkage - Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS			
LOCATION	ID	BH003	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.1	
	Reference	-	Depth 1.0 - 1.1m
	Description	Silty CLAY, with some sand; greyish brown. Very soft, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	
TEST RESULT			
Linear Shrinkage	13%		
TEST REMARKS			
- The material used for testing was natural, fraction passing a 425um sieve. - Date Tested: 8/5/2026			
This test result is IANZ accredited.			
Approved by KTP	ELMO	Date	18/05/2026

Our Ref: 2025000.0032.3.0/Rep1

	1 Hill Street	Geotechnics Project ID	2025000.0032.03.0
	Onehunga	Customer Project ID	1014358.31
	Auckland		
	New Zealand		
	p. +64 9 356 3510		

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.1, 2.2 (4 Point), 2.3 & 2.4

Determination of the Water Content - NZS 4402:1986 Test 2.1

TEST DETAILS			
LOCATION	ID	BH011	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.2	
	Reference	-	Depth0.5 - 0.8m
	Description	Silty CLAY, with some sand; greyish brown, mottled orange. Firm, moist, high plasticity	
SPECIMEN	Reference	-	Depth-
	Description	-	
TEST RESULTS			
Liquid Limit	127		
Plastic Limit	40		
Plasticity Index	88		
Natural Water Content	44.7 %		
TEST REMARKS			
• The material used for testing was natural, fraction passing a 425um sieve.			
Date Tested: 13/05/2026			

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID

2025000.0032.03.0

Customer Project ID

1014358.31

Determination of Linear Shrinkage - Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS			
LOCATION	ID	BH011	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.2	
	Reference	-	Depth 0.5 - 0.8m
	Description	Silty CLAY, with some sand; greyish brown in mottled orange. Firm, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	
TEST RESULT			
Linear Shrinkage	22%		
TEST REMARKS			
- The material used for testing was natural, fraction passing a 425um sieve. - Date Tested: 14/5/2026			
This test result is IANZ accredited.			
Approved by KTP	ELMO	Date	18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID 2025000.0032.03.0
Customer Project ID 1014358.31

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.1, 2.2 (4 Point), 2.3 & 2.4

Determination of the Water Content - NZS 4402:1986 Test 2.1

TEST DETAILS

LOCATION	ID	BH018	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.3	
	Reference	-	Depth 0.3-0.8m
	Description	Silty CLAY, with some sand; greyish brown. Stiff, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	

TEST RESULTS

Liquid Limit	80
Plastic Limit	30
Plasticity Index	50
Natural Water Content	28.8 %

TEST REMARKS

- The material used for testing was natural, fraction passing a 425um sieve.

Date Tested: 08/05/2026

This test result is IANZ accredited.

Approved by KTP ELMO **Date** 18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID

2025000.0032.03.0

Customer Project ID

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Determination of Linear Shrinkage - Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS			
LOCATION	ID	BH018	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.3	
	Reference	-	Depth 0.3-0.8m
	Description	Silty CLAY, with some sand; greyish brown. Stiff, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	
TEST RESULT			
Linear Shrinkage	16%		
TEST REMARKS			
• The material used for testing was natural, fraction passing a 425um sieve. • Date Tested: 8/5/2026.			
This test result is IANZ accredited.			
Approved by KTP	ELMO	Date	18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID 2025000.0032.03.0
Customer Project ID 1014358.31

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.1, 2.2 (4 Point), 2.3 & 2.4

Determination of the Water Content - NZS 4402:1986 Test 2.1

TEST DETAILS

LOCATION	ID	BH027	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.4	
	Reference	-	Depth 0.3-0.8m
	Description	Silty CLAY, with some sand; dark brown, mottled orange. Firm, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	

TEST RESULTS

Liquid Limit	70
Plastic Limit	28
Plasticity Index	41
Natural Water Content	32.0 %

TEST REMARKS

- The material used for testing was natural, fraction passing a 425um sieve.

Date Tested: 08/05/2026

This test result is IANZ accredited.

Approved by KTP ELMO **Date** 18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID

2025000.0032.03.0

Customer Project ID

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Determination of Linear Shrinkage - Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS			
LOCATION	ID	BH027	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.4	
	Reference	-	Depth 0.3-0.8m
	Description	Silty CLAY, with some sand; dark brown, with mottled orange. Firm, moist, high plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	
TEST RESULT			
Linear Shrinkage	16%		
TEST REMARKS			
- The material used for testing was natural, fraction passing a 425um sieve. - Date Tested: 8/5/2026			
This test result is IANZ accredited.			
Approved by KTP	ELMO	Date	18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID 2025000.0032.03.0
Customer Project ID 1014358.31

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.1, 2.2 (4 Point), 2.3 & 2.4

Determination of the Water Content - NZS 4402:1986 Test 2.1

TEST DETAILS

LOCATION	ID	BH034	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.5	
	Reference	-	Depth 0.5-1.0m
	Description	SILT with some clay, some sand and trace of gravel; light grey, mottled brown. Soft, moist, low plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	

TEST RESULTS

Liquid Limit	56
Plastic Limit	29
Plasticity Index	27
Natural Water Content	35.3 %

TEST REMARKS

- The material used for testing was natural, fraction passing a 425um sieve.

Date Tested: 08/05/2026

This test result is IANZ accredited.

Approved by KTP ELMO **Date** 18/05/2026

Our Ref: 2025000.0032.3.0/Rep1



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Geotechnics Project ID

2025000.0032.03.0

Customer Project ID

1014358.31

Determination of Linear Shrinkage - Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS			
LOCATION	ID	BH034	
	Description	Beachlands South	
	Data	N/A	
SAMPLE	Geotechnics ID	AKL1379.5	
	Reference	-	Depth 0.5-1.0m
	Description	SILT with some clay, some sand and trace of gravel; light grey, mottled brown. Soft, moist, low plasticity	
SPECIMEN	Reference	-	Depth -
	Description	-	
TEST RESULT			
Linear Shrinkage	12%		
TEST REMARKS			
- The material used for testing was natural, fraction passing a 425um sieve. - Date Tested: 7/5/2026			
This test result is IANZ accredited.			
Approved by KTP	ELMO	Date	18/05/2026

Our Ref: 2025000.0032.3.0/Rep1

Appendix D Liquefaction Analysis Outputs

- SLS
- ULS



Liquefaction Calculator
Analysis Summary
CPT: CPT-MT1Q-KCVQ / CPT-009 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-MT1Q-KCVQ
NZGD ID	-
Custom ID	CPT-009 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	17.9 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	17.9 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-P2U7-60OI / CPT-002-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-P2U7-60OI
NZGD ID	-
Custom ID	CPT-002-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	25.6 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.85 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	25.6 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.85 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-6QIC-1N60 / CPT-017 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-6QIC-1N60
NZGD ID	-
Custom ID	CPT-017 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	47.2 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	47.2 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-V613-PLLX / CPT-019 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-V613-PLLX
NZGD ID	-
Custom ID	CPT-019 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	47.1 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	47.1 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & DeJong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-NZS9-Z5KL / CPT-022 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-NZS9-Z5KL
NZGD ID	-
Custom ID	CPT-022 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	56.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	56.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-AJCJ-PLT4 / CPT-007-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-AJCJ-PLT4
NZGD ID	-
Custom ID	CPT-007-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	23.5 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.6 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	23.5 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.6 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-KCPM-IP2L / CPT-023- 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-KCPM-IP2L
NZGD ID	-
Custom ID	CPT-023- 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	50.05 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	50.05 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-PCUF-JVOY / CPT-012 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-PCUF-JVOY
NZGD ID	-
Custom ID	CPT-012 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-NLWG-UMVW / CPT-008 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-NLWG-UMVW
NZGD ID	-
Custom ID	CPT-008 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	20.9 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	9.7 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	20.9 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	9.7 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-CDEL-3697 / CPT-014 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-CDEL-3697
NZGD ID	-
Custom ID	CPT-014 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-Y1HL-1A2A / CPT-011 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-Y1HL-1A2A
NZGD ID	-
Custom ID	CPT-011 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	30.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	30.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-33QF-X89E / CPT-010 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-33QF-X89E
NZGD ID	-
Custom ID	CPT-010 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	32.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.3 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	32.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.3 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-ZI2L-96X7 / CPT-001-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-ZI2L-96X7
NZGD ID	-
Custom ID	CPT-001-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	16.5 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	16.5 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-VVD4-1ZFO / CPT-016 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-VVD4-1ZFO
NZGD ID	-
Custom ID	CPT-016 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-PB4F-2E1S / CPT-004-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-PB4F-2E1S
NZGD ID	-
Custom ID	CPT-004-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	27.9 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	27.9 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-QGNC-YMMG / CPT-020 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-QGNC-YMMG
NZGD ID	-
Custom ID	CPT-020 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	24.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.5 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	24.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.5 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-8OCE-5974 / CPT-003-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-8OCE-5974
NZGD ID	-
Custom ID	CPT-003-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	20.5 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	20.5 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-KQ52-0CZG / CPT-005-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-KQ52-0CZG
NZGD ID	-
Custom ID	CPT-005-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	18.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	7.6 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	18.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	7.6 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-5XJU-N1NS / CPT-018 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-5XJU-N1NS
NZGD ID	-
Custom ID	CPT-018 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	50.7 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.2 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	50.7 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.2 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-CUQ8-3CR2 / CPT-006-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-CUQ8-3CR2
NZGD ID	-
Custom ID	CPT-006-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	16.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.3 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	16.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.3 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & DeJong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-9VPB-U4WJ / CPT-015 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-9VPB-U4WJ
NZGD ID	-
Custom ID	CPT-015 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-0KQ8-VIB7 / CPT-013 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-0KQ8-VIB7
NZGD ID	-
Custom ID	CPT-013 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	42.1 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	42.1 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-VXJS-QMSW / CPT-021 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.05 g
Design Magnitude (Mw)	5.9
Case Name	SLS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-VXJS-QMSW
NZGD ID	-
Custom ID	CPT-021 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	46.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.9 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	46.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.9 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

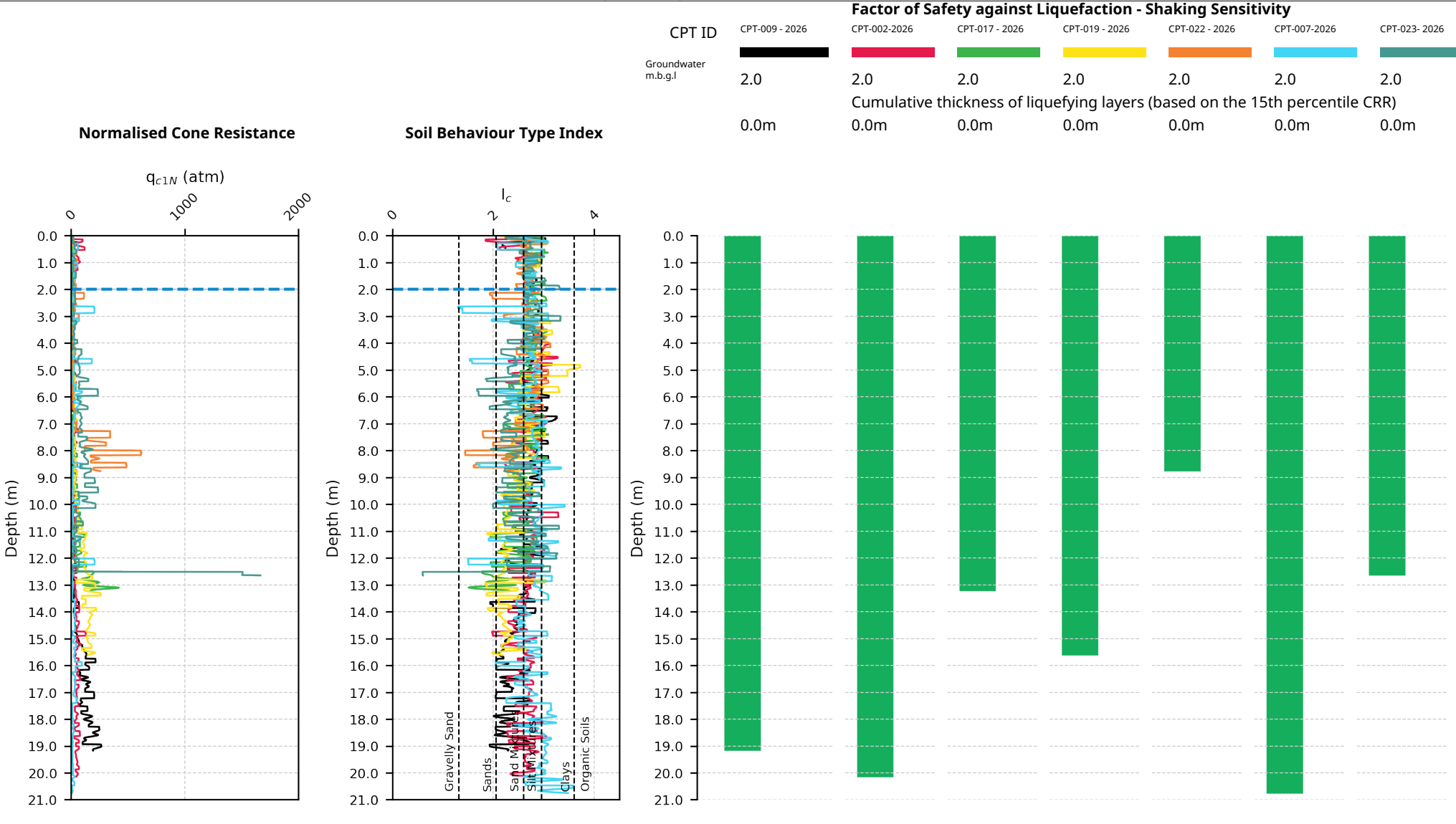
Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

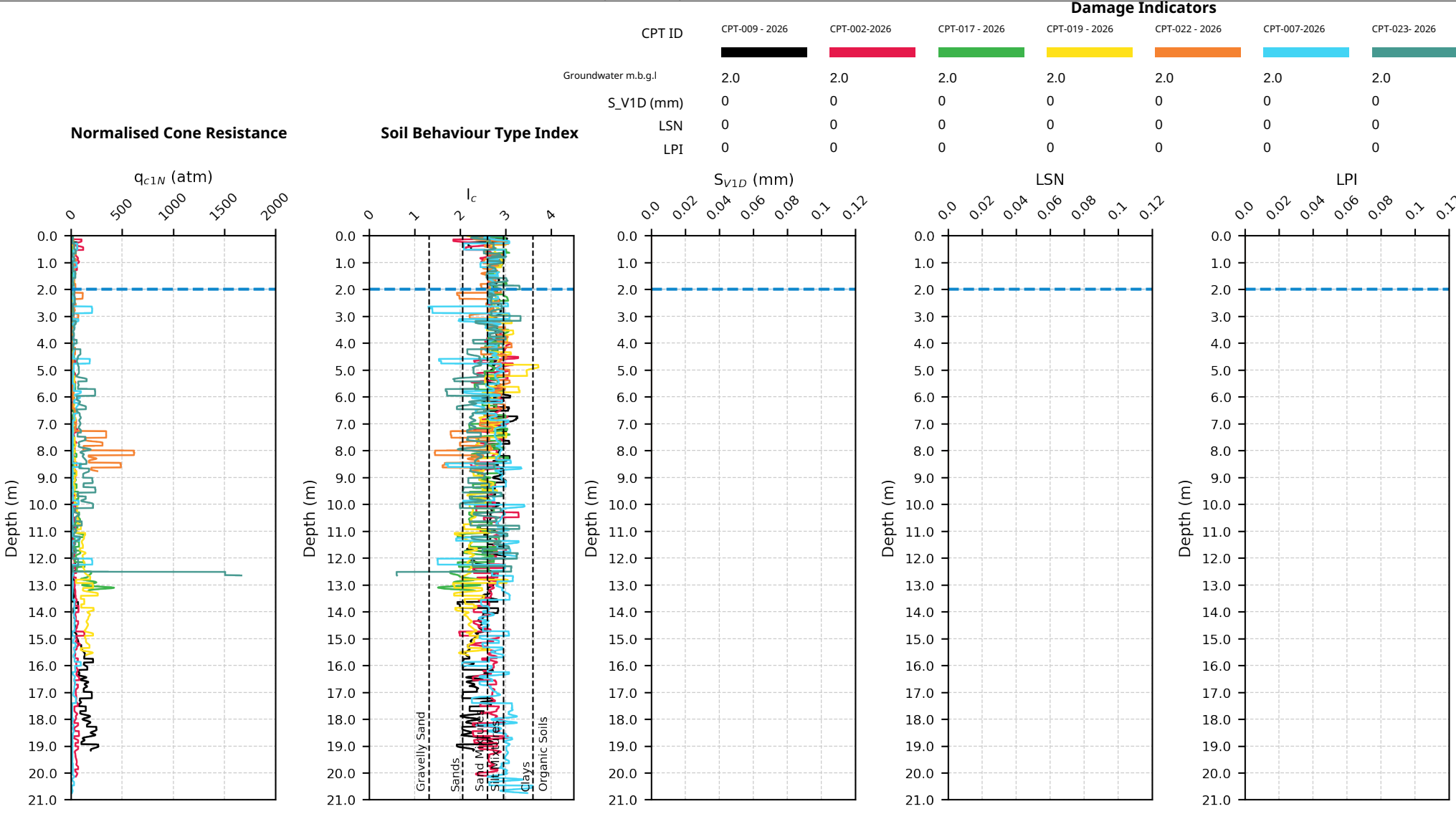




Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering
Based on the P_L 15th CRR Curve

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

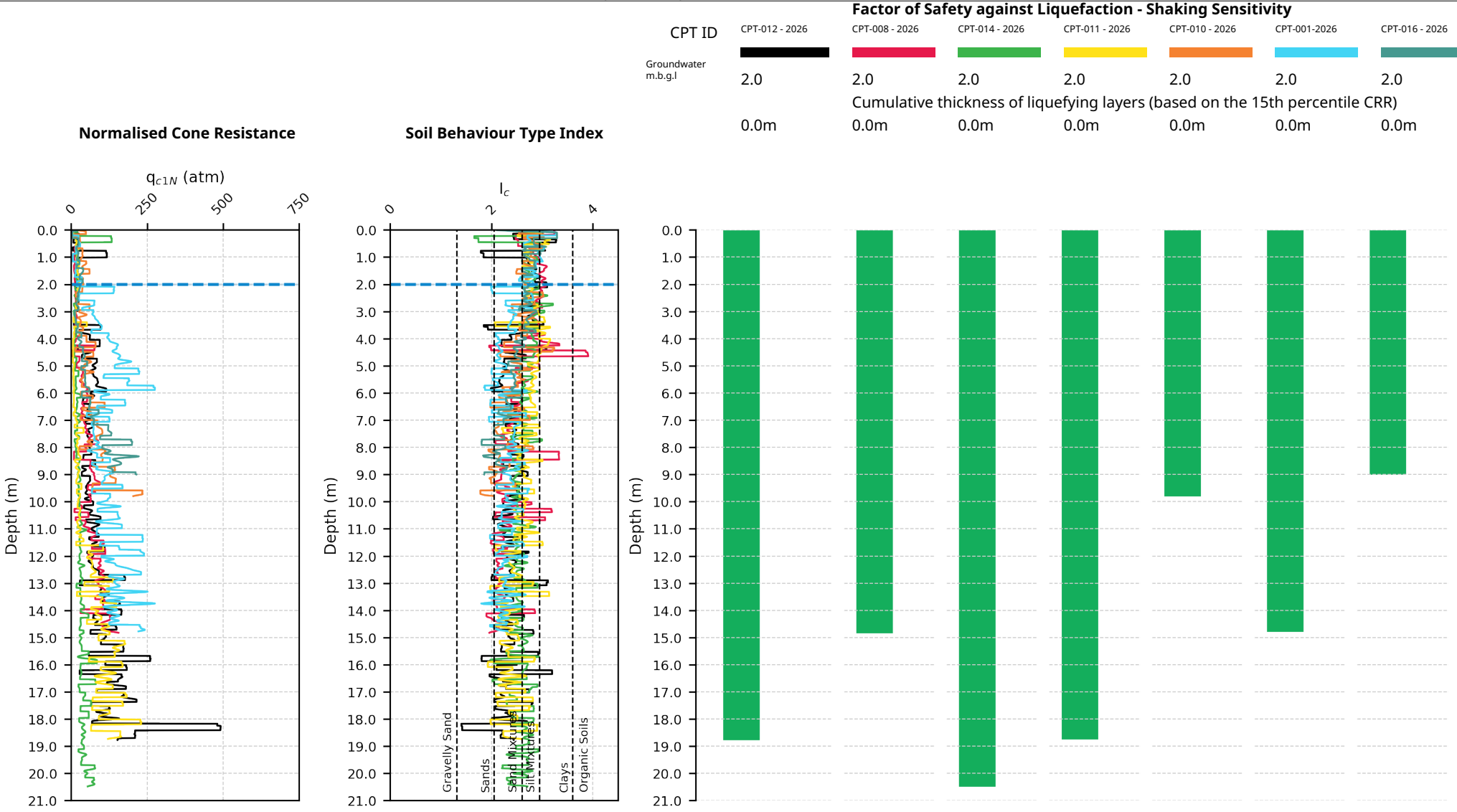




Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL



No Triggering based on 15th 50th Percentile CRR

Triggering based on 15th Percentile CRR

Triggering based on 50th Percentile CRR

Triggering based on 85th Percentile CRR

Design Groundwater Level

Design Groundwater Range

Earthquake Shaking Case

PGA 0.05g

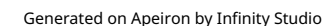
Magnitude 5.9

Return Period 1/25

Design Groundwater

Depth (m.b.g.l.) 2.0 to 2.0

Generated on Apeiron by Infinity Studio

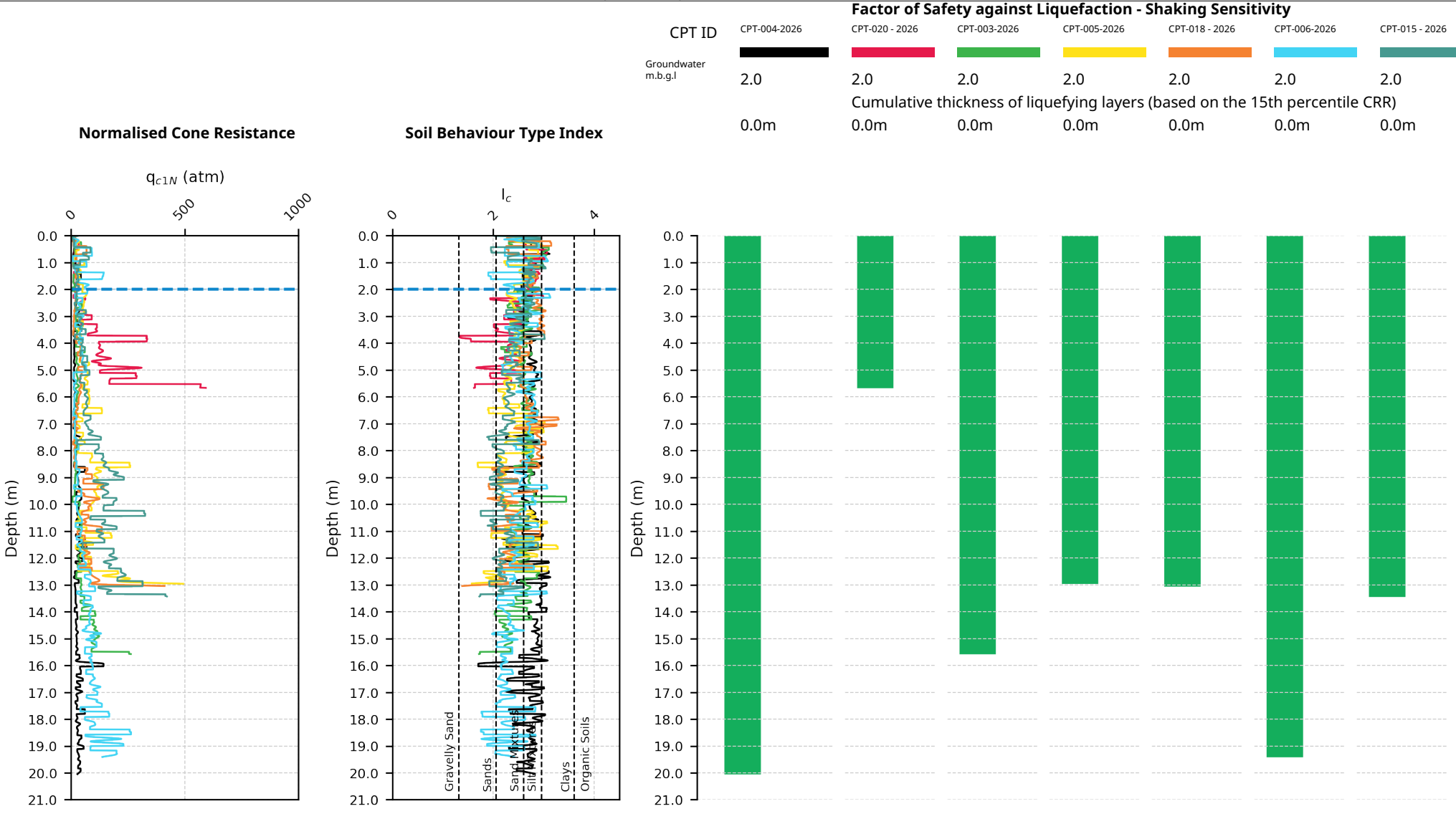




Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL



No Triggering based on 15th 50th Percentile CRR
Triggering based on 50th Percentile CRR
Triggering based on 15th Percentile CRR
Triggering based on 85th Percentile CRR
Design Groundwater Level
Design Groundwater Range

Earthquake Shaking Case
PGA 0.05g
Magnitude 5.9
Return Period 1/25
Design Groundwater
Depth (m.b.g.l.) 2.0 to 2.0



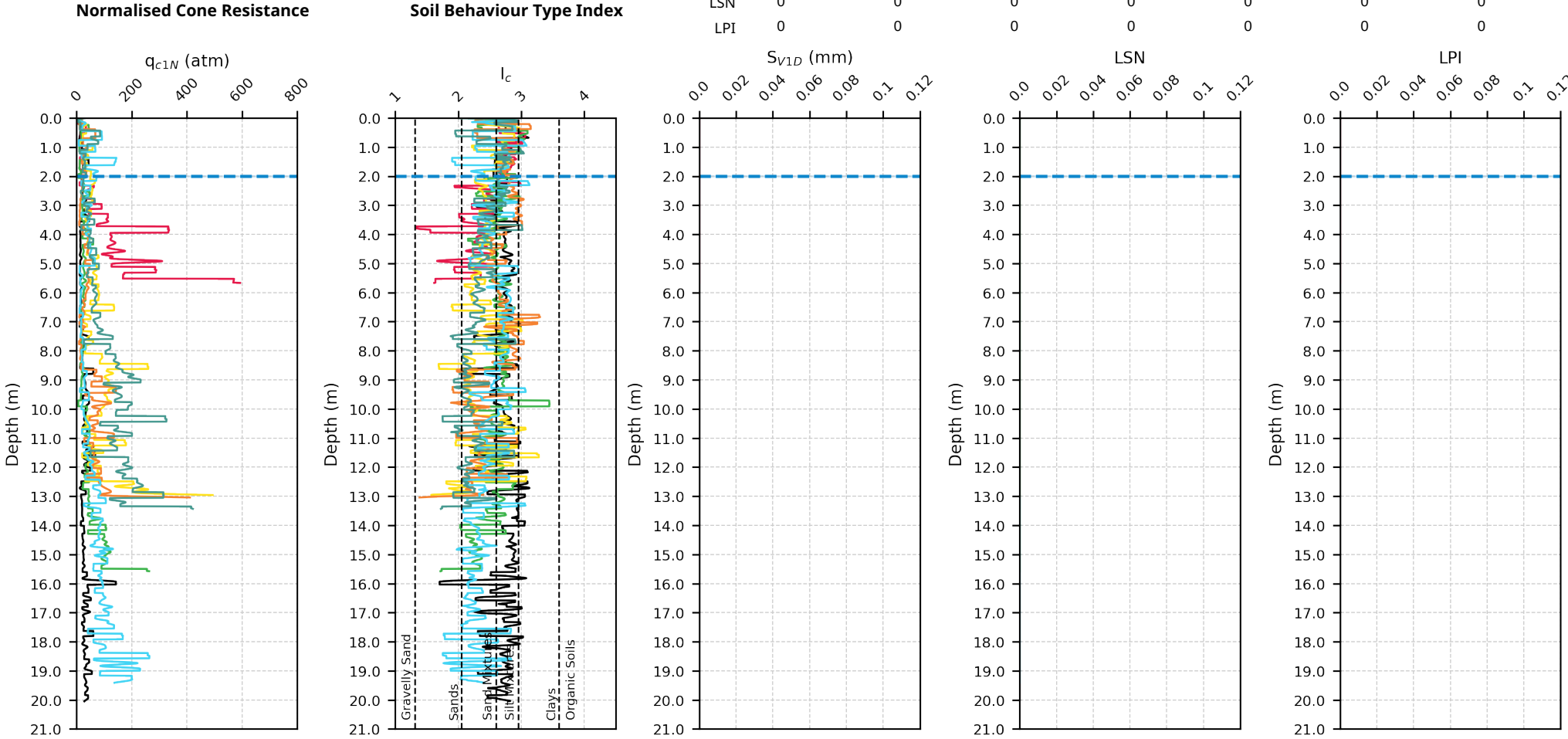
Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering
Based on the P_L 15th CRR Curve

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Damage Indicators

CPT ID	CPT-004-2026	CPT-020 - 2026	CPT-003-2026	CPT-005-2026	CPT-018 - 2026	CPT-006-2026	CPT-015 - 2026
Groundwater m.b.g.l	2.0	2.0	2.0	2.0	2.0	2.0	2.0
S_V1D (mm)	0	0	0	0	0	0	0
LSN	0	0	0	0	0	0	0
LPI	0	0	0	0	0	0	0



Design Groundwater Level Design Groundwater Range

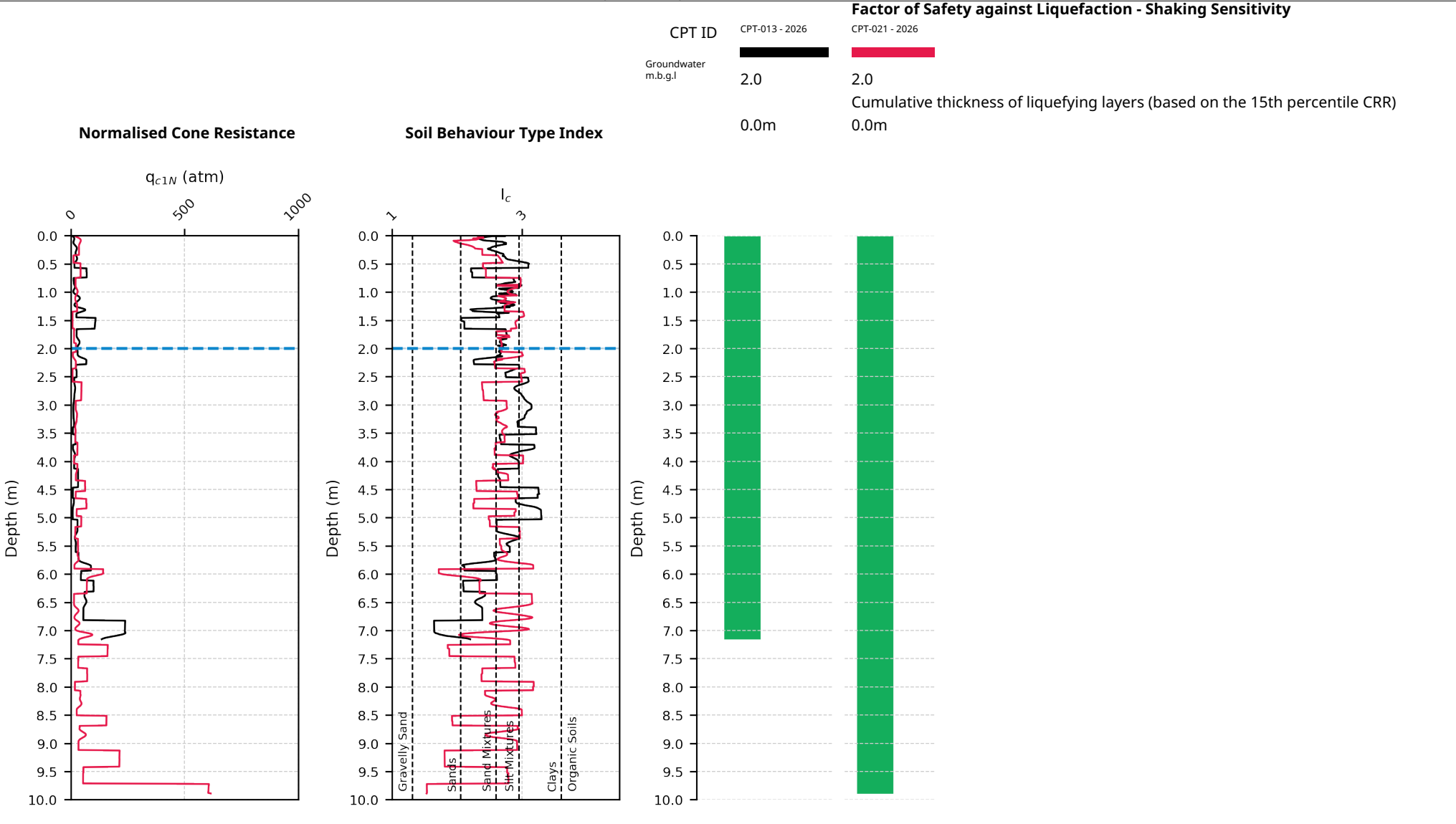
Earthquake Shaking Case
PGA 0.05g
Magnitude 5.9
Return Period 1/25
Design Groundwater
Depth (m.b.g.l.) 2.0 to 2.0



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL



No Triggering based on 15th 50th Percentile CRR Triggering based on 15th Percentile CRR	Triggering based on 50th Percentile CRR Triggering based on 85th Percentile CRR	Design Groundwater Level Design Groundwater Range	Earthquake Shaking Case PGA 0.05g Magnitude 5.9 Return Period 1/25	
			Design Groundwater Depth (m.b.g.l.) 2.0 to 2.0	

Generated on Apeiron by Infinity Studio



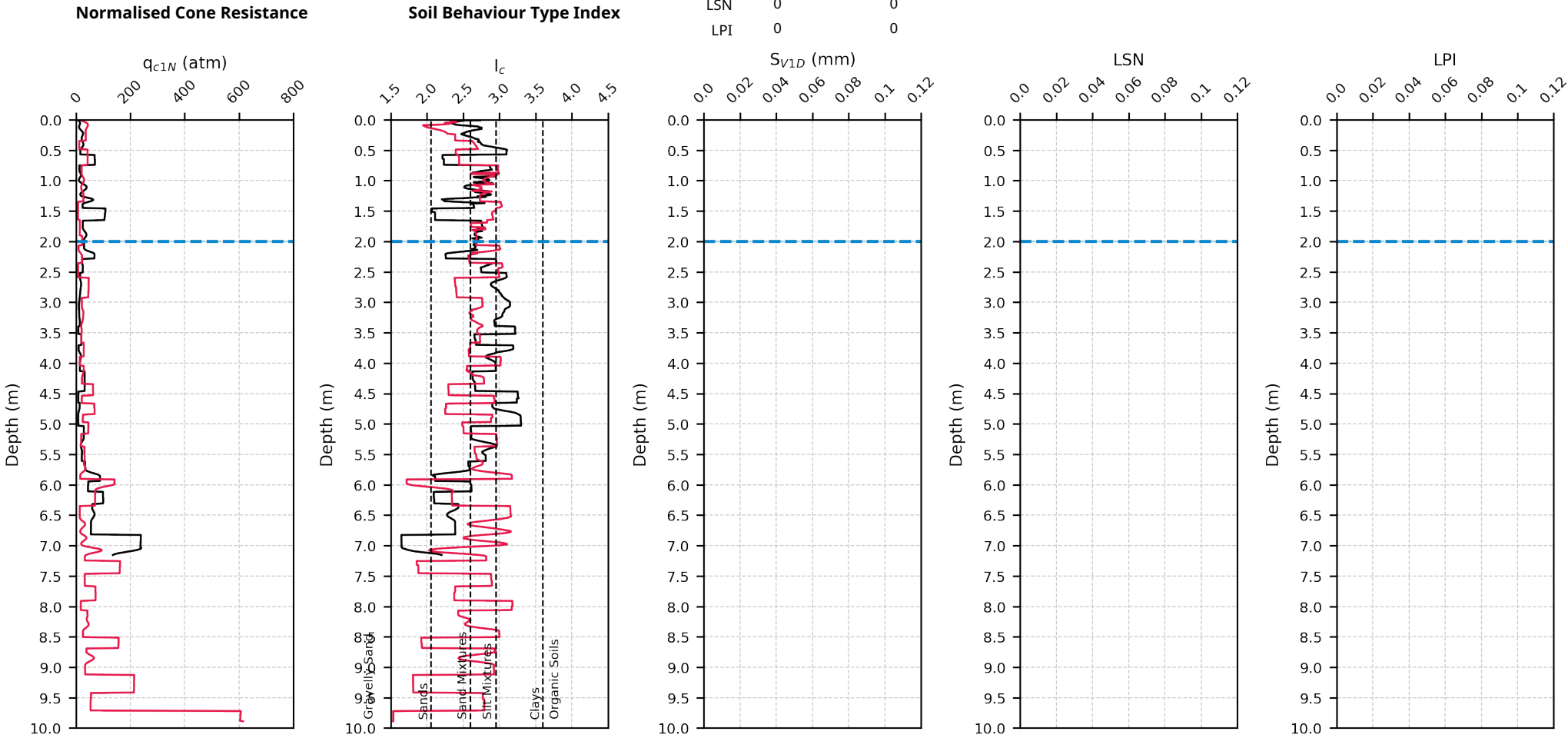
Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering
Based on the P_L 15th CRR Curve

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Damage Indicators

CPT ID	CPT-013 - 2026	CPT-021 - 2026
Groundwater m.b.g.l	2.0	2.0
S _{V1D} (mm)	0	0
LSN	0	0
LPI	0	0



Design Groundwater Level Design Groundwater Range

Earthquake Shaking Case	
PGA	0.05g
Magnitude	5.9
Return Period	1/25
Design Groundwater	
Depth (m.b.g.l.)	2.0 to 2.0



Liquefaction Calculator
Analysis Summary
CPT: CPT-MT1Q-KCVQ / CPT-009 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-MT1Q-KCVQ
NZGD ID	-
Custom ID	CPT-009 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	17.9 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	17.9 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-P2U7-60OI / CPT-002-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-P2U7-60OI
NZGD ID	-
Custom ID	CPT-002-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	25.6 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.85 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	25.6 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.85 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-6QIC-1N60 / CPT-017 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-6QIC-1N60
NZGD ID	-
Custom ID	CPT-017 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	47.2 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	47.2 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-V613-PLLX / CPT-019 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-V613-PLLX
NZGD ID	-
Custom ID	CPT-019 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	47.1 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	47.1 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-NZS9-Z5KL / CPT-022 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-NZS9-Z5KL
NZGD ID	-
Custom ID	CPT-022 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	56.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	56.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-AJCJ-PLT4 / CPT-007-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-AJCJ-PLT4
NZGD ID	-
Custom ID	CPT-007-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	23.5 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.6 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	23.5 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.6 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-KCPM-IP2L / CPT-023- 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-KCPM-IP2L
NZGD ID	-
Custom ID	CPT-023- 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	50.05 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	50.05 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-PCUF-JVOY / CPT-012 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-PCUF-JVOY
NZGD ID	-
Custom ID	CPT-012 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-NLWG-UMVW / CPT-008 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-NLWG-UMVW
NZGD ID	-
Custom ID	CPT-008 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	20.9 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	9.7 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	20.9 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	9.7 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-CDEL-3697 / CPT-014 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-CDEL-3697
NZGD ID	-
Custom ID	CPT-014 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.6 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-Y1HL-1A2A / CPT-011 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-Y1HL-1A2A
NZGD ID	-
Custom ID	CPT-011 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	30.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	30.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-33QF-X89E / CPT-010 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-33QF-X89E
NZGD ID	-
Custom ID	CPT-010 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	32.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.3 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	32.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.3 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-ZI2L-96X7 / CPT-001-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-ZI2L-96X7
NZGD ID	-
Custom ID	CPT-001-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	16.5 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	16.5 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-VVD4-1ZFO / CPT-016 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-VVD4-1ZFO
NZGD ID	-
Custom ID	CPT-016 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-PB4F-2E1S / CPT-004-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-PB4F-2E1S
NZGD ID	-
Custom ID	CPT-004-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	27.9 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	27.9 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-QGNC-YMMG / CPT-020 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-QGNC-YMMG
NZGD ID	-
Custom ID	CPT-020 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	24.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.5 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	24.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.5 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-8OCE-5974 / CPT-003-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-8OCE-5974
NZGD ID	-
Custom ID	CPT-003-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	20.5 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.1 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	20.5 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.1 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-KQ52-0CZG / CPT-005-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-KQ52-0CZG
NZGD ID	-
Custom ID	CPT-005-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	18.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	7.6 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	18.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	7.6 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-5XJU-N1NS / CPT-018 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-5XJU-N1NS
NZGD ID	-
Custom ID	CPT-018 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	50.7 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.2 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	50.7 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.2 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-CUQ8-3CR2 / CPT-006-2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-CUQ8-3CR2
NZGD ID	-
Custom ID	CPT-006-2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	16.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.3 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	16.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.3 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-9VPB-U4WJ / CPT-015 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-9VPB-U4WJ
NZGD ID	-
Custom ID	CPT-015 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	1.4 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	36.8 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	1.4 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-0KQ8-VIB7 / CPT-013 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-0KQ8-VIB7
NZGD ID	-
Custom ID	CPT-013 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	42.1 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	3.8 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	42.1 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	3.8 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Analysis Summary
CPT: CPT-VXJS-QMSW / CPT-021 - 2026

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Seismic Input	
Design PGA	0.19 g
Design Magnitude (Mw)	6.5
Case Name	ULS
PGA for Sensitivity Analysis	-
Mw for Sensitivity Analysis	-

Groundwater Input	
Design Groundwater Option	user-defined
Design Groundwater	2.0 m.b.g.l
Sensitivity Analysis	-

Applied Surcharge and Cut/Fill	
Applied Stress Option	surcharge
Applied Stress Method	surcharge
Surcharge	0.0 kPa

CPT Summary	
Infinity ID	CPT-VXJS-QMSW
NZGD ID	-
Custom ID	CPT-021 - 2026
Cone Tip Area	10.0 cm ²
Elevation at Top of Investigation	46.4 m
Veritcal Datum	New Zealand Vertical Datum 2016
Pre-drill Depth	0.0 m
Investigation Groundwater	2.9 m

Analysis Summary	
Inverse Filtering Method	Customised
Cone Tip Area Used in Analysis	10.0 cm ²
Elevation at Top of Investigation	46.4 m
Veritcal Datum	NZVD2016
Pre-drill Depth Used in Analysis	0.0 m
Groundwater Used in Analysis	2.9 m

Residual Strength Assessment Method Weighting	
Boulanger & Idriss 2007	0.2
Kramer & Wang 2015	0.5
Weber 2015	0.3

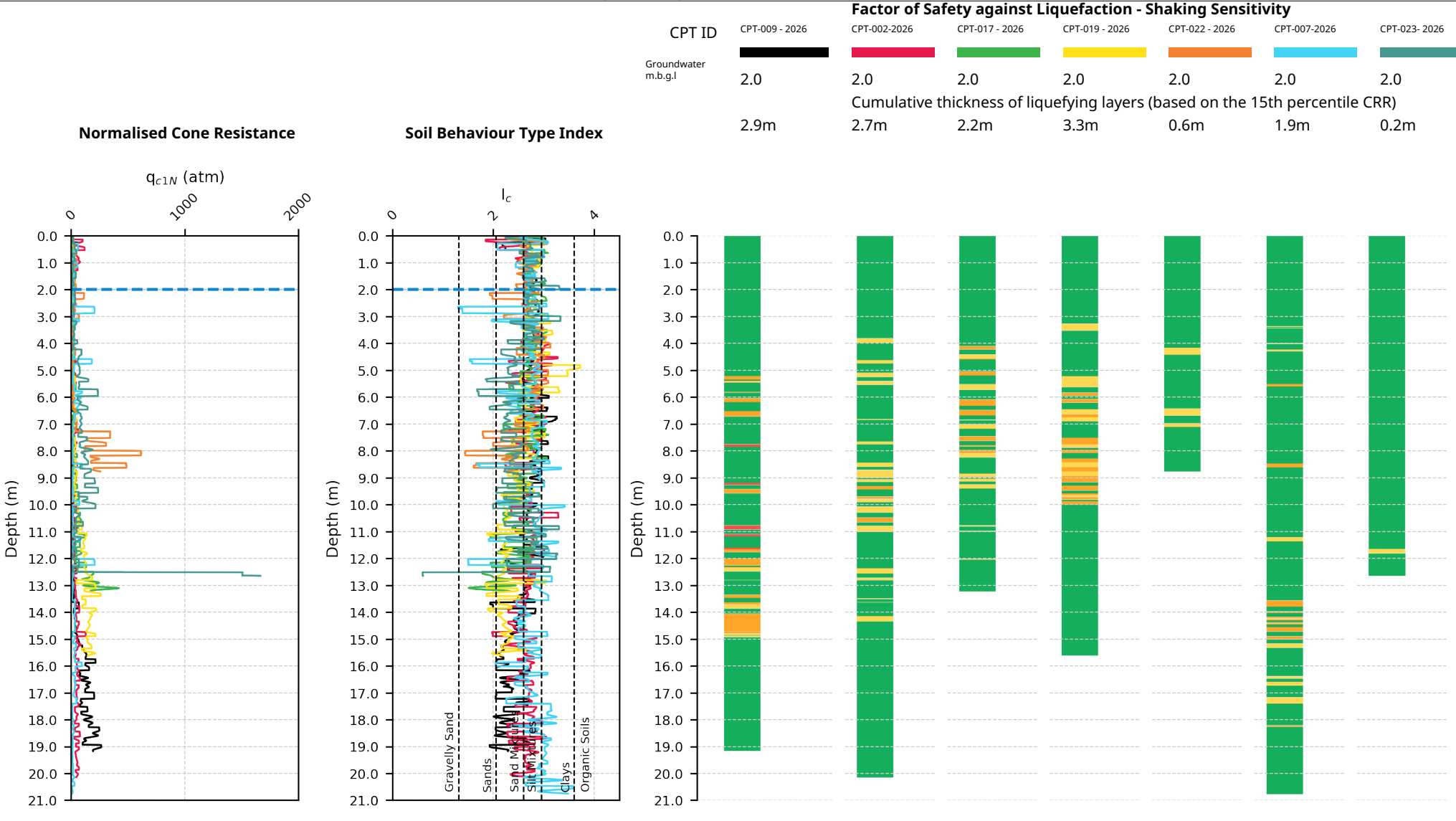
Analysis Methods	
Inverse Filtering	Boulanger & Dejong (2018)
Liquefaction Triggering	Boulanger & Idriss (2014)
Cyclic Softening Triggering	Boulanger & Idriss (2007)
Liquefaction Induced Settlement	Zhang et al. (2002)
Liquefaction Induced Lateral Displacement Index	Zhang et al. (2004)
Liquefaction Induced Cyclic Displacement	Tokimatsu & Asaka (1998)
Ejecta Severity	Bray & Hutabarat (2022)



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL



No Triggering based on 15th 50th Percentile CRR		Triggering based on 50th Percentile CRR		Design Groundwater Level		Earthquake Shaking Case PGA0.19g Magnitude6.5 Return Period1/500 Design Groundwater Depth (m.b.g.l.)2.0 to 2.0	Generated on Apeiron by Infinity Studio
Triggering based on 15th Percentile CRR		Triggering based on 85th Percentile CRR		Design Groundwater Range			



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering
Based on the P_L 15th CRR Curve

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

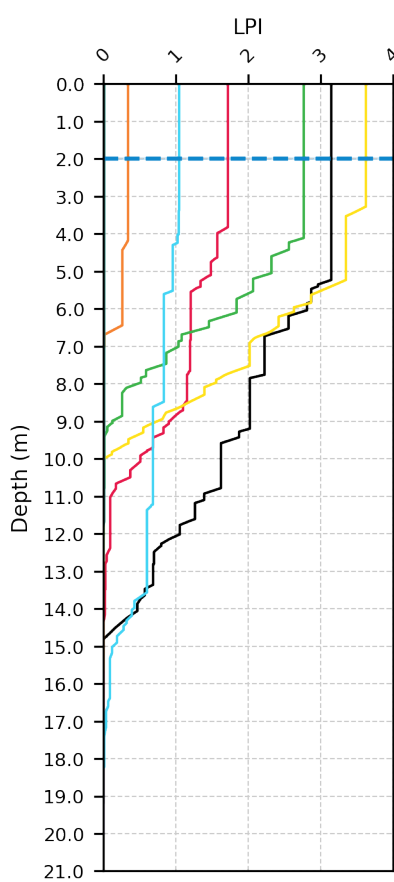
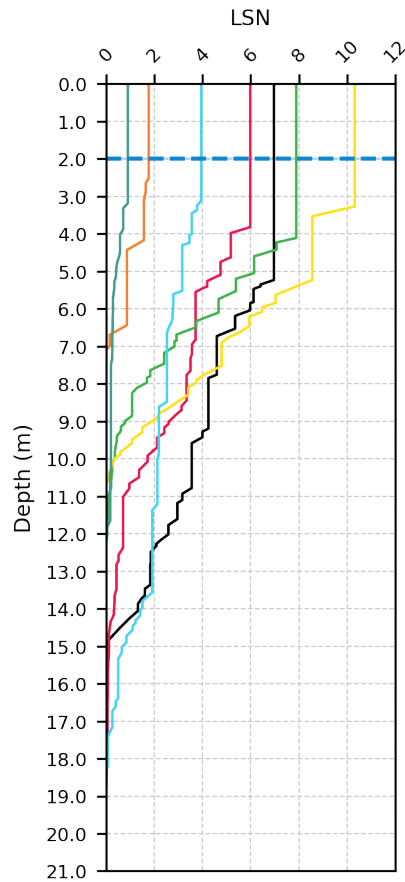
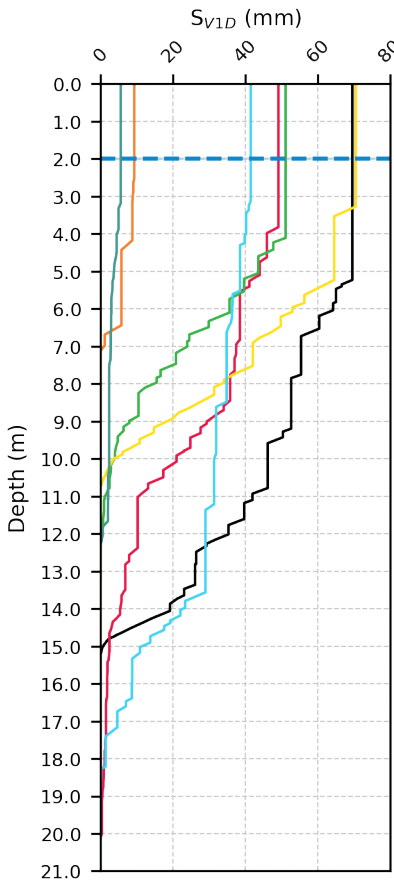
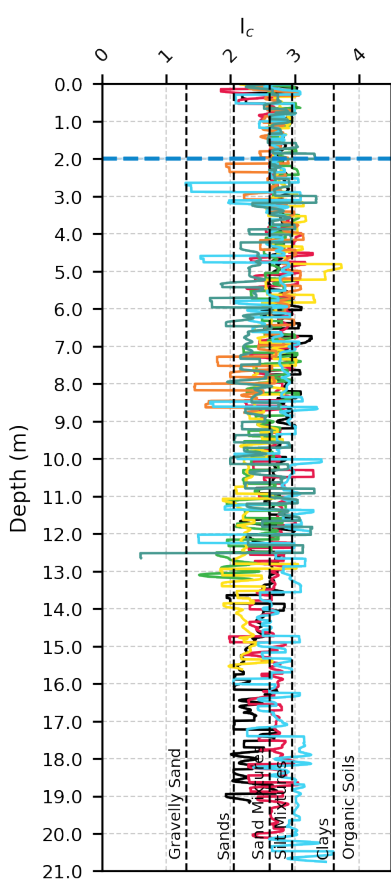
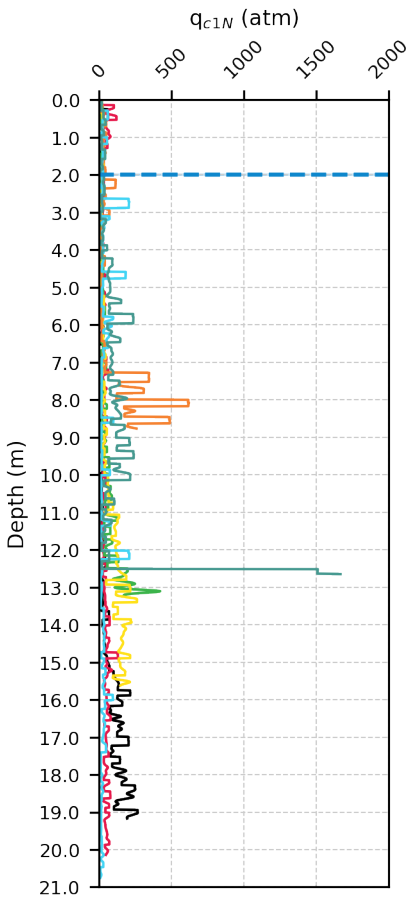
Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Damage Indicators

CPT ID	CPT-009 - 2026	CPT-002-2026	CPT-017 - 2026	CPT-019 - 2026	CPT-022 - 2026	CPT-007-2026	CPT-023- 2026
Groundwater m.b.g.l	2.0	2.0	2.0	2.0	2.0	2.0	2.0
S_V1D (mm)	70	49	51	71	9	42	6
LSN	7	6	8	10	2	4	1
LPI	3	2	3	4	0	1	0

Normalised Cone Resistance

Soil Behaviour Type Index



Design Groundwater Level
Design Groundwater Range

Earthquake Shaking Case

PGA 0.19g
Magnitude 6.5
Return Period 1/500

Design Groundwater

Depth (m.b.g.l.) 2.0 to 2.0

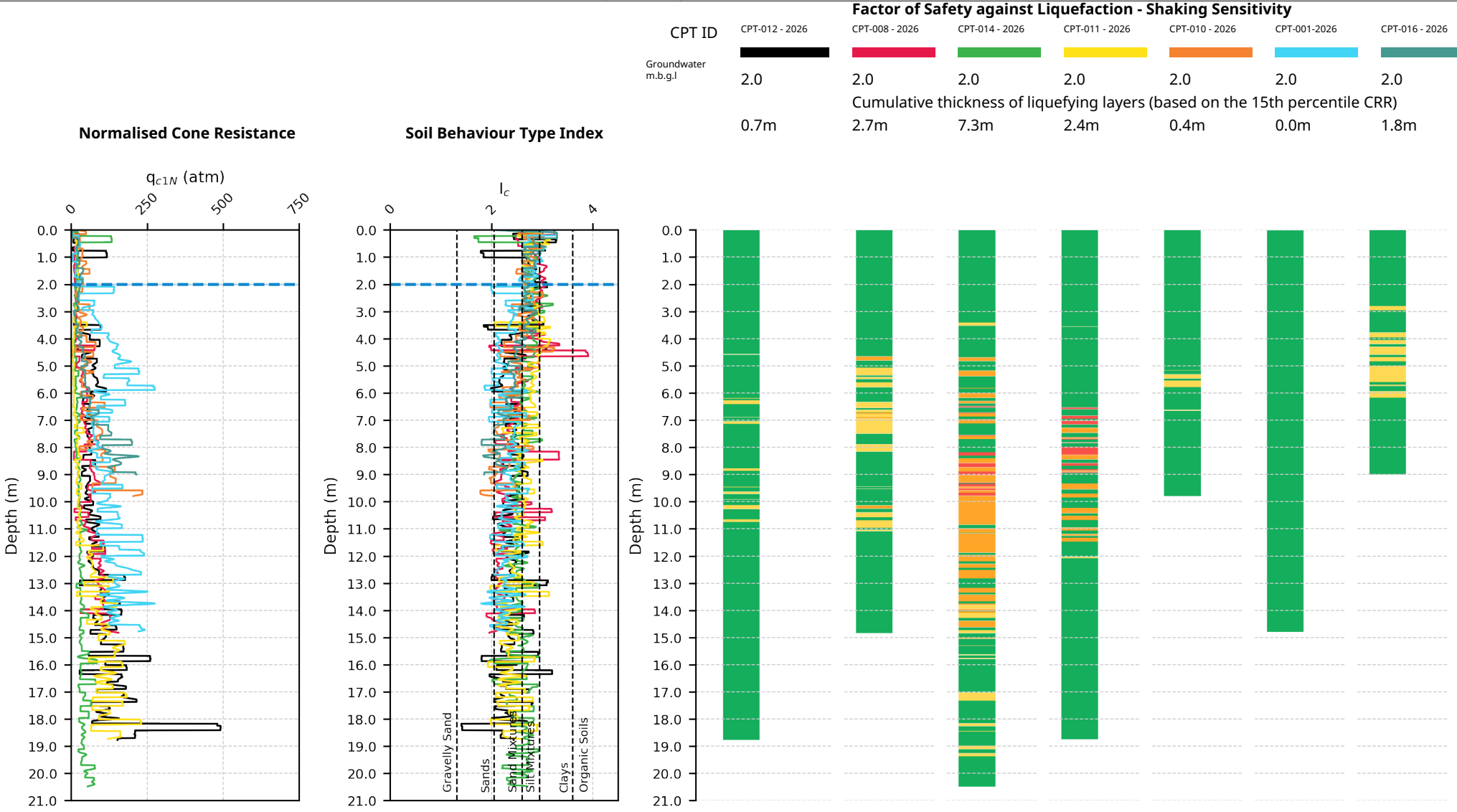
Generated on Apeiron by Infinity Studio



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

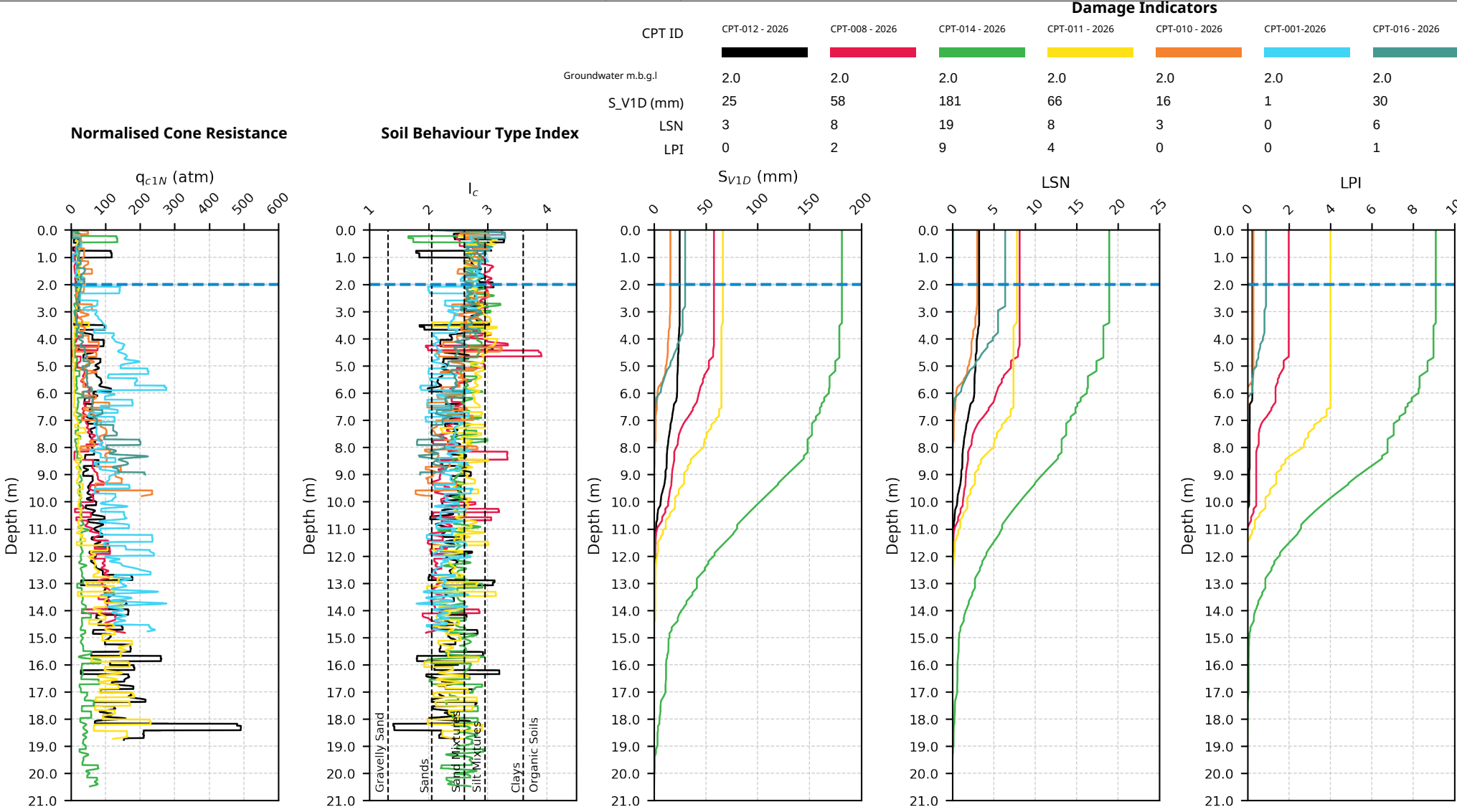




Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering
Based on the P_L 15th CRR Curve

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL



Design Groundwater Level
Design Groundwater Range

Earthquake Shaking Case

PGA 0.19g
Magnitude 6.5
Return Period 1/500

Design Groundwater

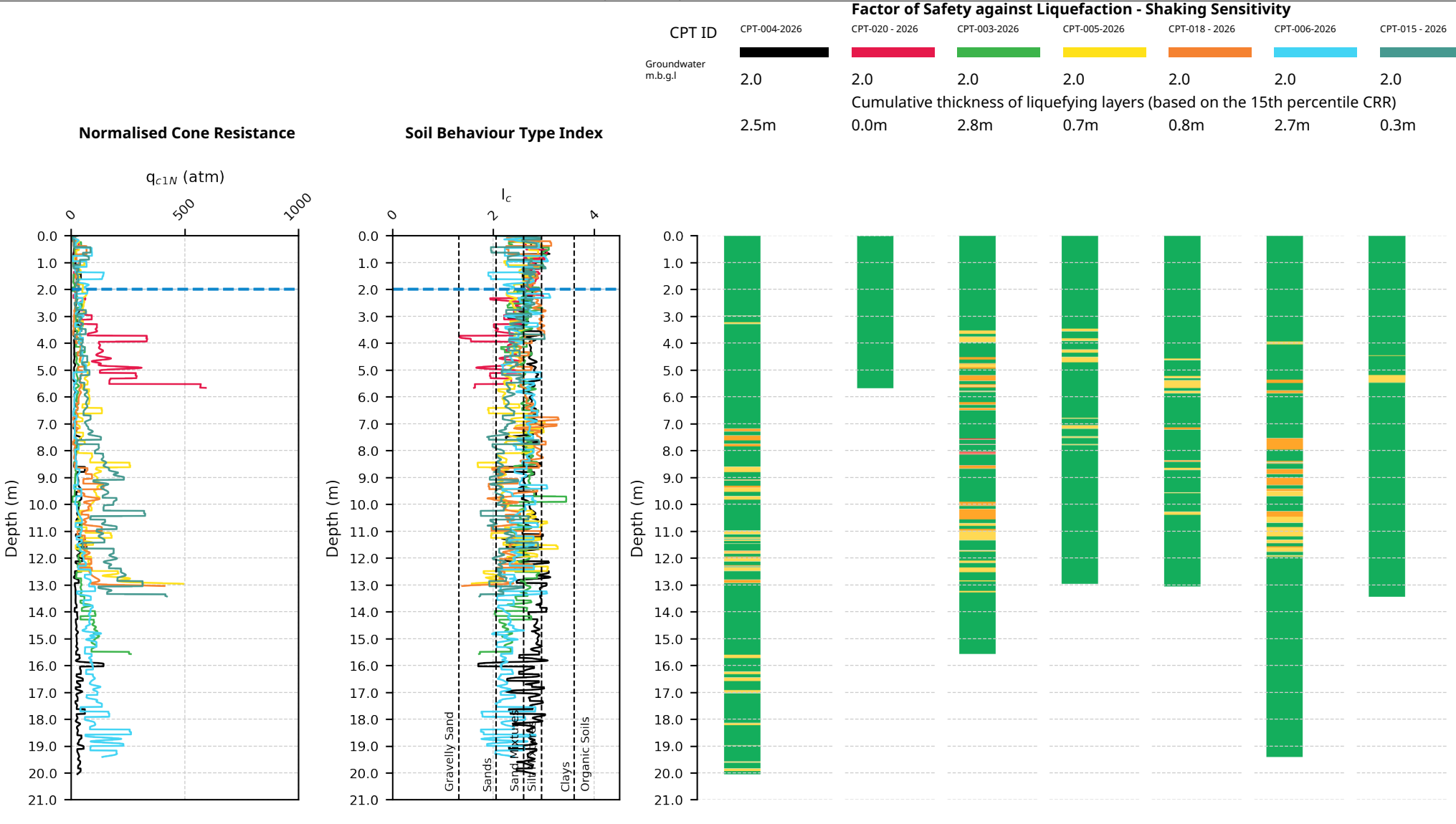
Depth (m.b.g.l.) 2.0 to 2.0



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL





Liquefaction Calculator

Liquefaction Assessment

Liquefaction Triggering
Based on the P_L 15th CRR Curve

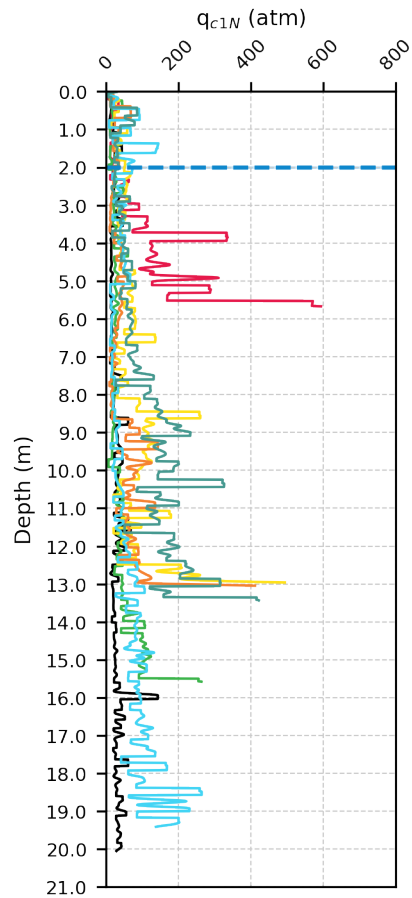
Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

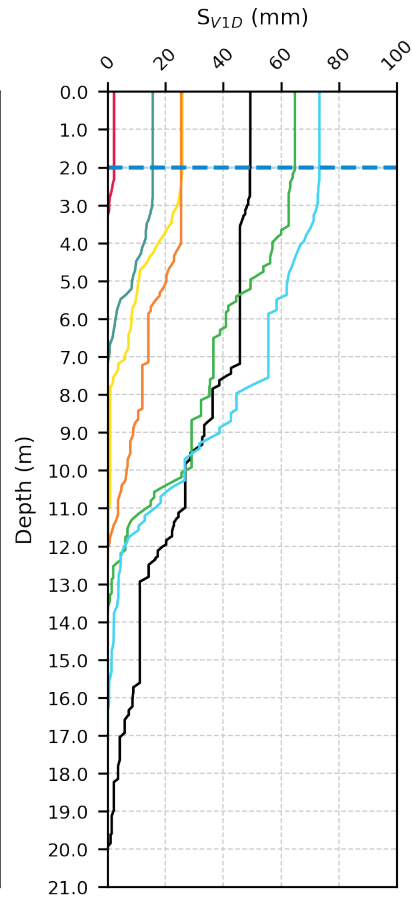
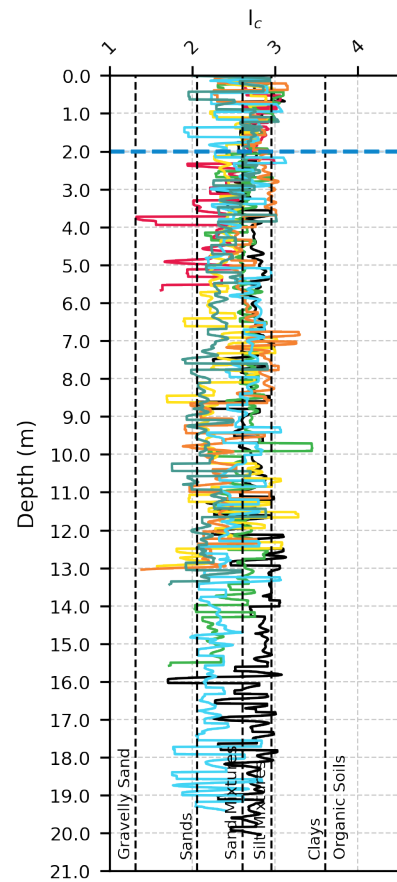
Damage Indicators

CPT ID	CPT-004-2026	CPT-020 - 2026	CPT-003-2026	CPT-005-2026	CPT-018 - 2026	CPT-006-2026	CPT-015 - 2026
Groundwater m.b.g.l	2.0	2.0	2.0	2.0	2.0	2.0	2.0
S_{V1D} (mm)	49	2	65	26	25	73	16
LSN	5	1	10	6	4	10	3
LPI	2	0	3	0	0	3	0

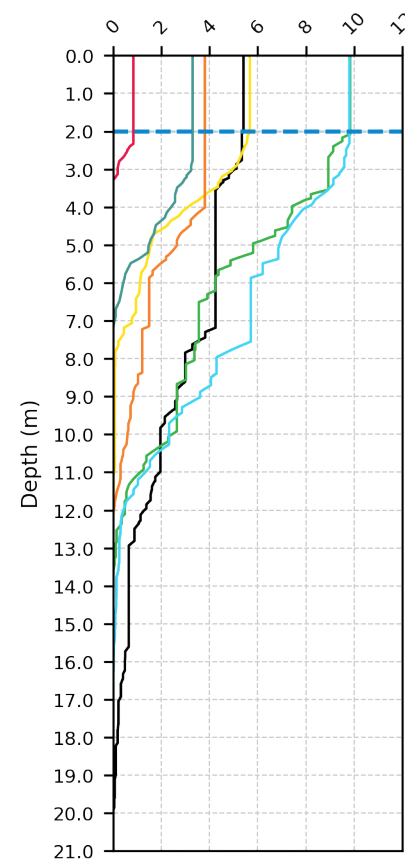
Normalised Cone Resistance



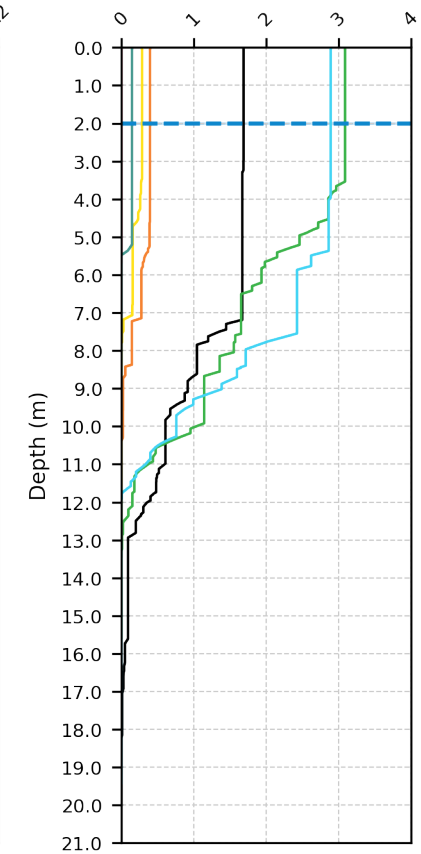
Soil Behaviour Type Index



LSN



LPI



Design Groundwater Level
Design Groundwater Range

Earthquake Shaking Case

PGA 0.19g
Magnitude 6.5
Return Period 1/500

Design Groundwater

Depth (m.b.g.l.) 2.0 to 2.0

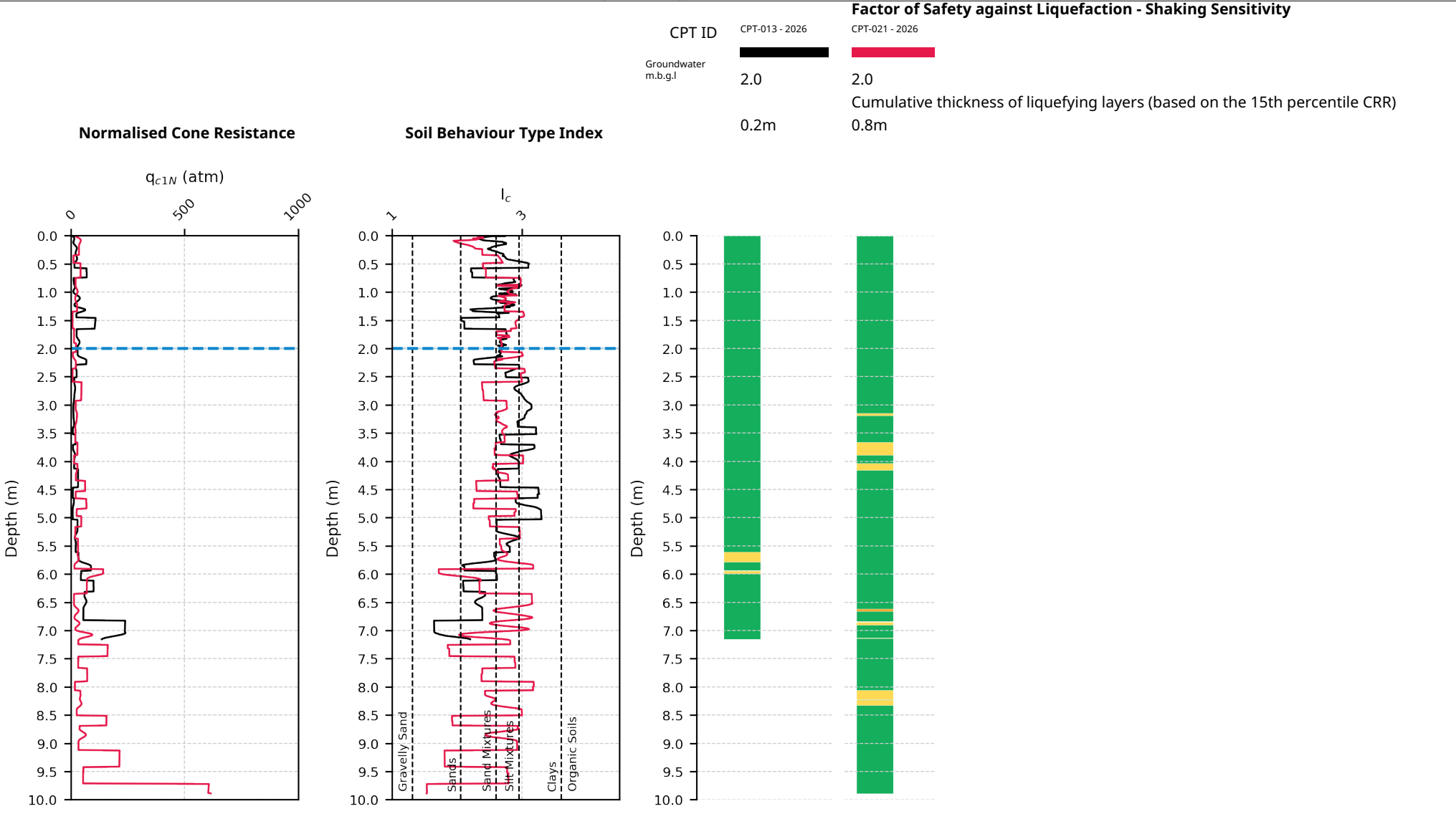
Generated on Apeiron by Infinity Studio



Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL



No Triggering based on 15th 50th Percentile CRR

Triggering based on 50th Percentile CRR

Triggering based on 15th Percentile CRR

Triggering based on 85th Percentile CRR

Design Groundwater Level

Design Groundwater Range

Earthquake Shaking Case	
PGA	0.19g
Magnitude	6.5
Return Period	1/500
Design Groundwater	
Depth (m.b.g.l.)	2.0 to 2.0



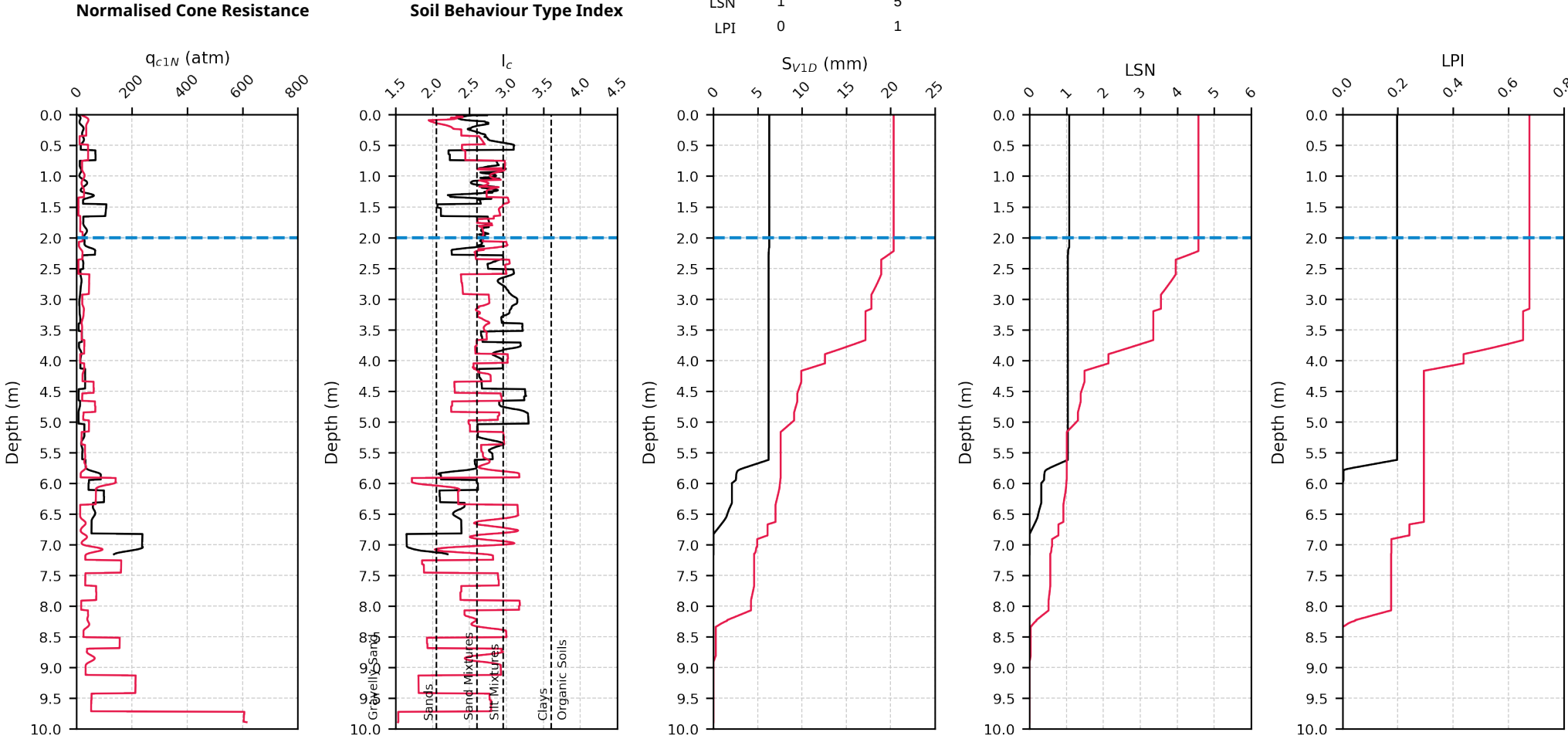
Liquefaction Calculator
Liquefaction Assessment
Liquefaction Triggering
Based on the P_L 15th CRR Curve

Project: Beachlands south
Project Number: 1014358.3100
Project Client: Beachlands south pacific partnership

Project Stage: Stage 2
Generated By: Jacob Simpson
Reviewed By: JXXL

Damage Indicators

CPT ID	CPT-013 - 2026	CPT-021 - 2026
Groundwater m.b.g.l	2.0	2.0
S _{V1D} (mm)	6	20
LSN	1	5
LPI	0	1



Design Groundwater Level
Design Groundwater Range

Earthquake Shaking Case

PGA 0.19g
Magnitude 6.5
Return Period 1/500

Design Groundwater

Depth (m.b.g.l.) 2.0 to 2.0

Appendix E Slope Stability Analysis Outputs

Refer to 1014358.3200–Figure 1 Site Investigation Plan in Appendix A for slope stability cross-section locations:

- XS-1 (Western Cliff)
- XS-2
- XS-3
- XS-6 (Southern Cliff, relict scallop-shaped landslide feature)
- XS-7 (Southern Cliff)
- XS-8 (Southern Cliff)
- XS-9 (Southern Cliff)
- XS-11
- XS-12
- XS-15
- XS-18 (Western Cliff)
- XS-19 (Western Cliff)
- XS-20 (Western Cliff)

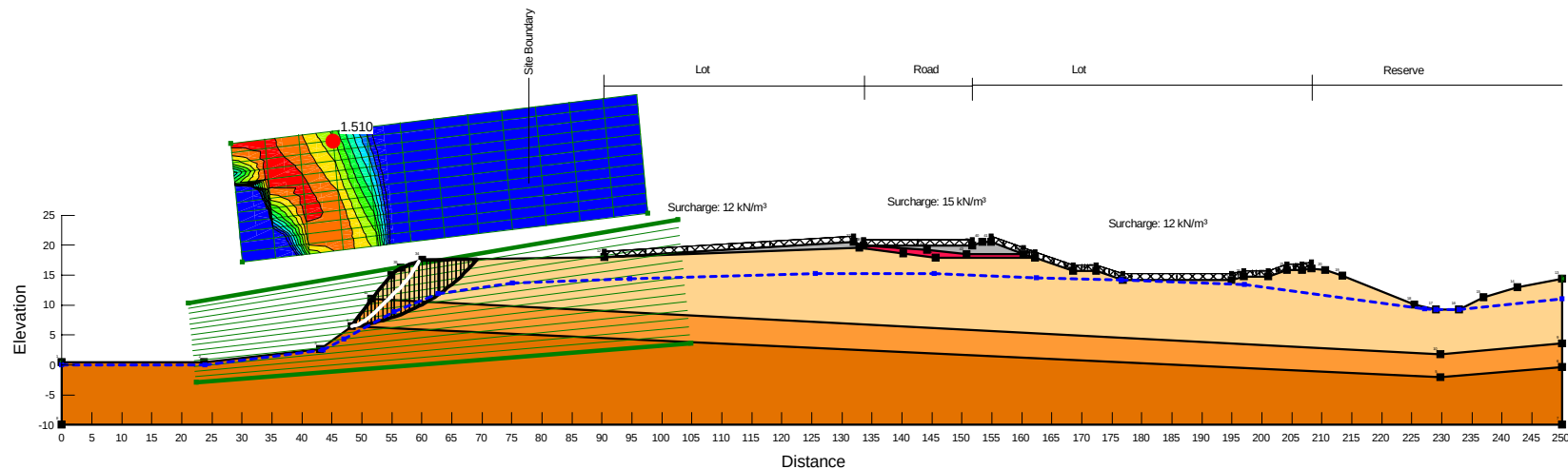
Refer to 1014358.3200–Figure 12 for indicative location and extent of the palisade wall, including a typical detail



SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	Fill (Historic)	Mohr-Coulomb	17	3	28	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-01 (Coastal - Western Cliffs)
Analysis: Design Profile: 01a_Static

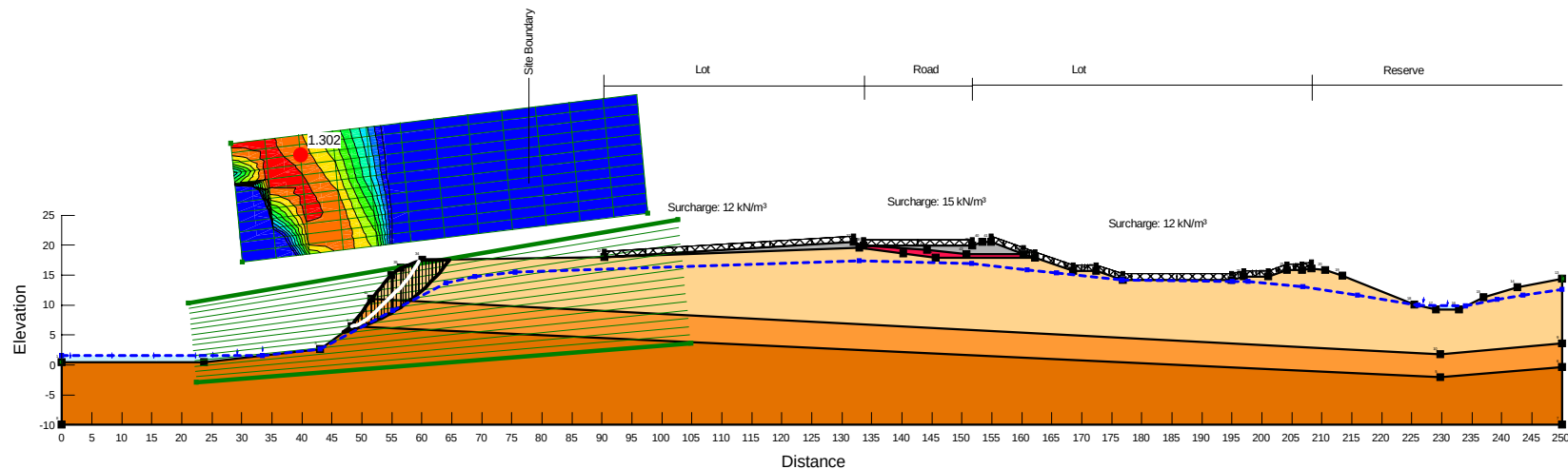
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Red	Fill (Historic)	Mohr-Coulomb	17	3	28	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Brown	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-01 (Coastal - Western Cliffs)
Analysis: Design Profile: 01b_EGWL

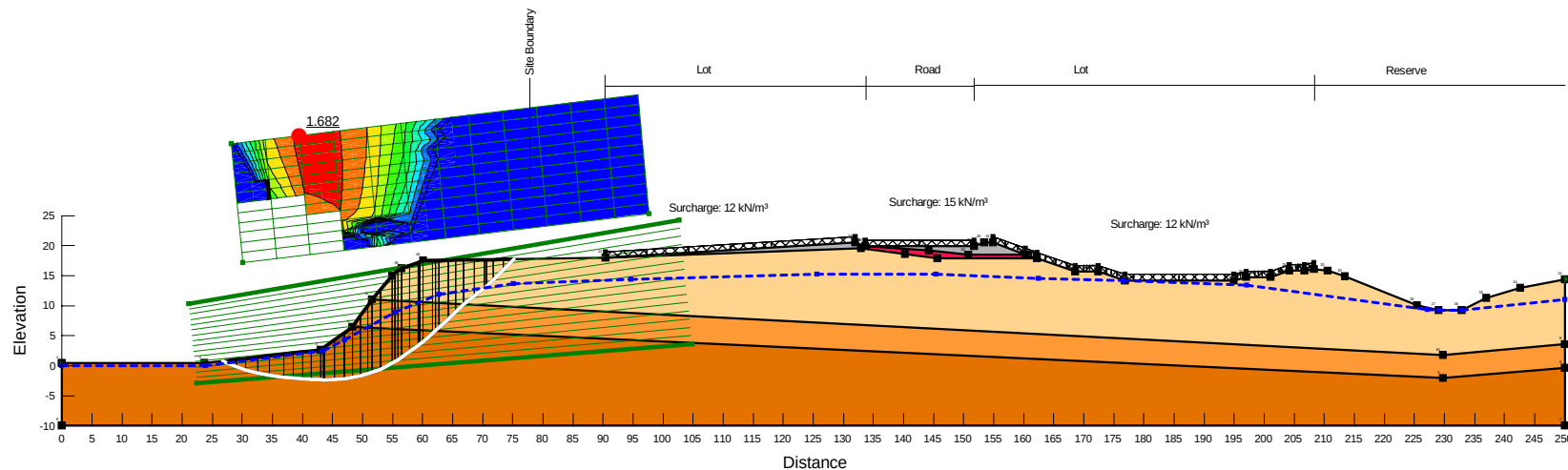
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
Grey	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
Red	Fill (Historic, Undrained)	Undrained (Phi=0)	17			1	60
Orange	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
Brown	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
Light Orange	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-01 (Coastal - Western Cliffs)
Analysis: Design Profile: 01c_EQ

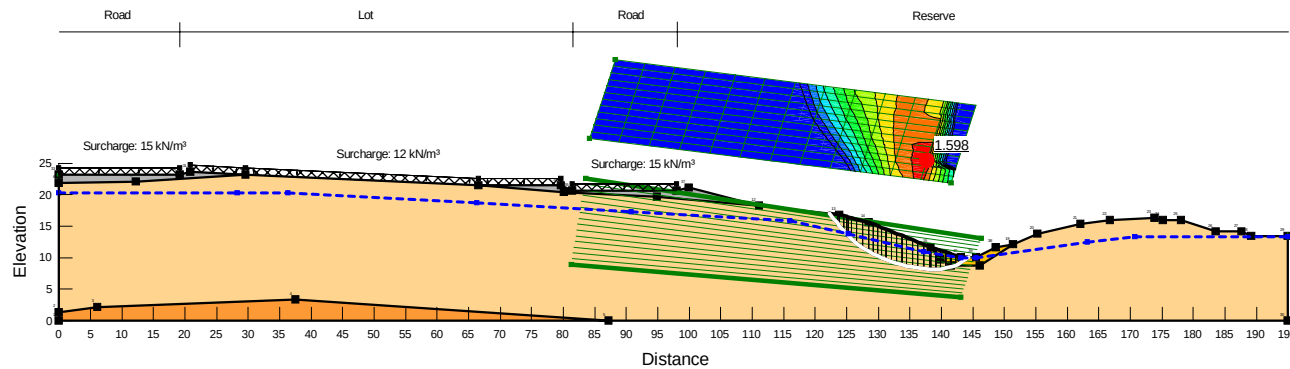
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Left to Right
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-02 (Coastal)
Analysis: Design Profile: 02a_Static

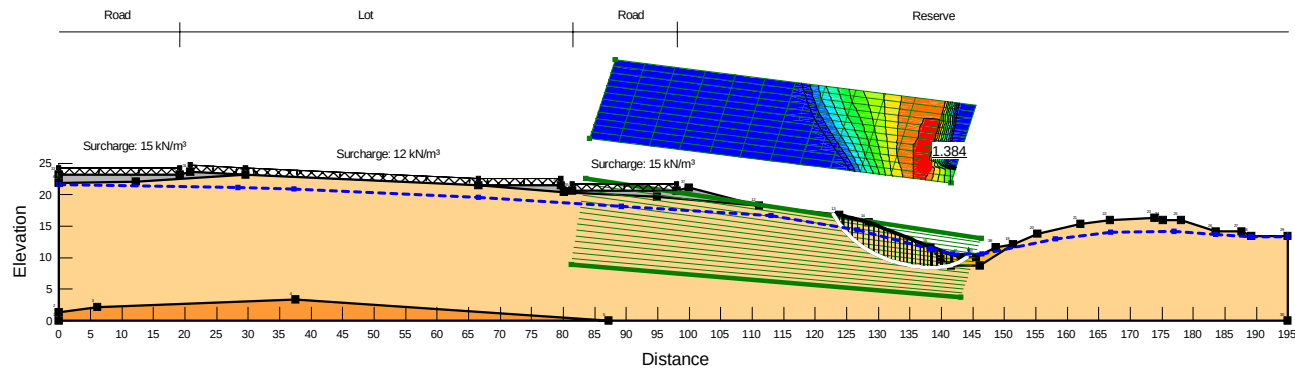
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Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Left to Right
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Yellow	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-02 (Coastal)
Analysis: Design Profile: 02b_EGWL

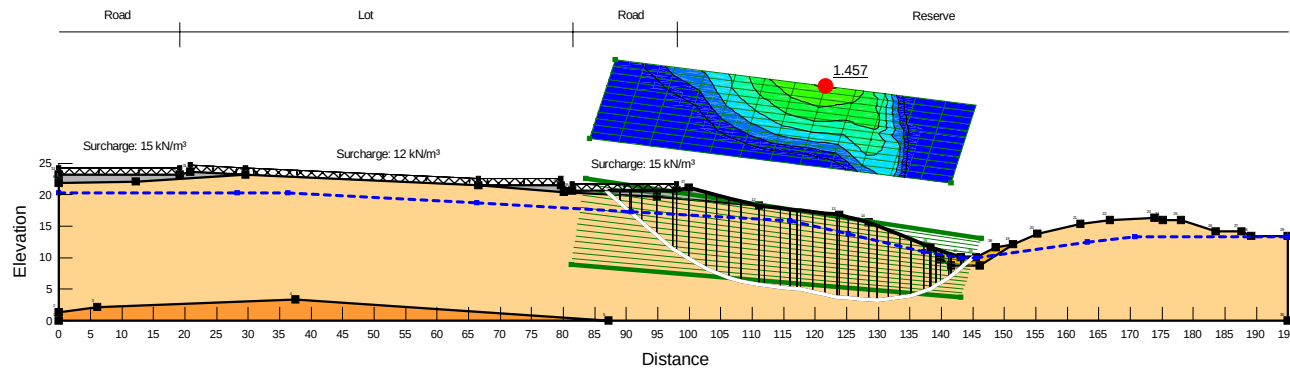
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Left to Right
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Undrained Shear Strength (kPa)	Piezometric Surface
■	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17	40	1
■	Fill (Engineered, Undrained)	Undrained (Phi=0)	18	140	1
■	HW ECBF (Undrained)	Undrained (Phi=0)	19	200	1
■	Residual ECBF (Undrained)	Undrained (Phi=0)	17	70	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-02 (Coastal)
Analysis: Design Profile: 02c_EQ

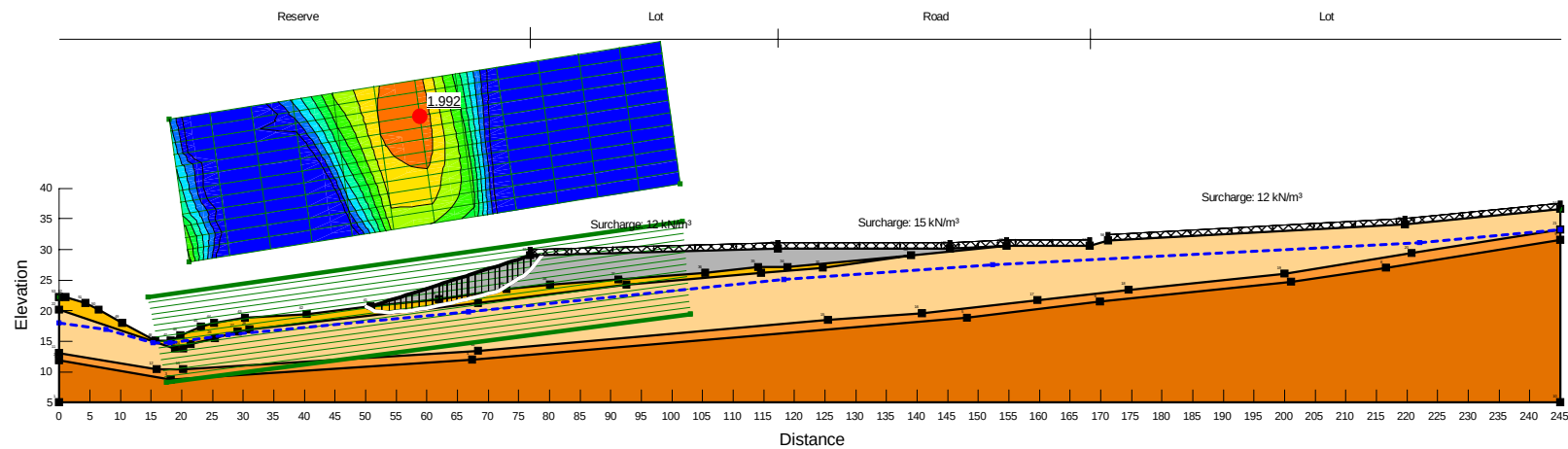
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Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-03 (Central East)
Analysis: Design Profile: 03a_Static

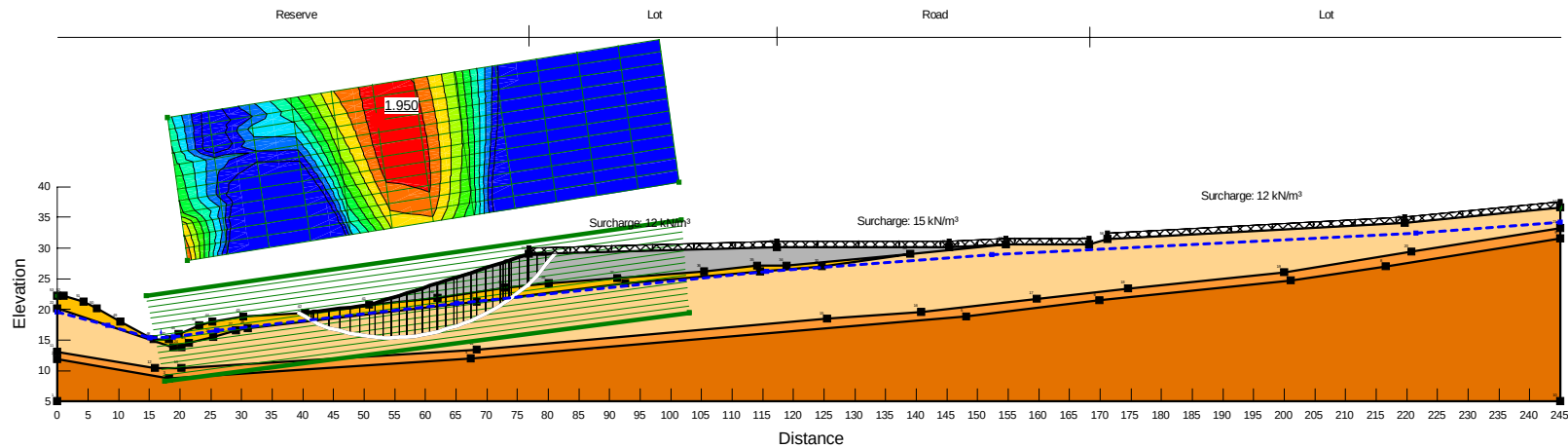
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Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-03 (Central East)
Analysis: Design Profile: 03b_EGWL

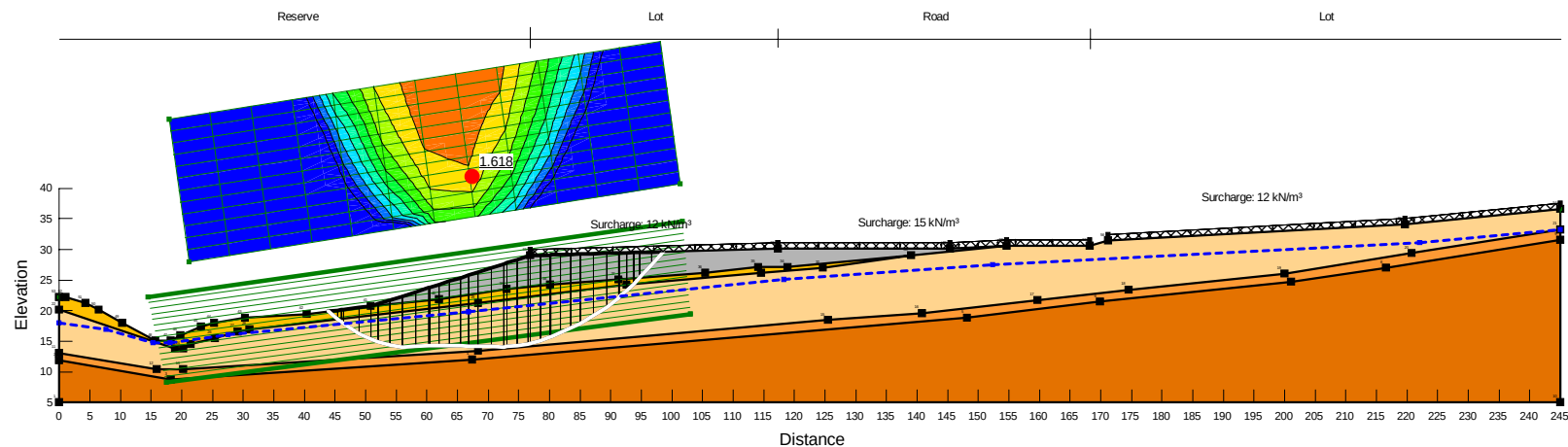
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 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-03 (Central East)
Analysis: Design Profile: 03c_EQ

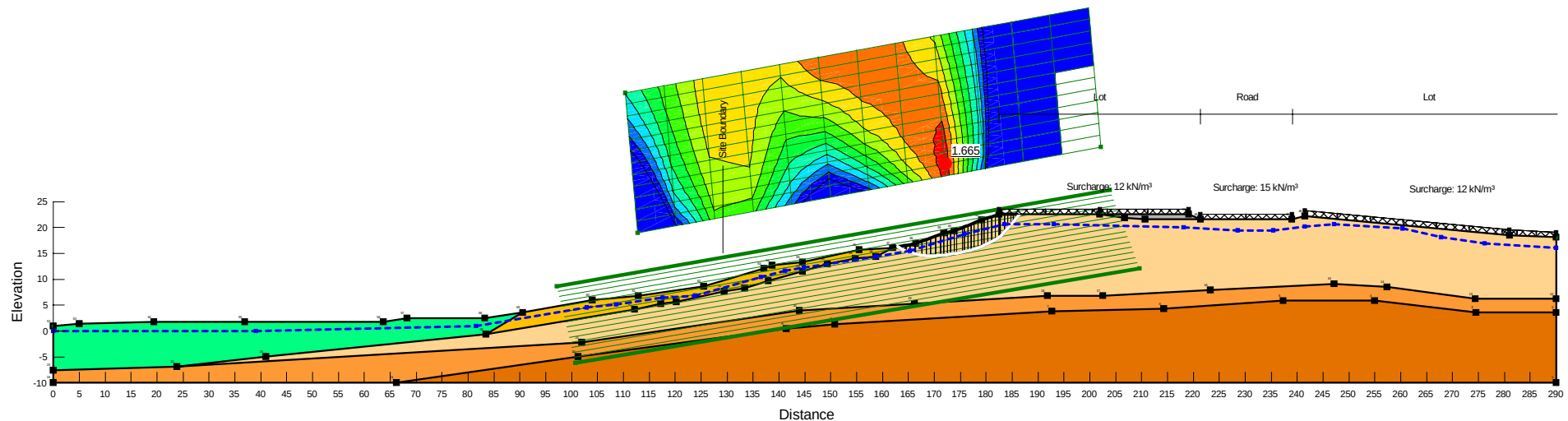
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	Marine Deposits	Mohr-Coulomb	16	2	25	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-06 (Coastal - Southern Cliffs - Instability)
Analysis: Design Profile: 06a_Static

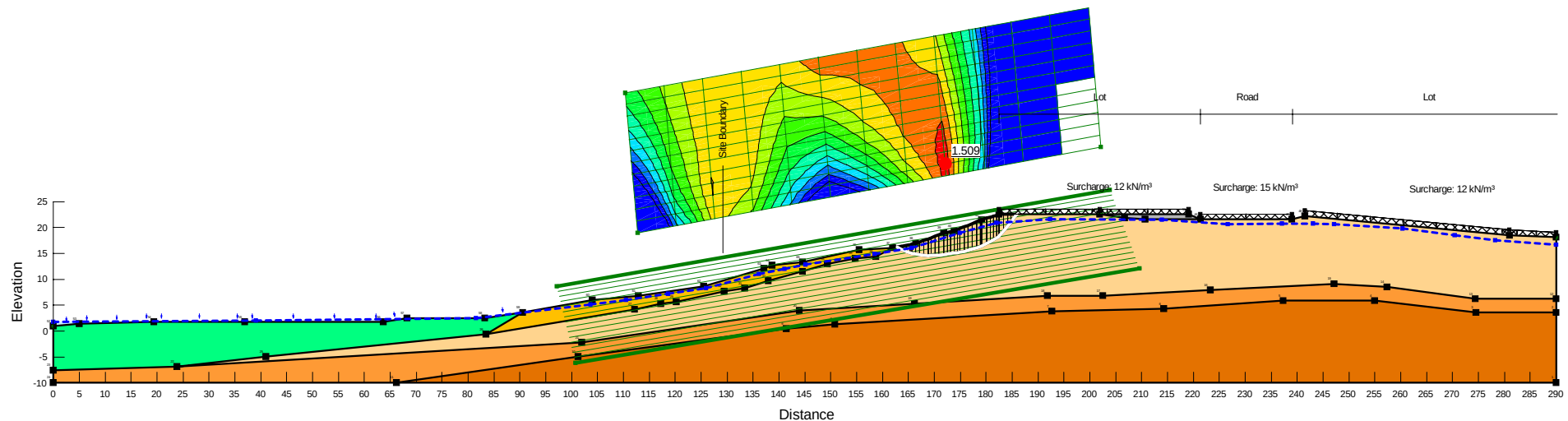
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	Marine Deposits	Mohr-Coulomb	16	2	25	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-06 (Coastal - Southern Cliffs - Instability)
Analysis: Design Profile: 06b_EGWL

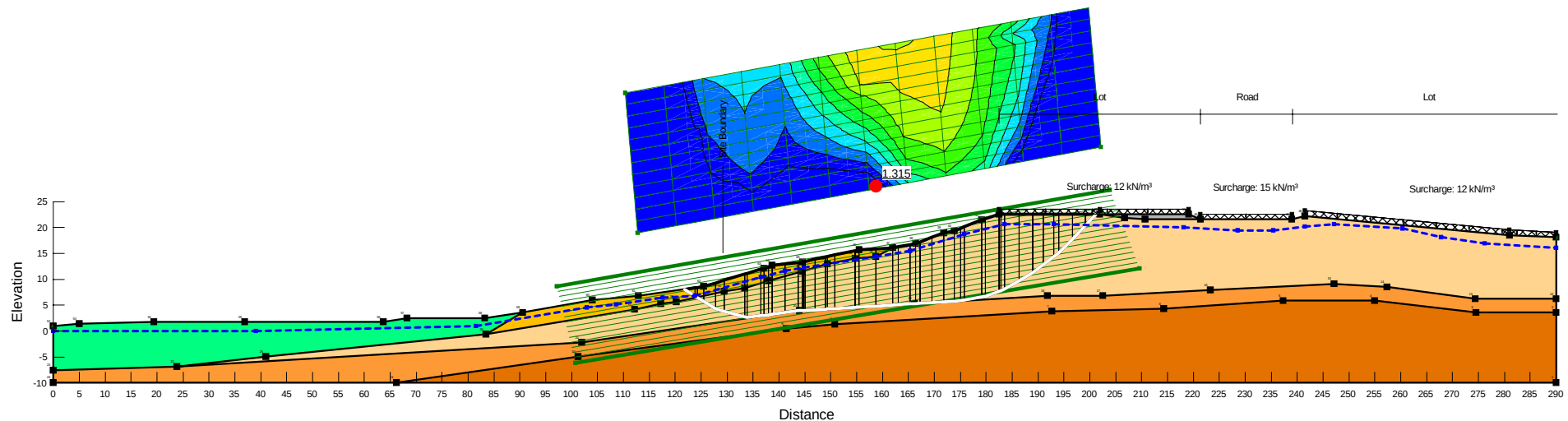
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	Marine Deposits (Undrained)	Undrained (Phi=0)	16			1	30
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-06 (Coastal - Southern Cliffs - Instability)
Analysis: Design Profile: 06c_EQ

T+T Ref: 1014358.3200.v1

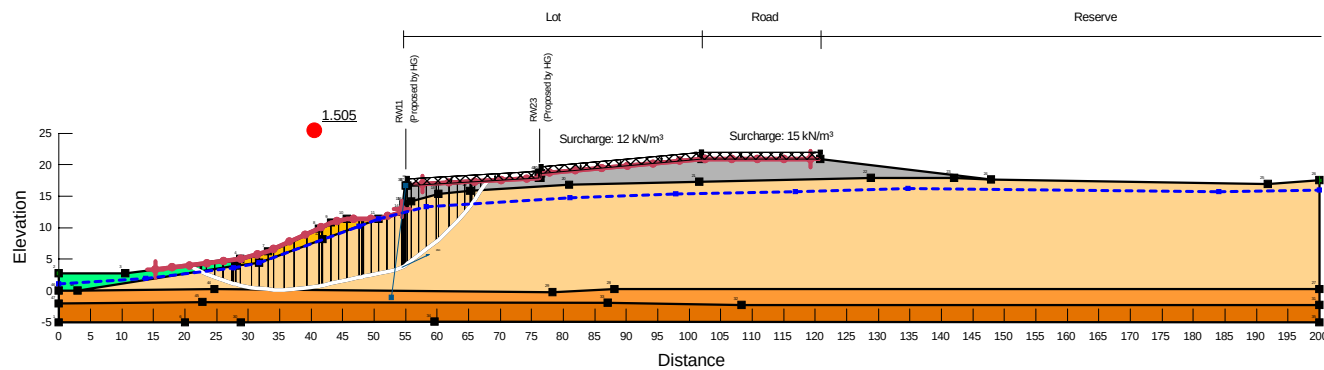
Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Entry and Exit
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 18 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	Marine Deposits	Mohr-Coulomb	16	2	25	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1
■	Retaining Wall	High Strength	21			1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-07 (Coastal - Southern Cliffs)
Analysis: Design Profile: 07a_Static (325kN) entry exit

T+T Ref: 1014358.3200.v1

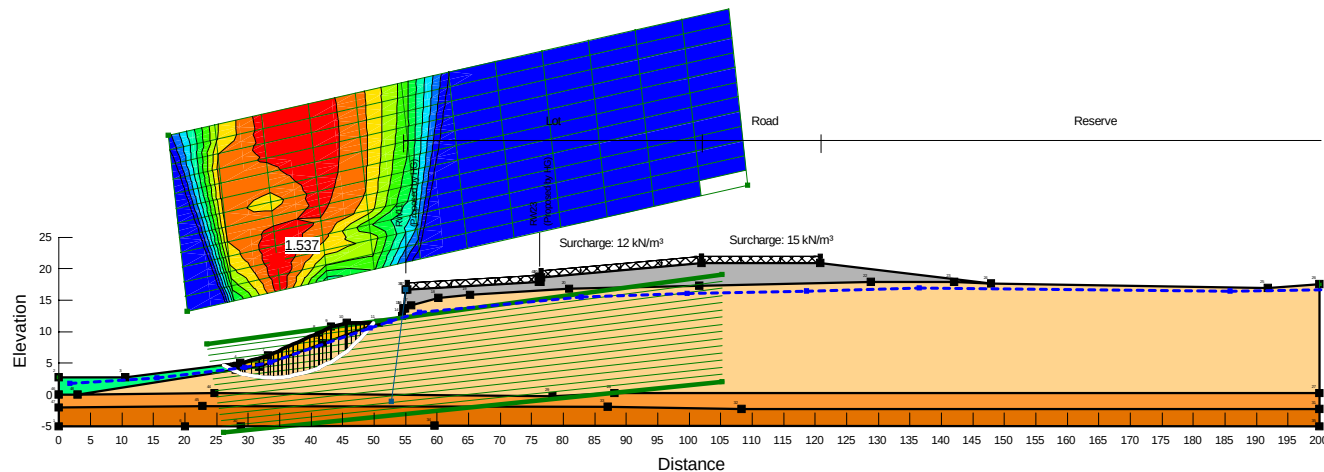
Created By: Scott Honiss
Date: 02/06/2026, 05:28:00 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 18 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	Marine Deposits	Mohr-Coulomb	16	2	25	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1
■	Retaining Wall	High Strength	21			1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-07 (Coastal - Southern Cliffs)
Analysis: Design Profile: 07a_Static (325kN)
Check of downslope stability

T+T Ref: 1014358.3200.v1

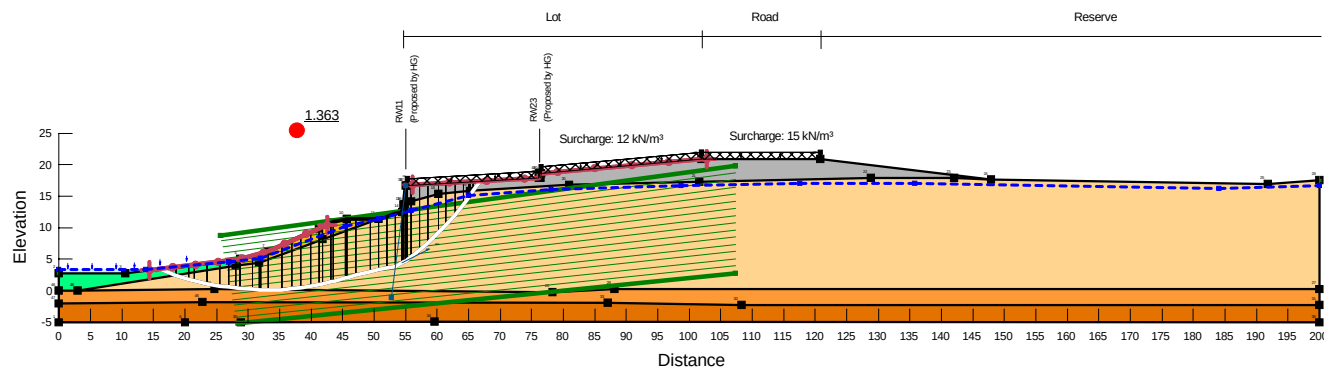
Created By: Scott Honiss
Date: 02/06/2026, 05:28:00 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Entry and Exit
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 18 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	Marine Deposits	Mohr-Coulomb	16	2	25	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1
■	Retaining Wall	High Strength	21			1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-07 (Coastal - Southern Cliffs)
Analysis: Design Profile: 07b_EGWL (325kN)

T+T Ref: 1014358.3200.v1

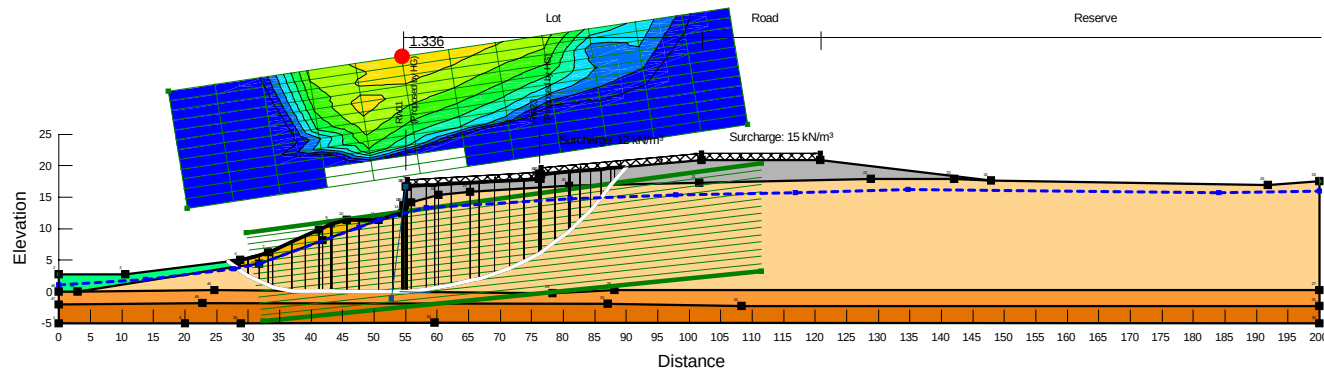
Created By: Scott Honiss
Date: 08/06/2026, 01:51:57 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 18 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
■	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
■	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
■	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
■	Marine Deposits (Undrained)	Undrained (Phi=0)	16			1	30
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
■	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70
■	Retaining Wall	High Strength	21			1	



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-07 (Coastal - Southern Cliffs)
Analysis: Design Profile: 07c_EQ (325kN)

T+T Ref: 1014358.3200.v1

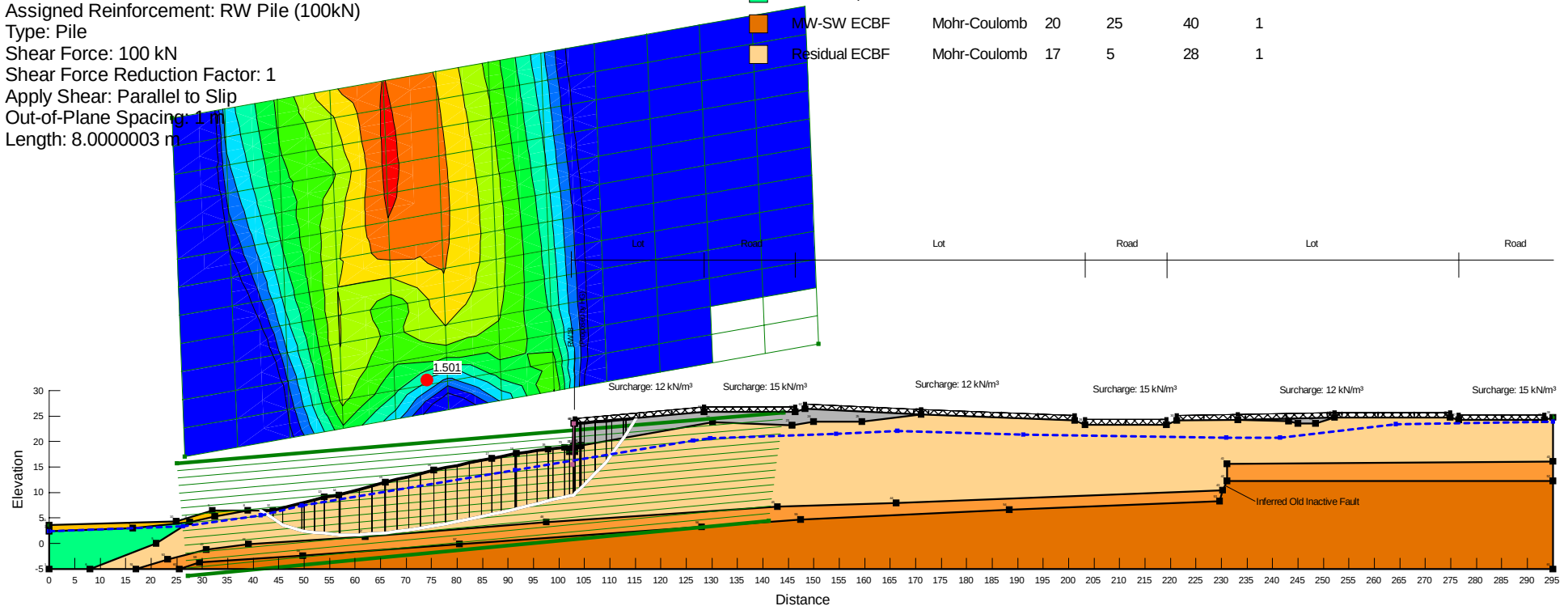
Created By: Scott Honiss
Date: 02/06/2026, 05:28:00 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (100kN)
Type: Pile
Shear Force: 100 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 8.0000003 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	Marine Deposits	Mohr-Coulomb	16	2	25	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-08 (Coastal - Southern Cliffs)
Analysis: Design Profile: 08a_Static (100kN)

T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1

Assigned Reinforcement: RW Pile (100kN)

Type: Pile

Shear Force: 100 kN

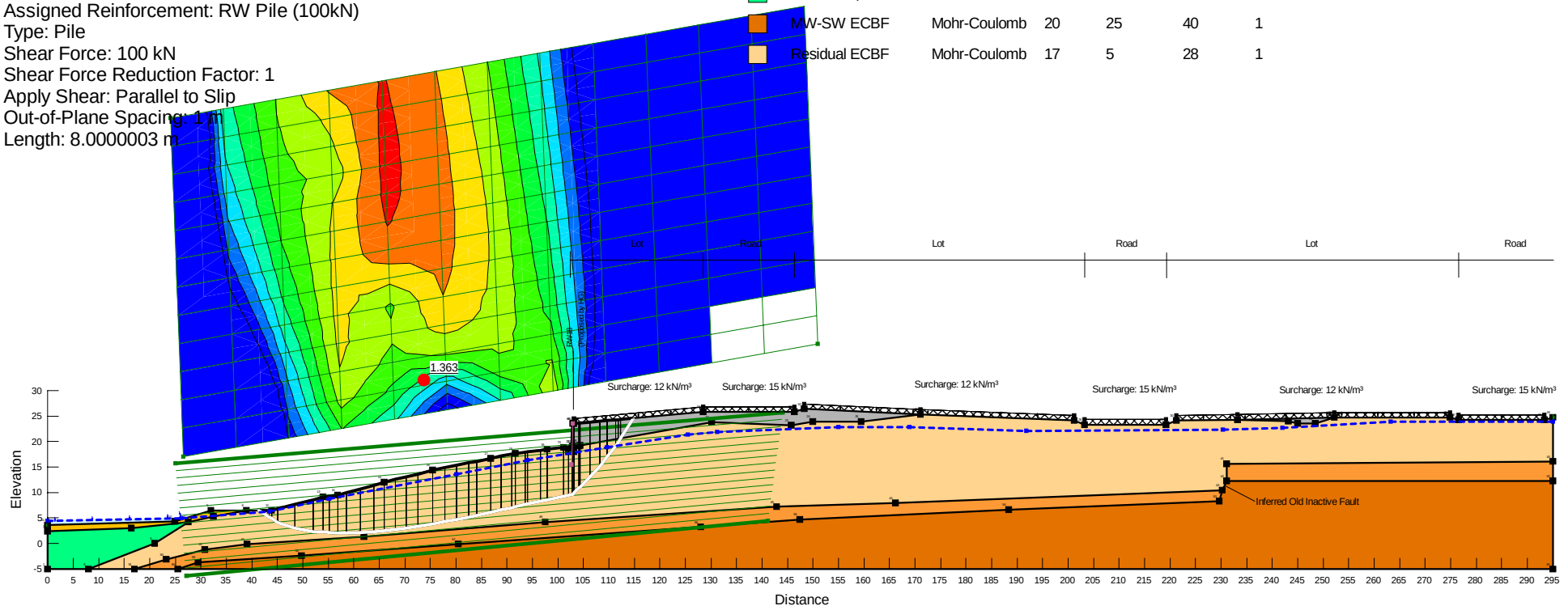
Shear Force Reduction Factor: 1

Apply Shear: Parallel to Slip

Out-of-Plane Spacing: 1m

Length: 8.0000003 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	Marine Deposits	Mohr-Coulomb	16	2	25	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-08 (Coastal - Southern Cliffs)
Analysis: Design Profile: 08b_EGWL (100kN)

T+T Ref: 1014358.3200.v1

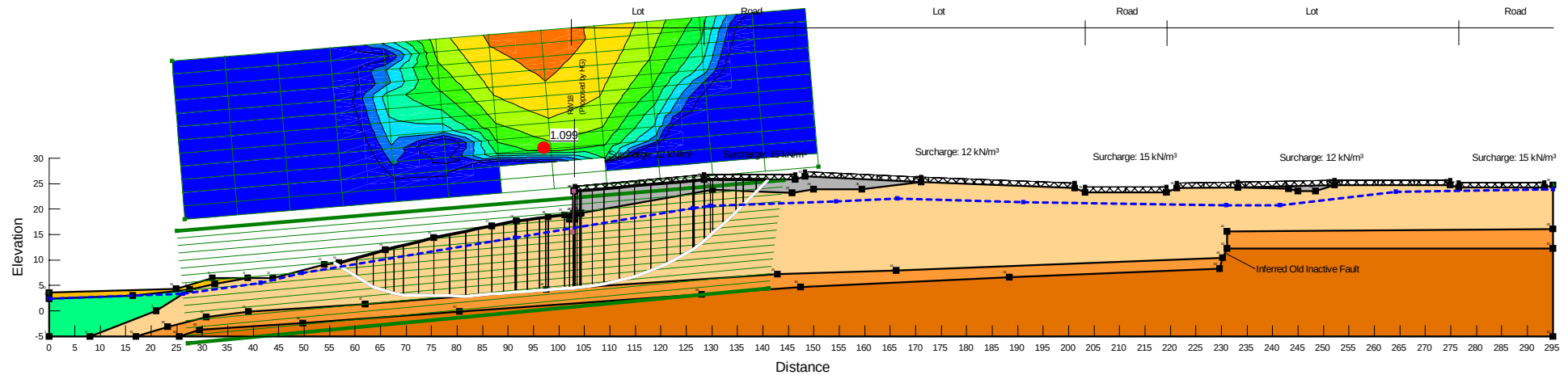
Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (100kN)
Type: Pile
Shear Force: 100 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 8.0000003 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	Marine Deposits (Undrained)	Undrained (Phi=0)	16			1	30
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-08 (Coastal - Southern Cliffs)
Analysis: Design Profile: 08c_EQ (100kN)

T+T Ref: 1014358.3200.v1

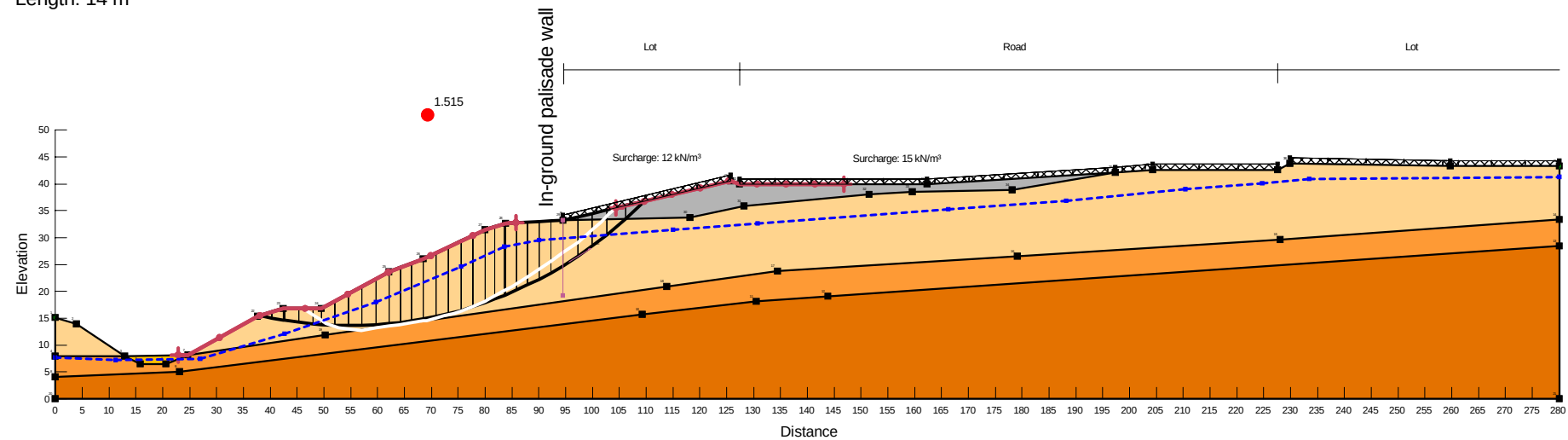
Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Entry and Exit
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (350kN)
Type: Pile
Shear Force: 350 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 14 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Yellow	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Dark Orange	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-09 (Central East)
Analysis: Design Profile: 09b static

T+T Ref: 1014358.3200.v1

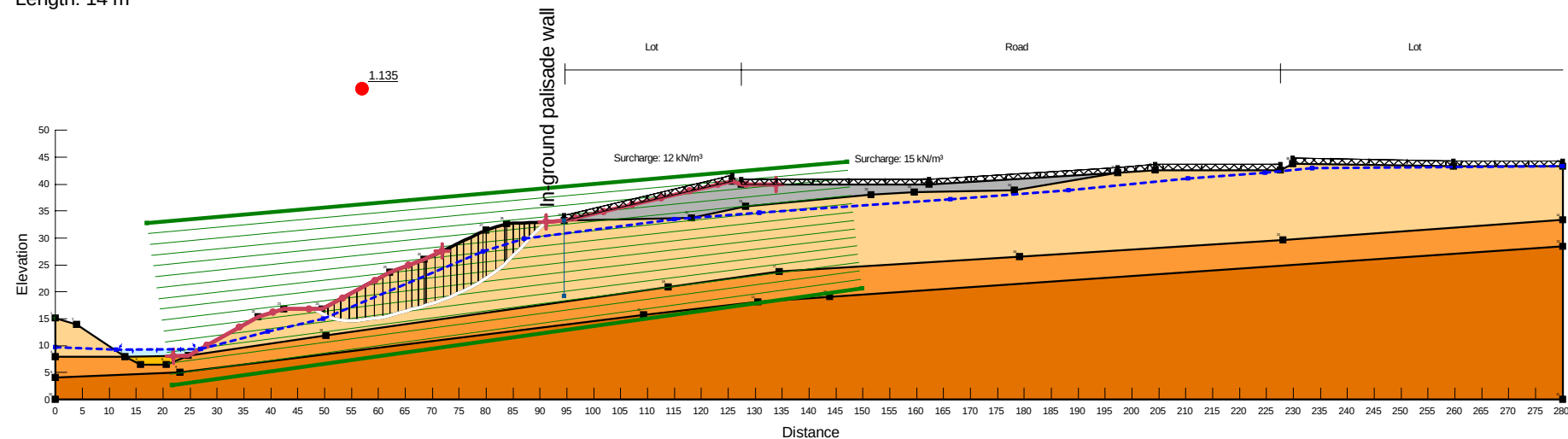
Created By: Scott Honiss
Date: 08/06/2026, 03:01:09 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Entry and Exit
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 14 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-09 (Central East)
Analysis: Design Profile: 09b_EGWL
Check of downslope stability

T+T Ref: 1014358.3200.v1

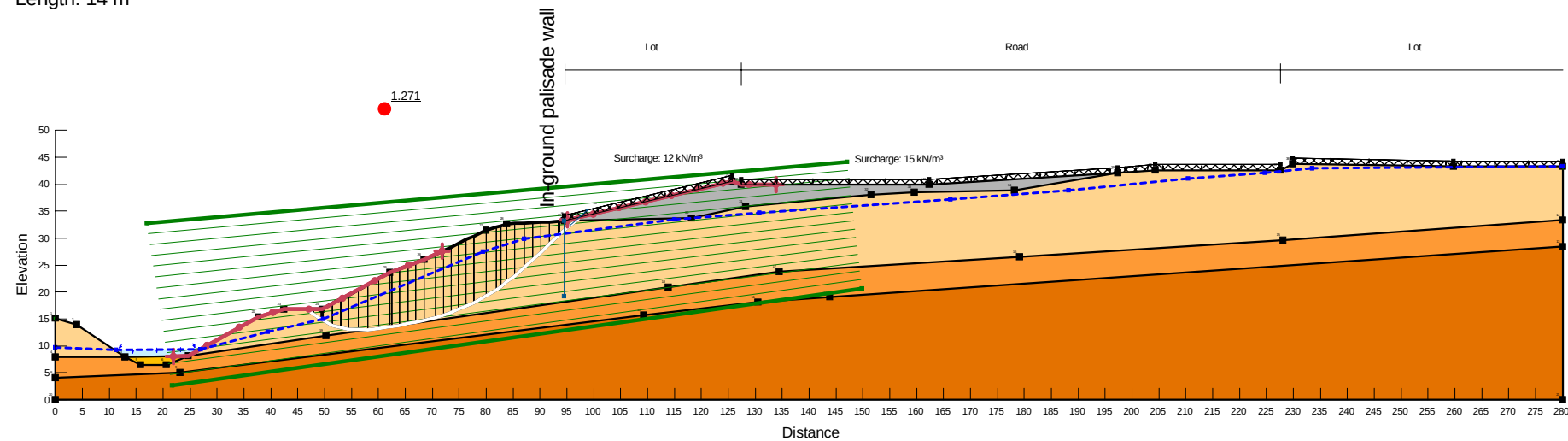
Created By: Scott Honiss
Date: 08/06/2026, 03:03:06 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Entry and Exit
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 14 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Yellow	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Dark Orange	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-09 (Central East)
Analysis: Design Profile: 09b_EGWL

T+T Ref: 1014358.3200.v1

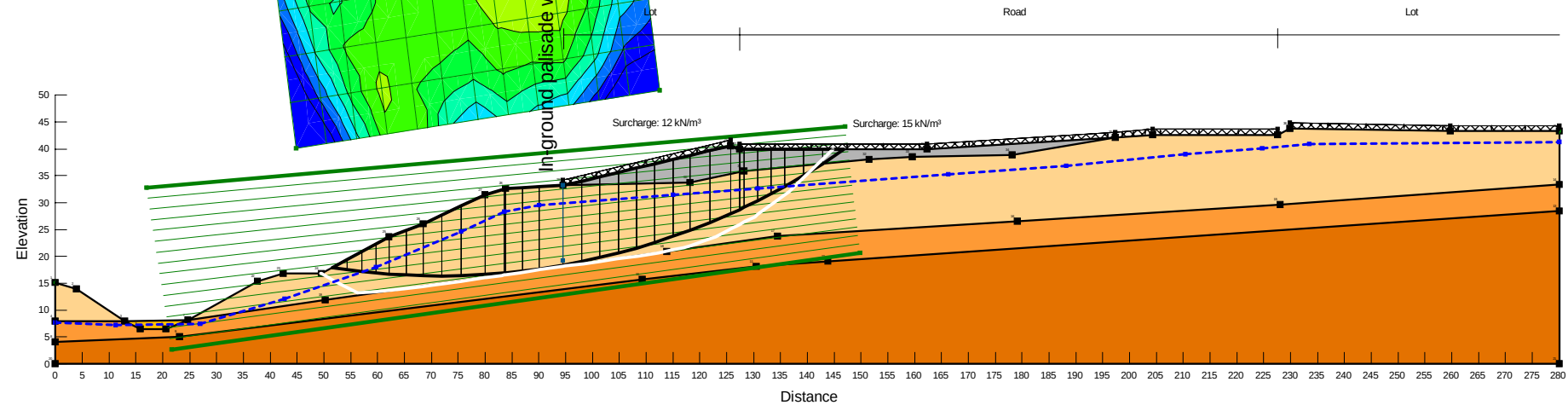
Created By: Scott Honiss
Date: 08/06/2026, 03:07:37 pm
Checked By: J Simpson
Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Reinforcement Line ID: 1
Assigned Reinforcement: RW Pile (325kN)
Type: Pile
Shear Force: 325 kN
Shear Force Reduction Factor: 1
Apply Shear: Parallel to Slip
Out-of-Plane Spacing: 1 m
Length: 14 m

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1	
	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF	Mohr-Coulomb	17	5	28	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-09 (Central East)
Analysis: Design Profile: 09b seismic

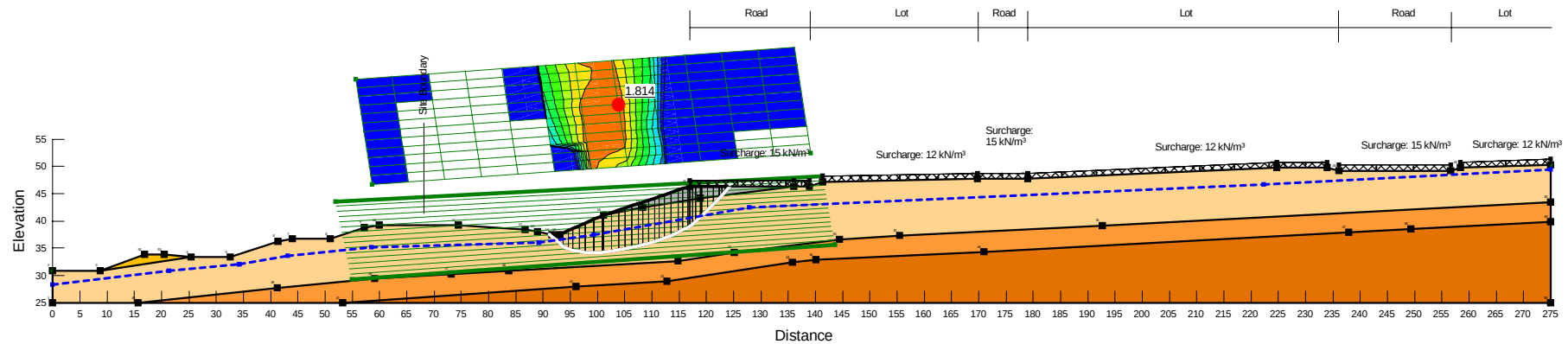
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
Date: 08/06/2026, 03:01:09 pm
Checked By: J Simpson
Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-11 (Central East)
Analysis: Design Profile: 11a_Static

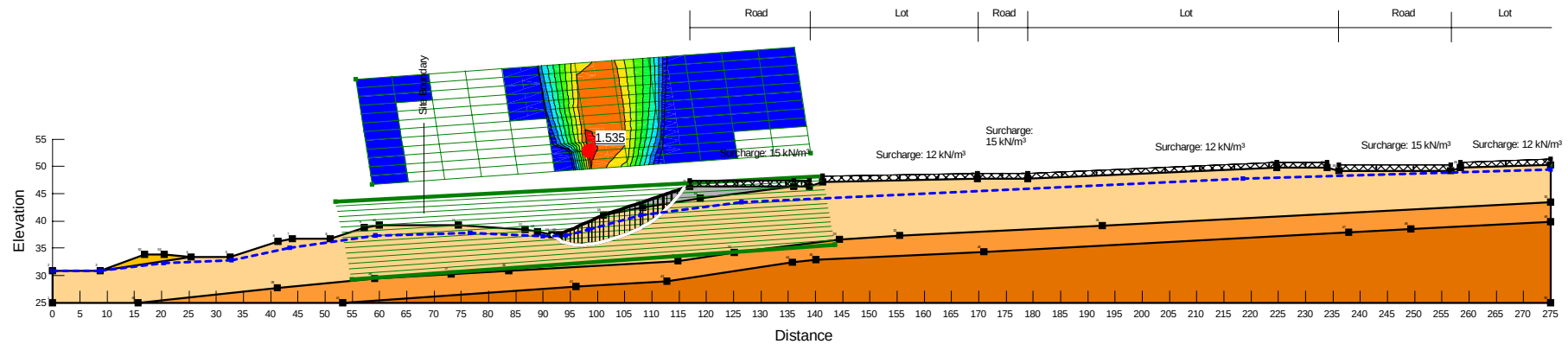
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-11 (Central East)
Analysis: Design Profile: 11b_EGWL

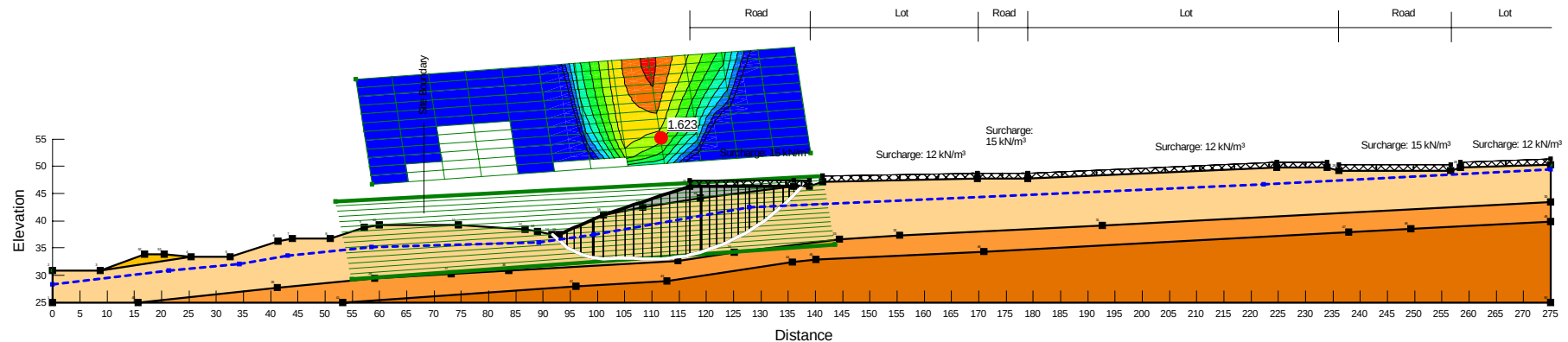
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-11 (Central East)
Analysis: Design Profile: 11c_EQ

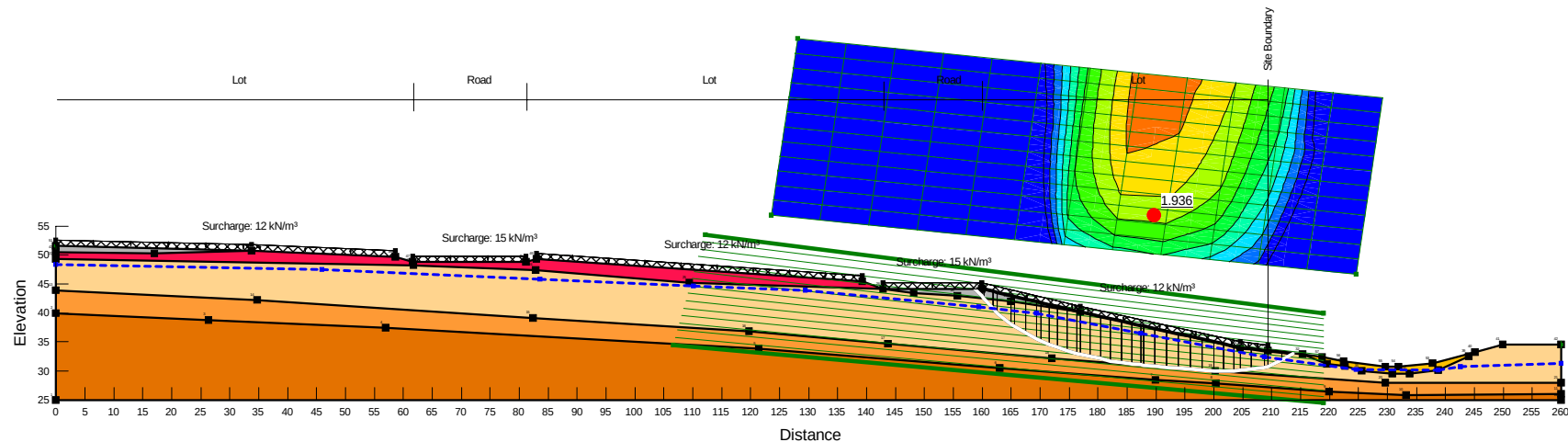
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Left to Right
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	Fill (Historic)	Mohr-Coulomb	17	3	28	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-12 (Central East)
Analysis: Design Profile: 12a_Static

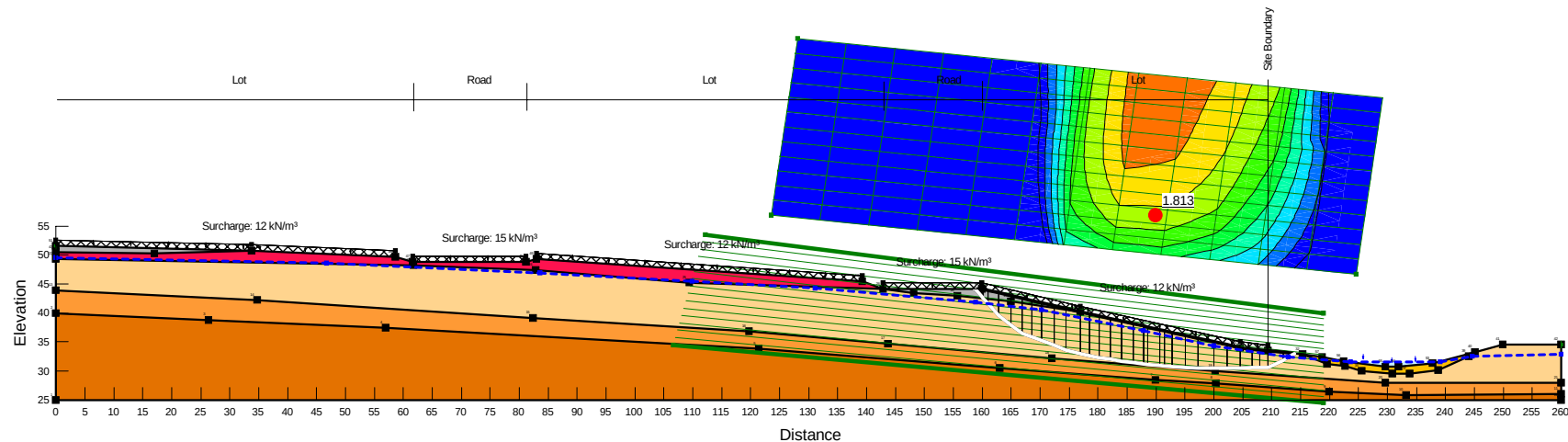
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Left to Right
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	Fill (Historic)	Mohr-Coulomb	17	3	28	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-12 (Central East)
Analysis: Design Profile: 12b_EGWL

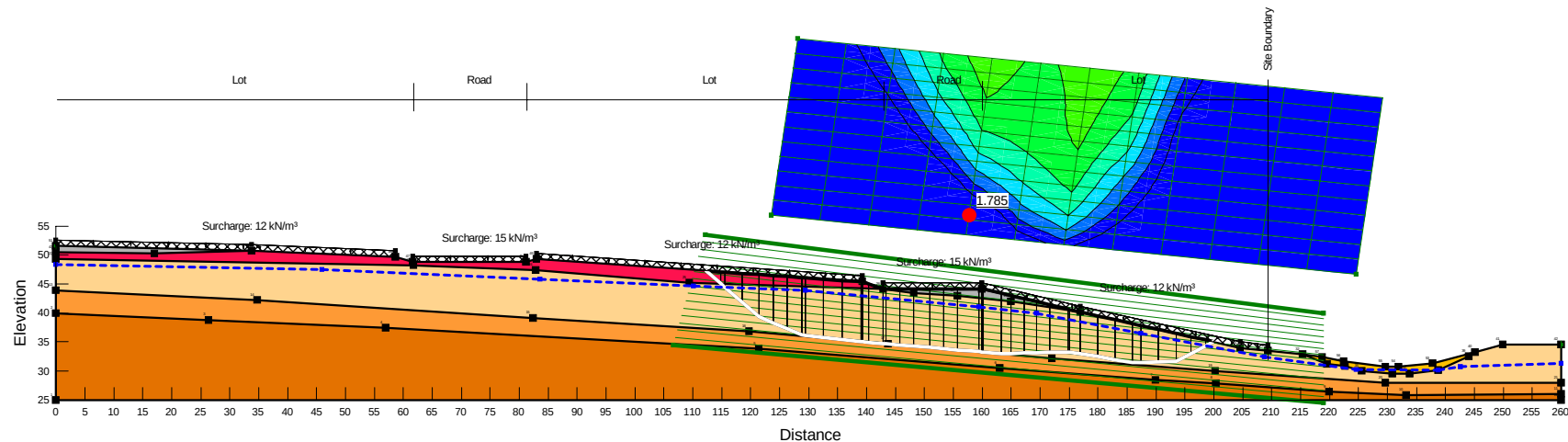
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Left to Right
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
	Fill (Historic, Undrained)	Undrained (Phi=0)	17			1	60
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-12 (Central East)
Analysis: Design Profile: 12c_EQ

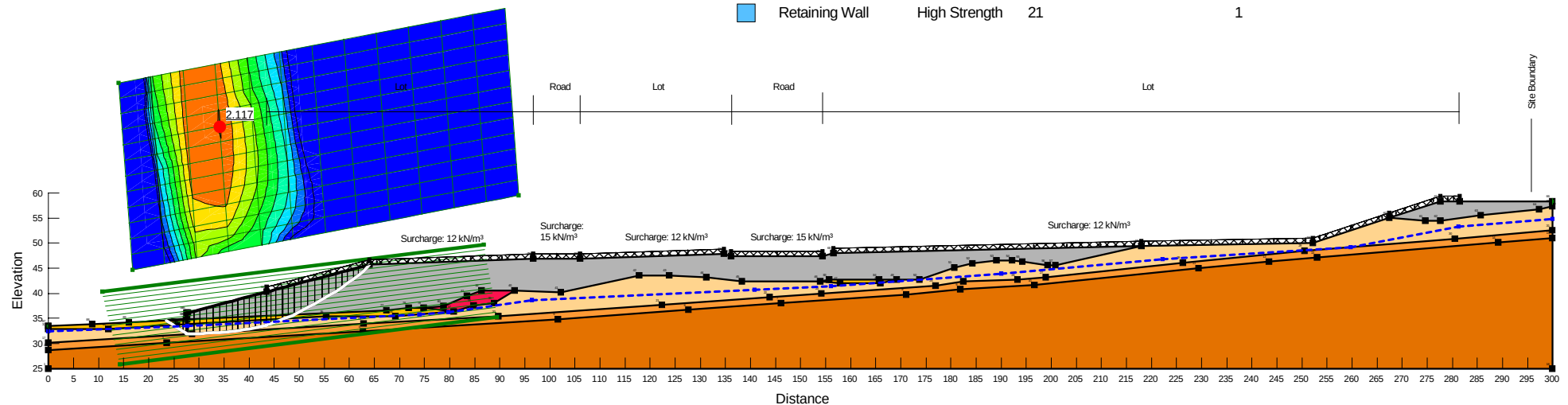
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
	Fill (Historic)	Mohr-Coulomb	17	3	28	1
	HW ECBF	Mohr-Coulomb	19	10	32	1
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
	Residual ECBF	Mohr-Coulomb	17	5	28	1
	Retaining Wall	High Strength	21			1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-15 (Employment - Gully)
Analysis: Design Profile: 15a_Static

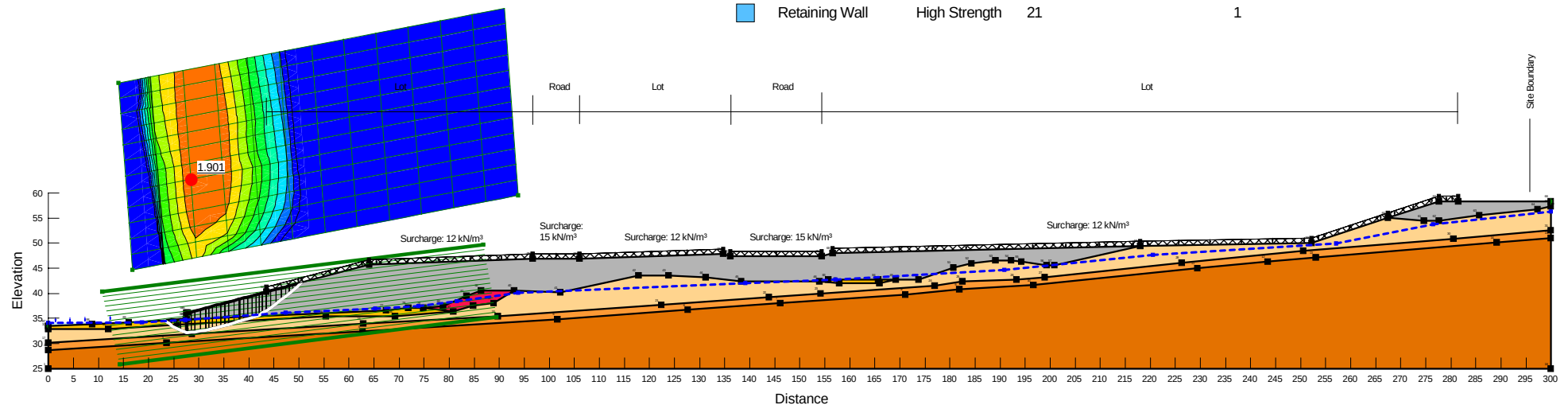
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
■	Alluvium / Colluvium	Mohr-Coulomb	17	3	26	1
■	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
■	Fill (Historic)	Mohr-Coulomb	17	3	28	1
■	HW ECBF	Mohr-Coulomb	19	10	32	1
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
■	Residual ECBF	Mohr-Coulomb	17	5	28	1
■	Retaining Wall	High Strength	21			1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-15 (Employment - Gully)
Analysis: Design Profile: 15b_EGWL

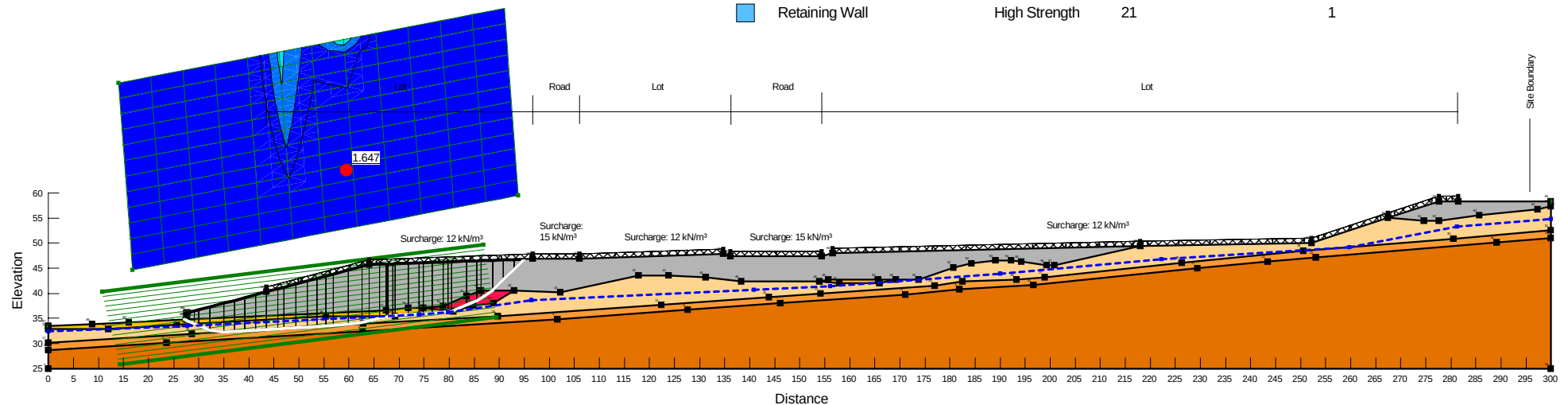
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
■	Alluvium / Colluvium (Undrained)	Undrained (Phi=0)	17			1	40
■	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
■	Fill (Historic, Undrained)	Undrained (Phi=0)	17			1	60
■	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
■	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
■	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70
■	Retaining Wall	High Strength	21			1	



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-15 (Employment - Gully)
Analysis: Design Profile: 15c_EQ

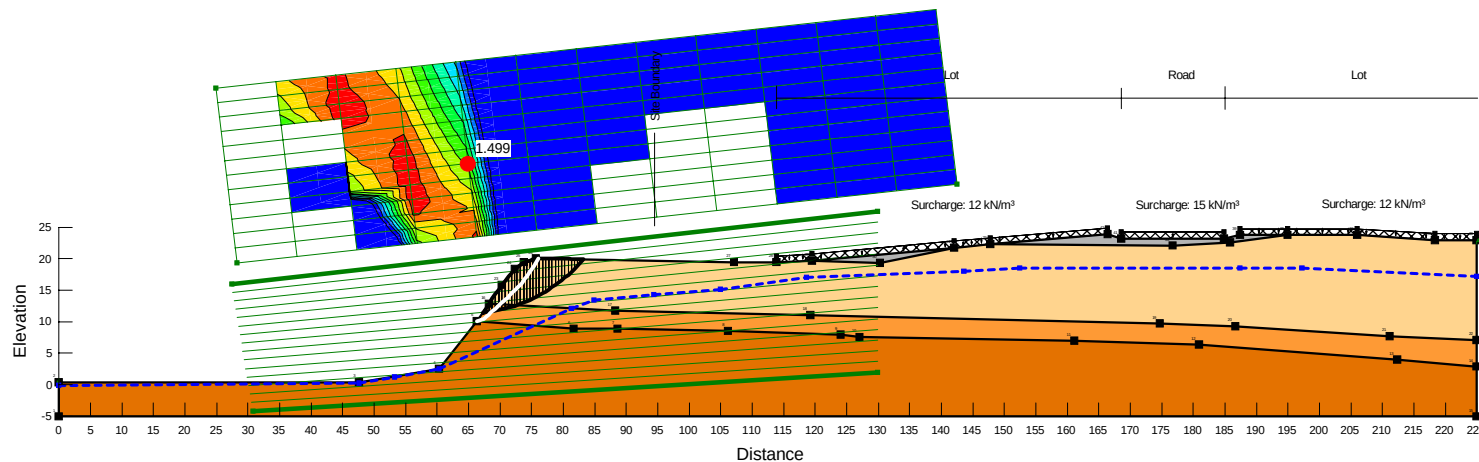
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Dark Orange	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-18 (Coastal - Western Cliffs)
Analysis: Design Profile: 18a_Static

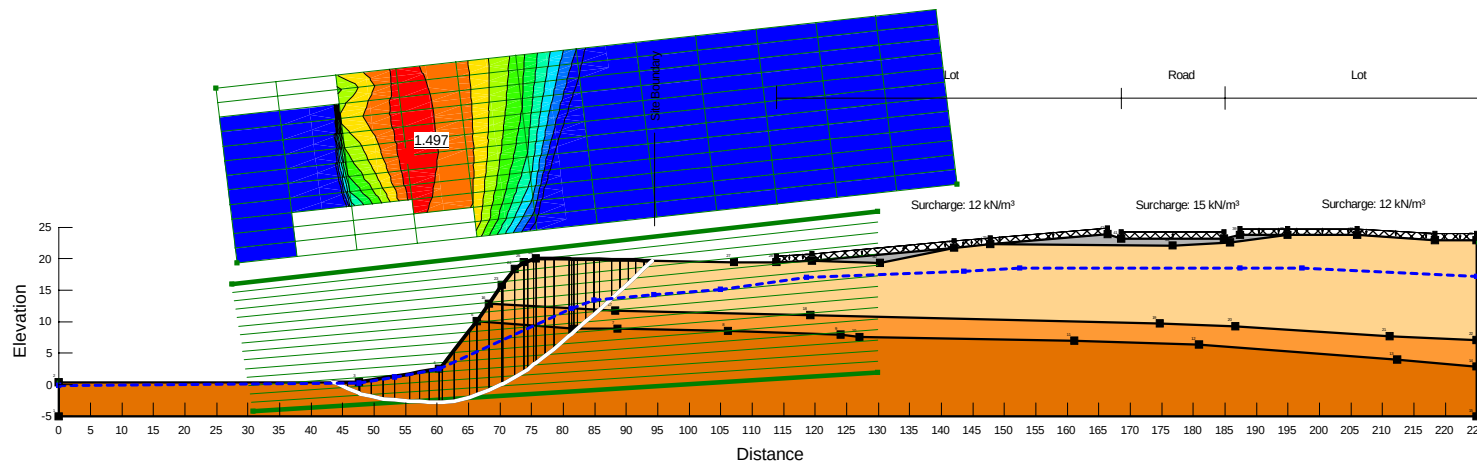
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
Grey	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
Orange	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
Dark Orange	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
Light Orange	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-18 (Coastal - Western Cliffs)
Analysis: Design Profile: 18c_EQ

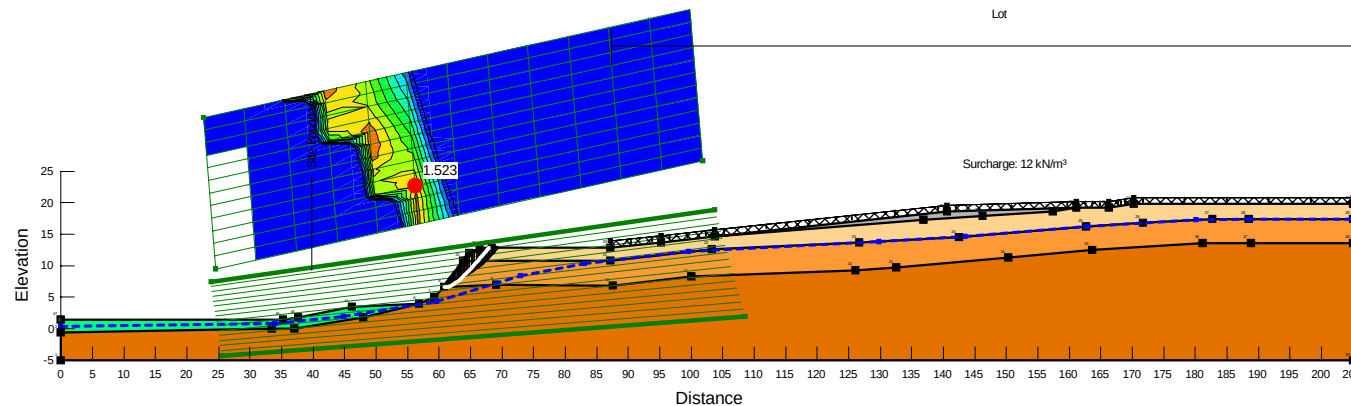
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Green	Marine Deposits	Mohr-Coulomb	16	2	25	1
Brown	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-19 (Marina - Western Cliffs)
Analysis: Design Profile: 19a_Static

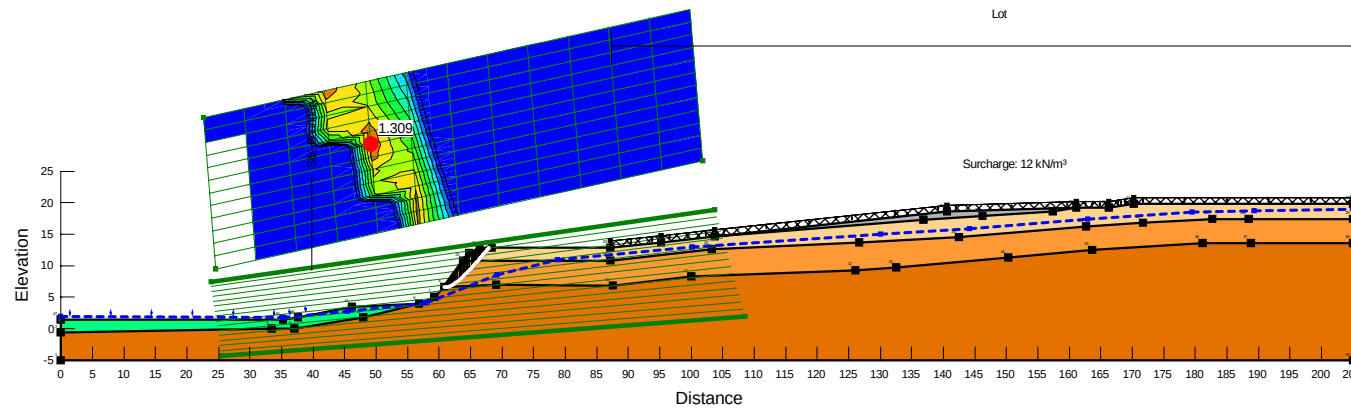
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Grey	Fill (Engineered)	Mohr-Coulomb	18	5	30	1
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Green	Marine Deposits	Mohr-Coulomb	16	2	25	1
Brown	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-19 (Marina - Western Cliffs)
Analysis: Design Profile: 19b_EGWL

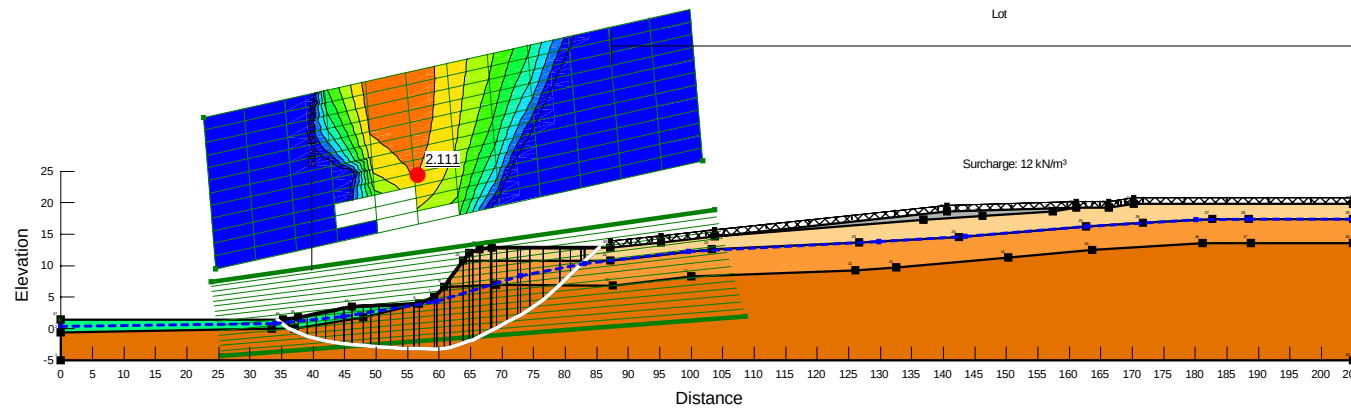
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
Grey	Fill (Engineered, Undrained)	Undrained (Phi=0)	18			1	140
Orange	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
Green	Marine Deposits (Undrained)	Undrained (Phi=0)	16			1	30
Brown	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
Light Orange	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-19 (Marina - Western Cliffs)
Analysis: Design Profile: 19c_EQ

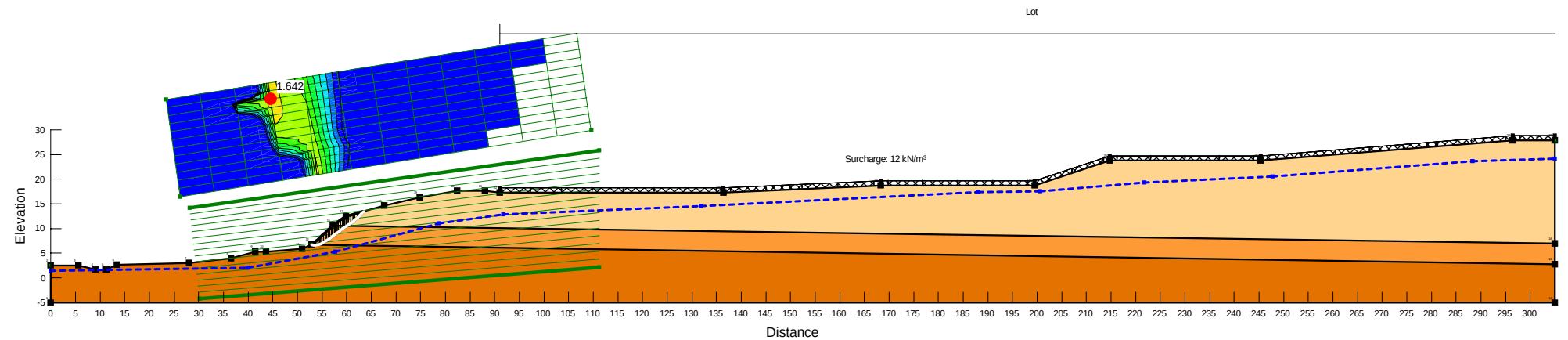
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Dark Orange	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-20 (Marina - Western Cliffs)
Analysis: Design Profile: 20a_Static

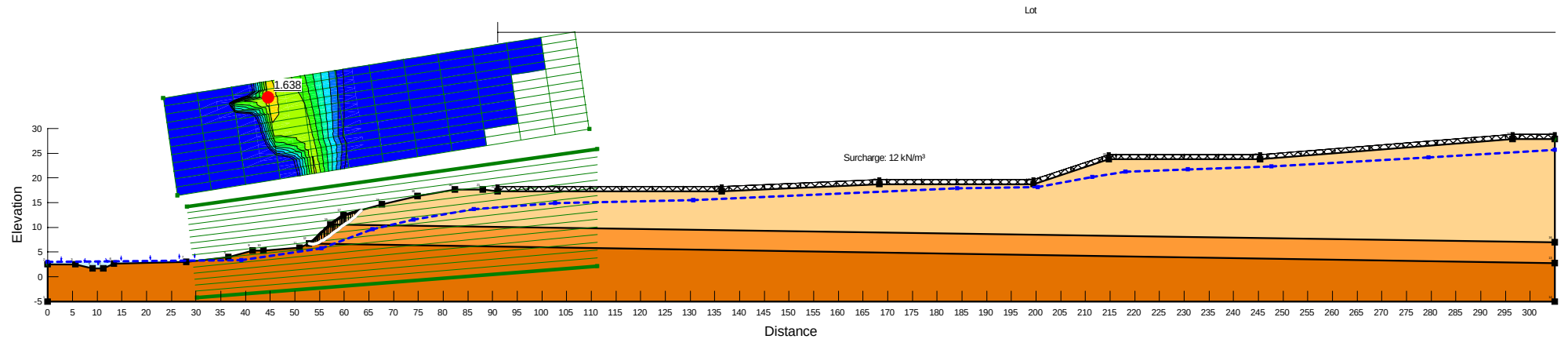
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPEW Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface
Orange	HW ECBF	Mohr-Coulomb	19	10	32	1
Dark Orange	MW-SW ECBF	Mohr-Coulomb	20	25	40	1
Light Orange	Residual ECBF	Mohr-Coulomb	17	5	28	1



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-20 (Marina - Western Cliffs)
Analysis: Design Profile: 20b_EGWL

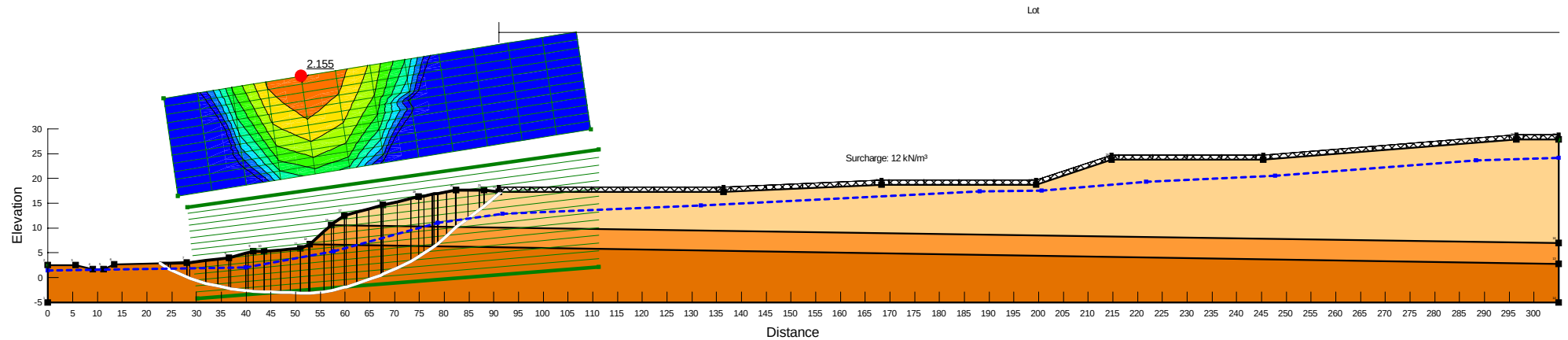
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
 Date: 01/06/2026, 11:13:11 pm
 Checked By: J Simpson
 Date: June 2026

SLOPE/W Analysis Information:

1. Analysis Method: Morgenstern-Price
2. PWP Conditions from: Piezometric Surfaces
3. Direction of Movement: Right to Left
4. Search Method: Grid and Radius
5. Optimise Critical Slip Surface: Yes
6. Tension Crack Option: (none)
7. Horz Seismic Coef.: 0.19
8. Scale: 1:1,200
9. Vertical Exaggeration: 1

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Piezometric Surface	Undrained Shear Strength (kPa)
	HW ECBF (Undrained)	Undrained (Phi=0)	19			1	200
	MW-SW ECBF	Mohr-Coulomb	20	25	40	1	
	Residual ECBF (Undrained)	Undrained (Phi=0)	17			1	70



Beachlands South - Balance Live-Zone Fast-Track RC
Location: XS-20 (Marina - Western Cliffs)
Analysis: Design Profile: 20c_EQ

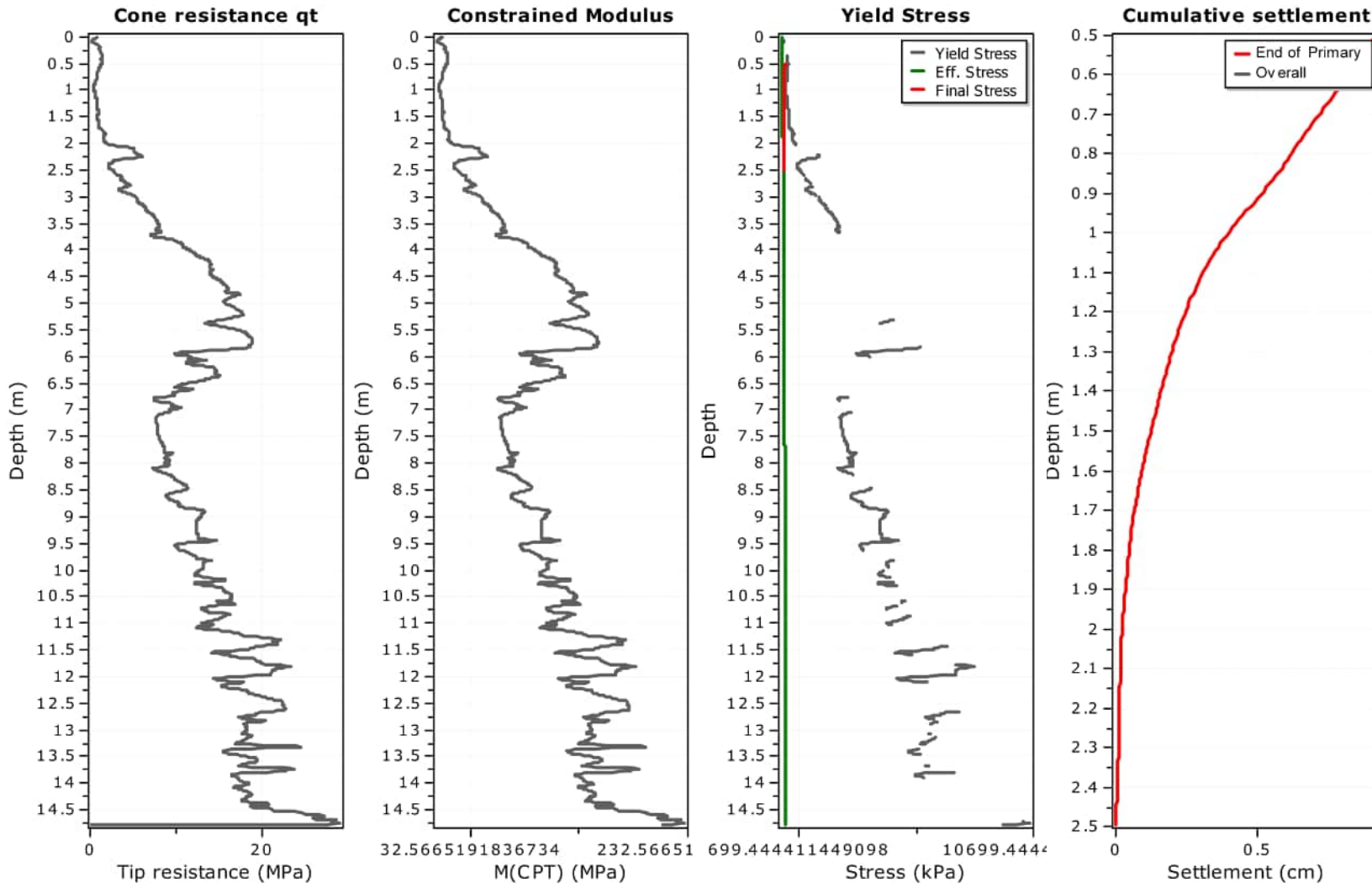
T+T Ref: 1014358.3200.v1

Created By: Scott Honiss
Date: 01/06/2026, 11:13:11 pm
Checked By: J Simpson
Date: June 2026

Appendix F Settlement Analysis Output

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

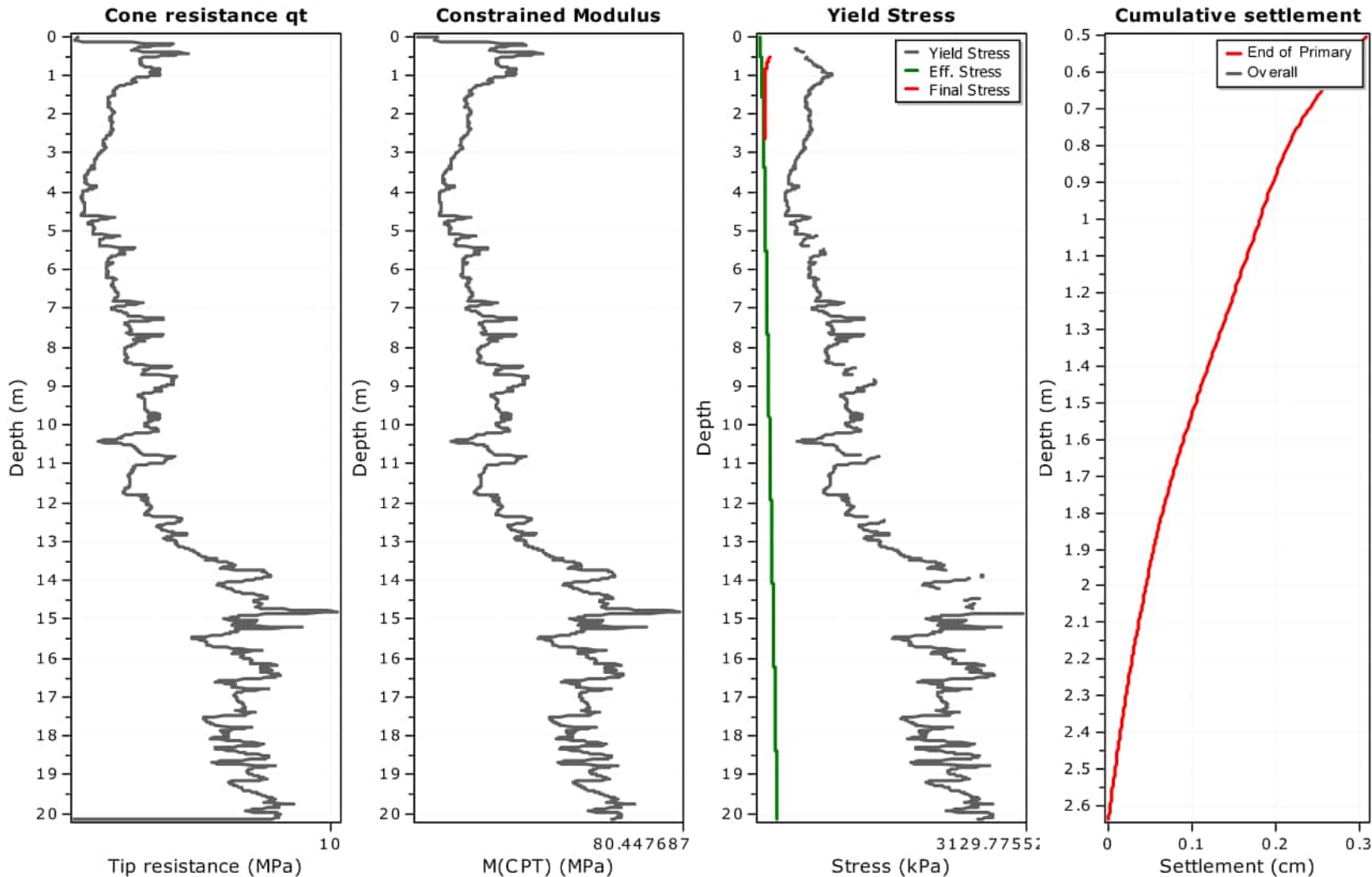
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

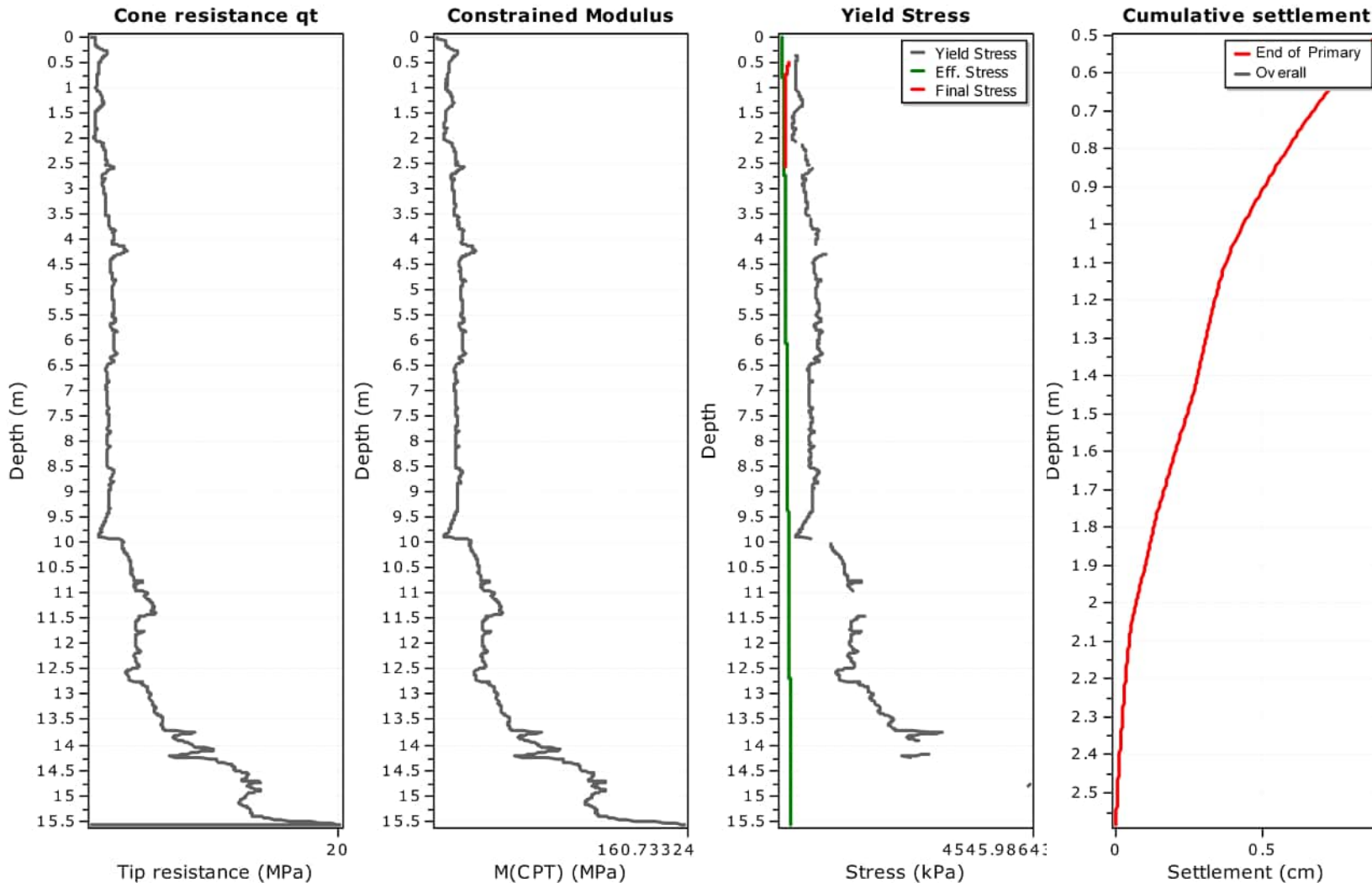
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-003

Total depth: 15.58 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 2.10 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

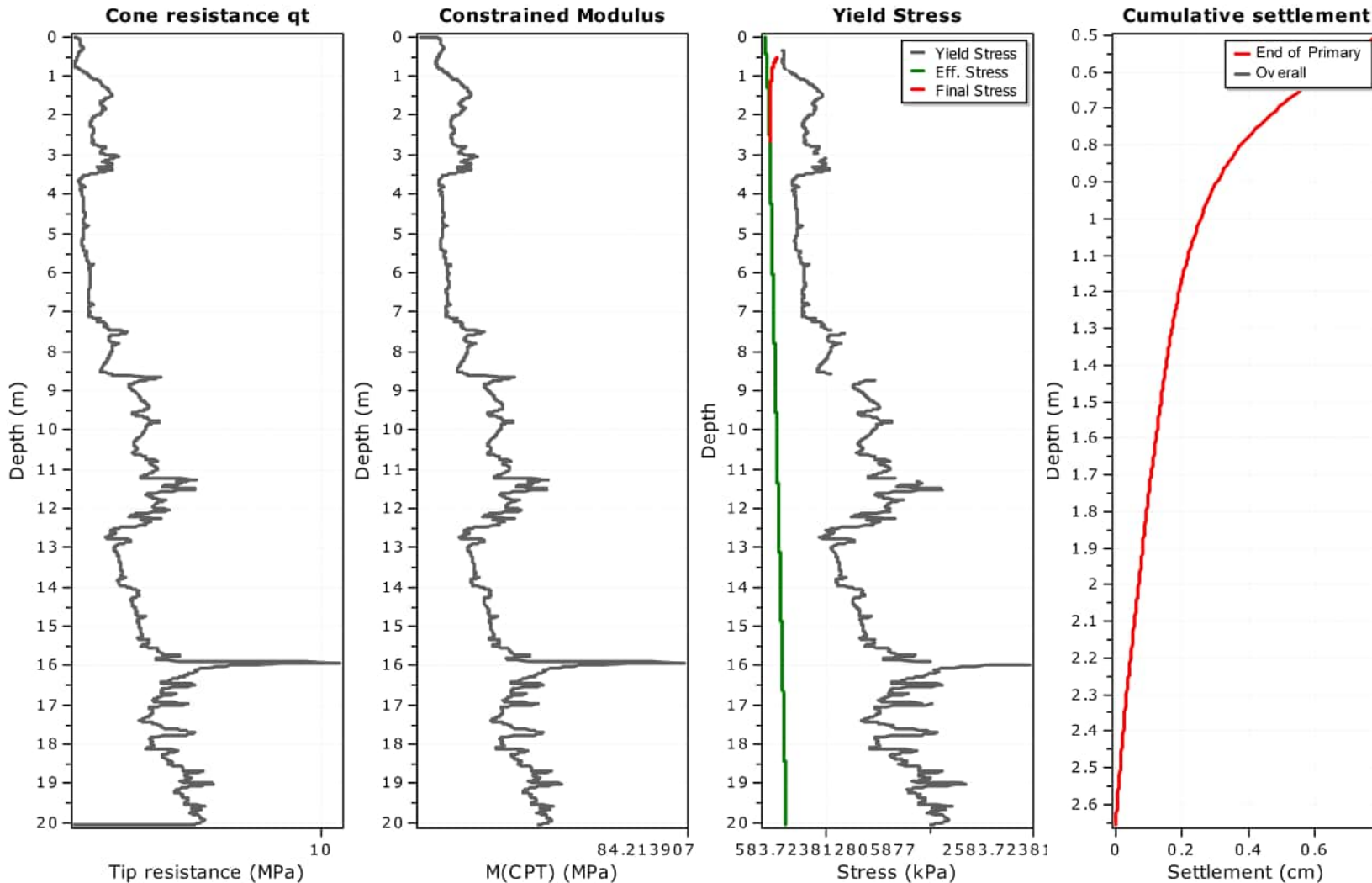
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

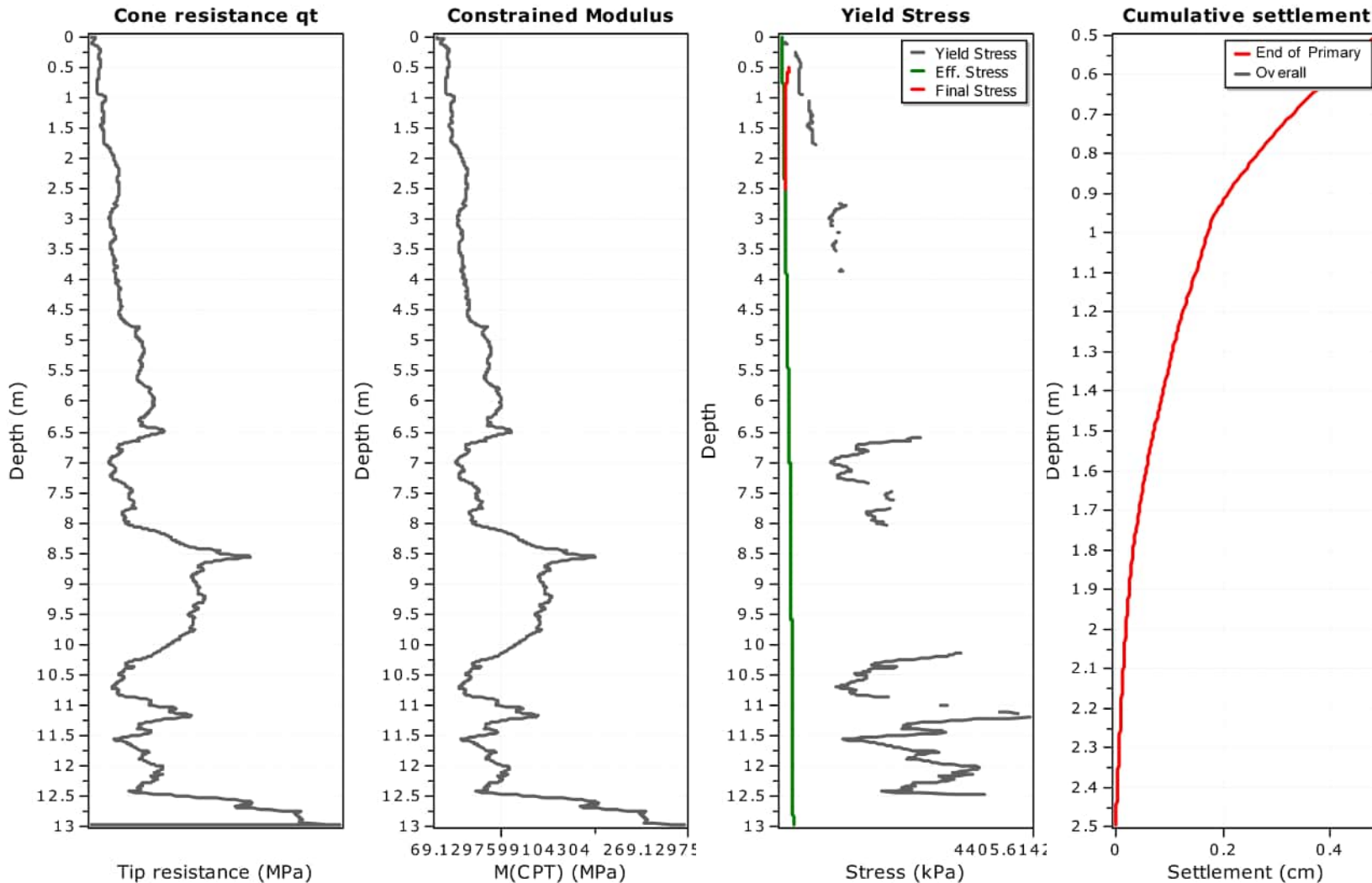
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

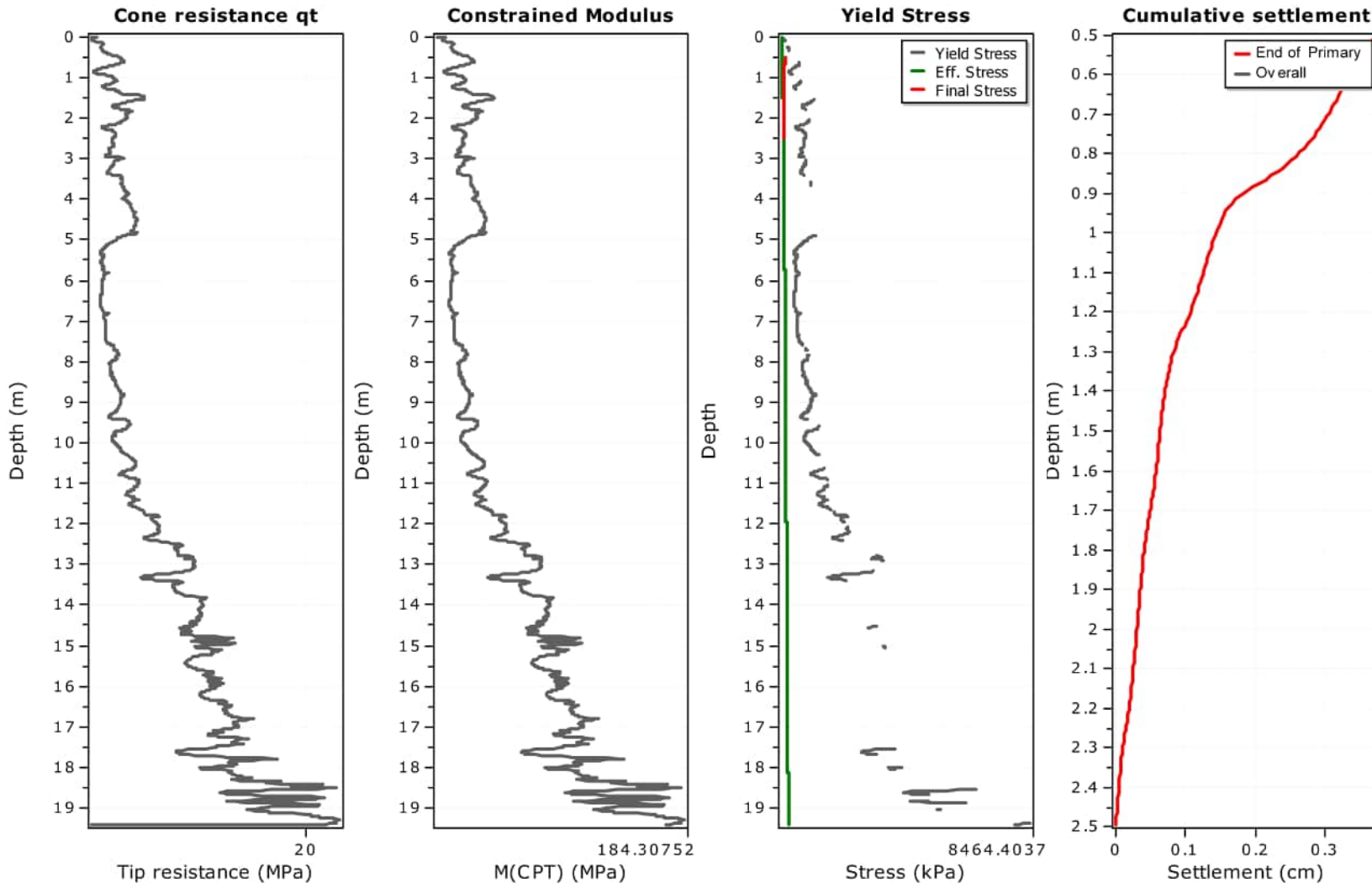
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-006

Total depth: 19.41 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 3.30 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

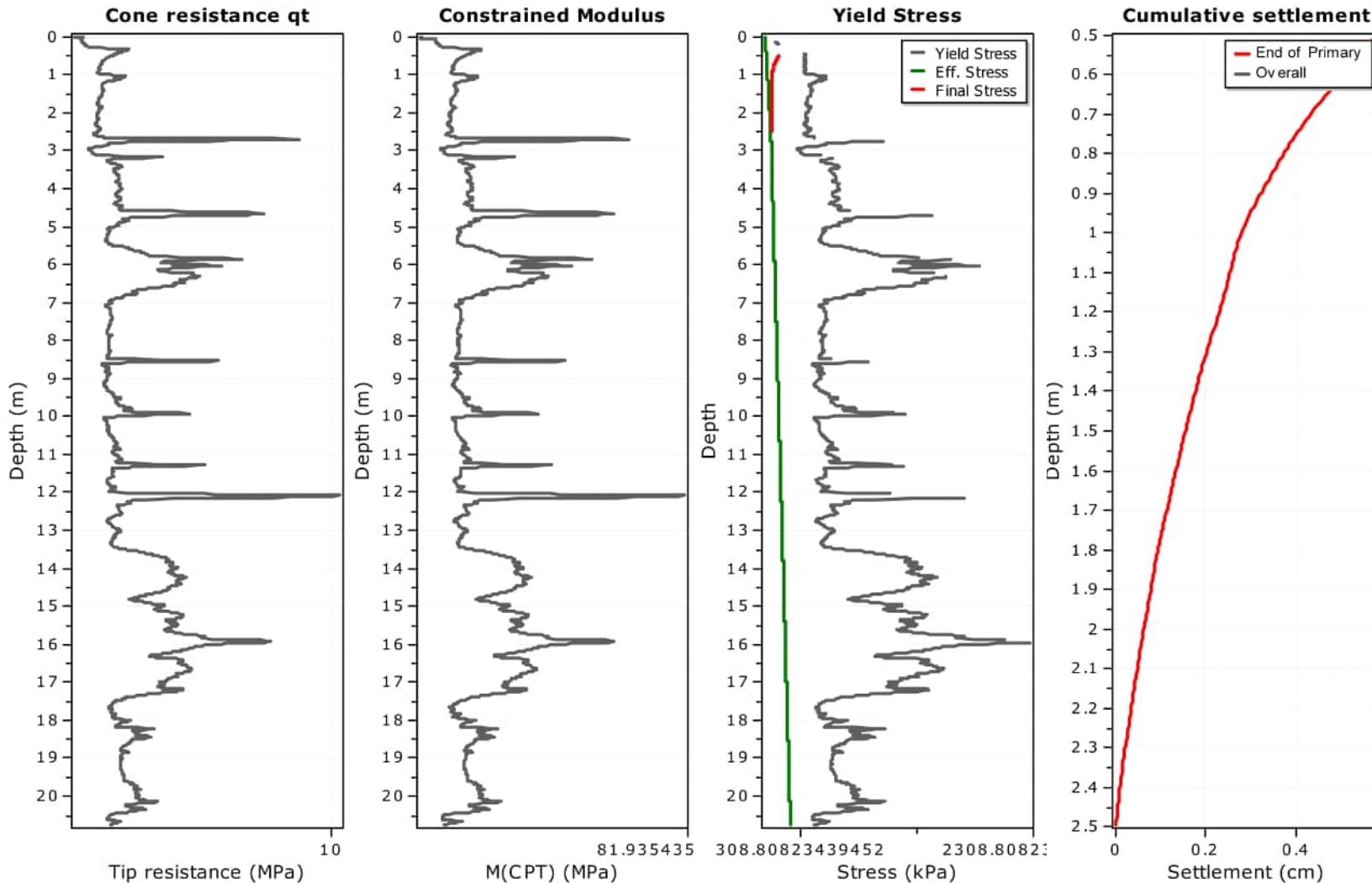
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

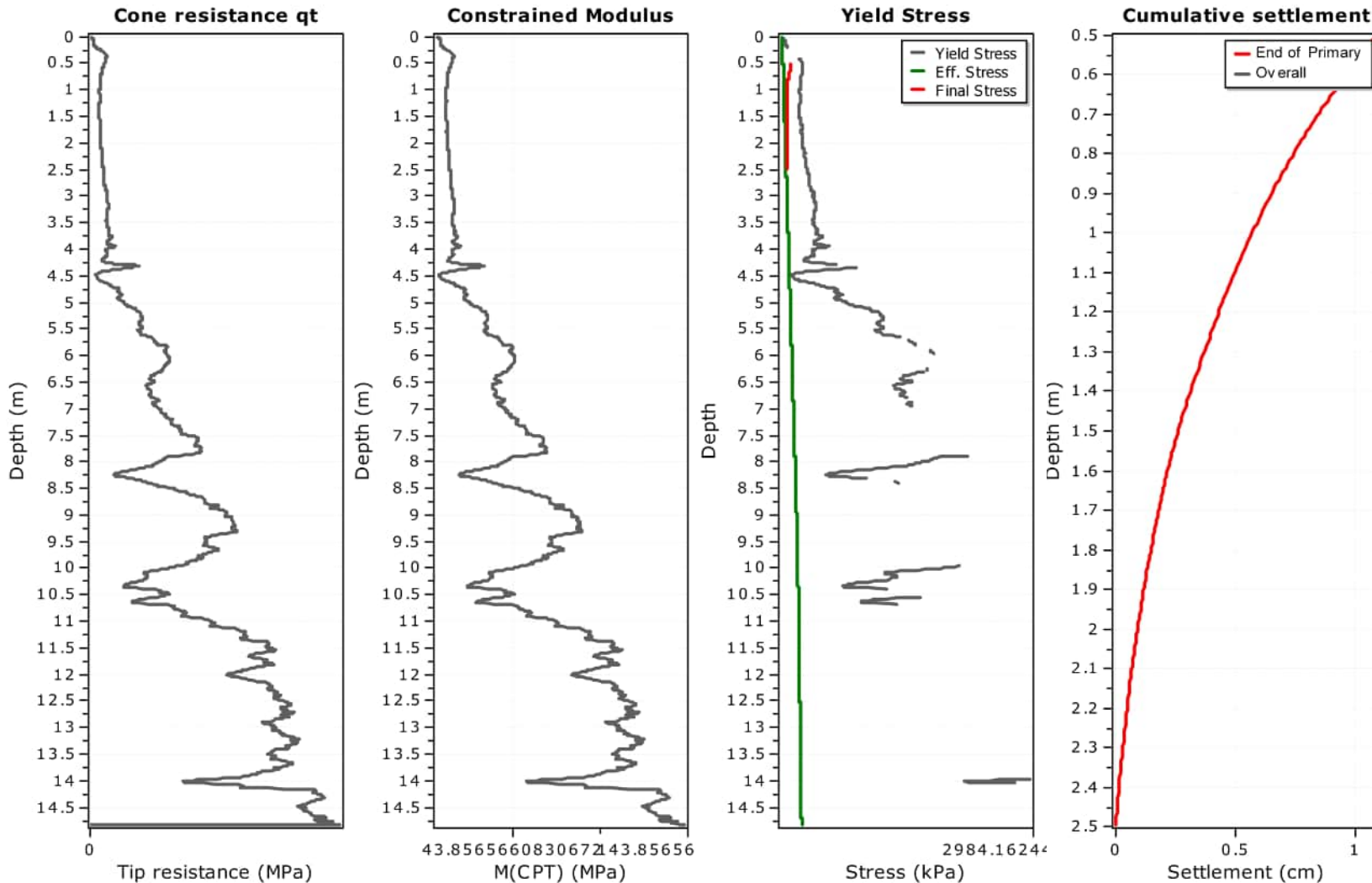
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

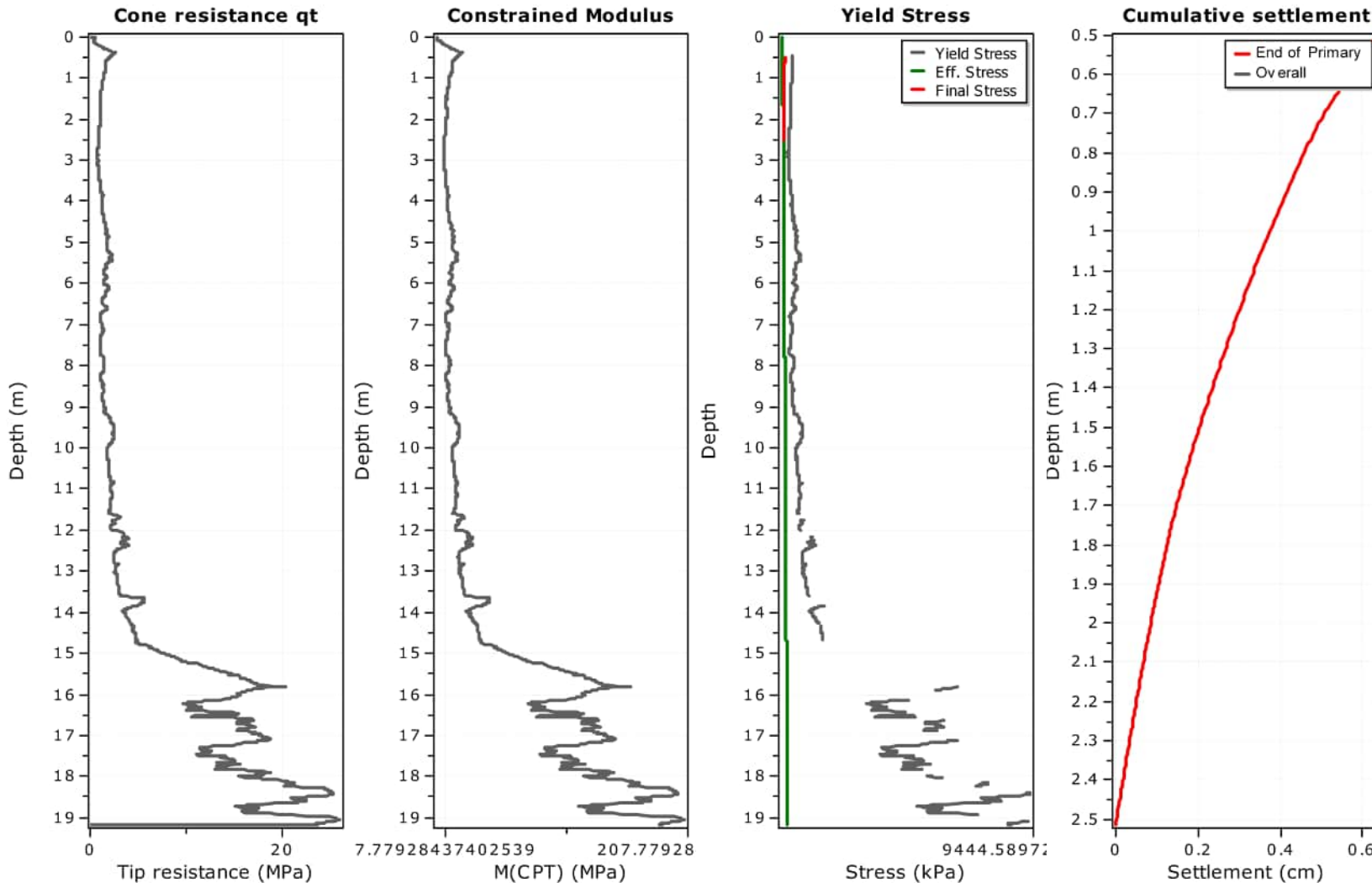
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-t/t_p} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

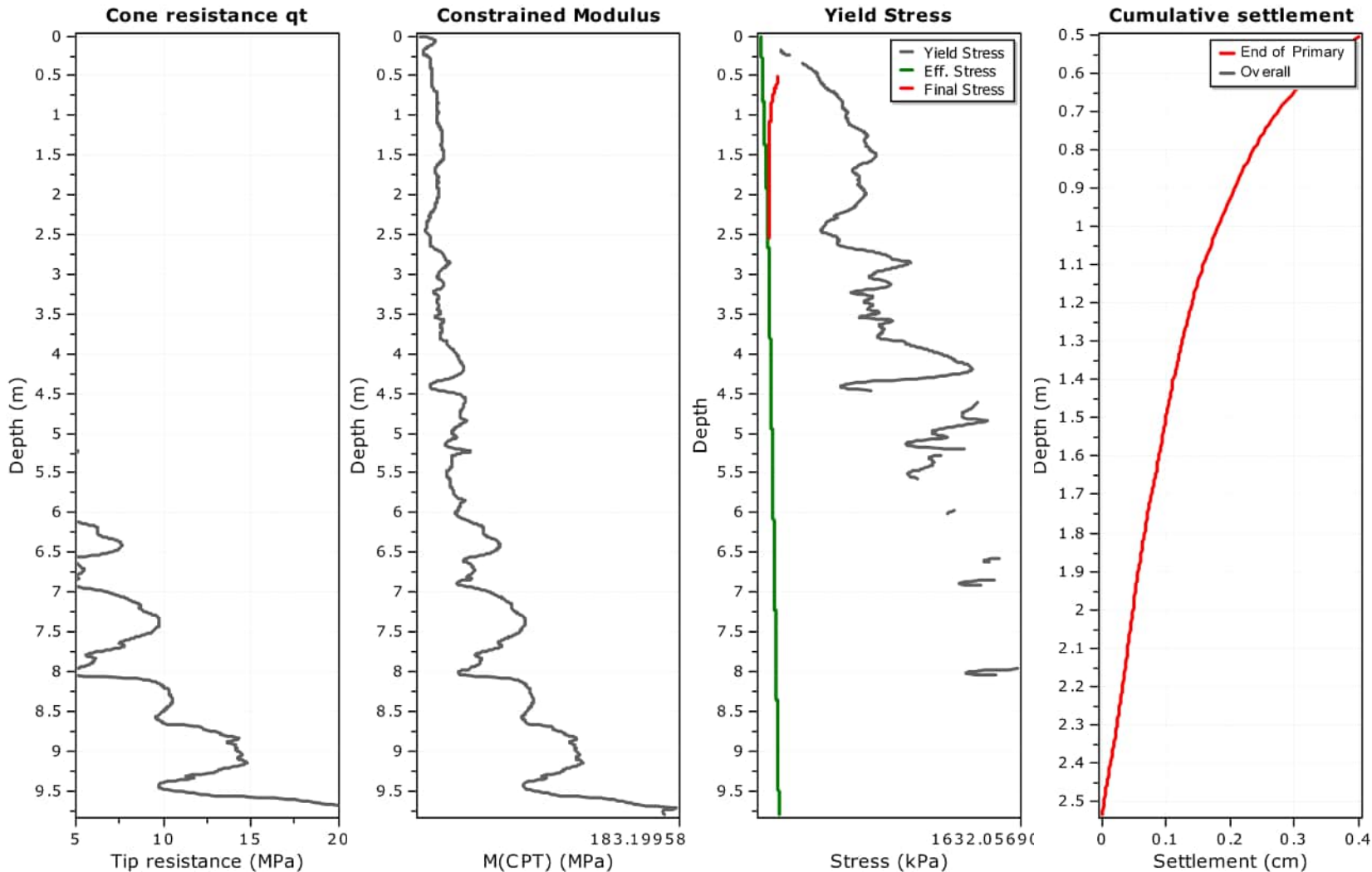
Project:

Location:

CPT: CPT-010

Total depth: 9.80 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 2.30 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

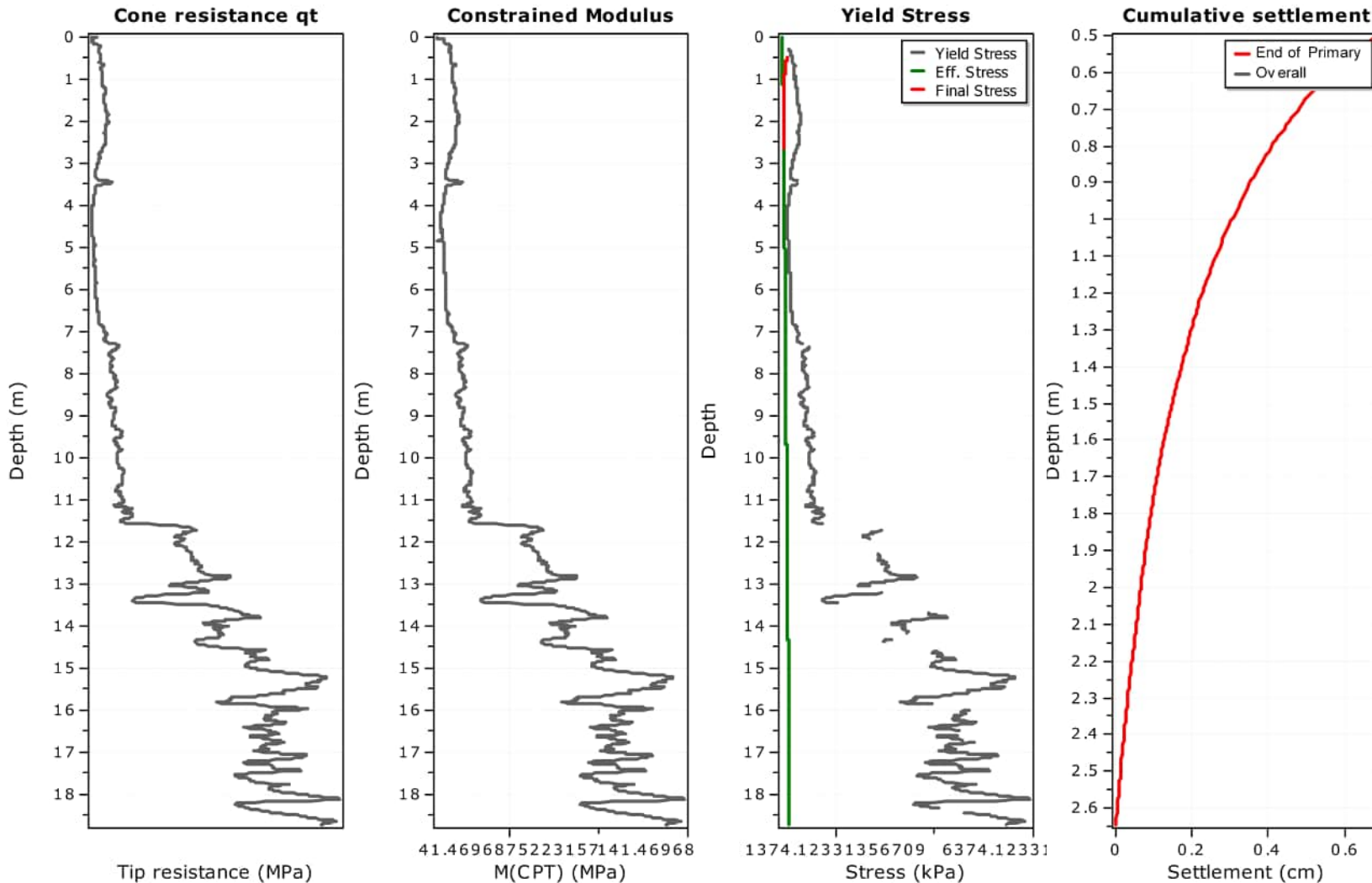
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-011

Total depth: 18.74 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 1.82 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

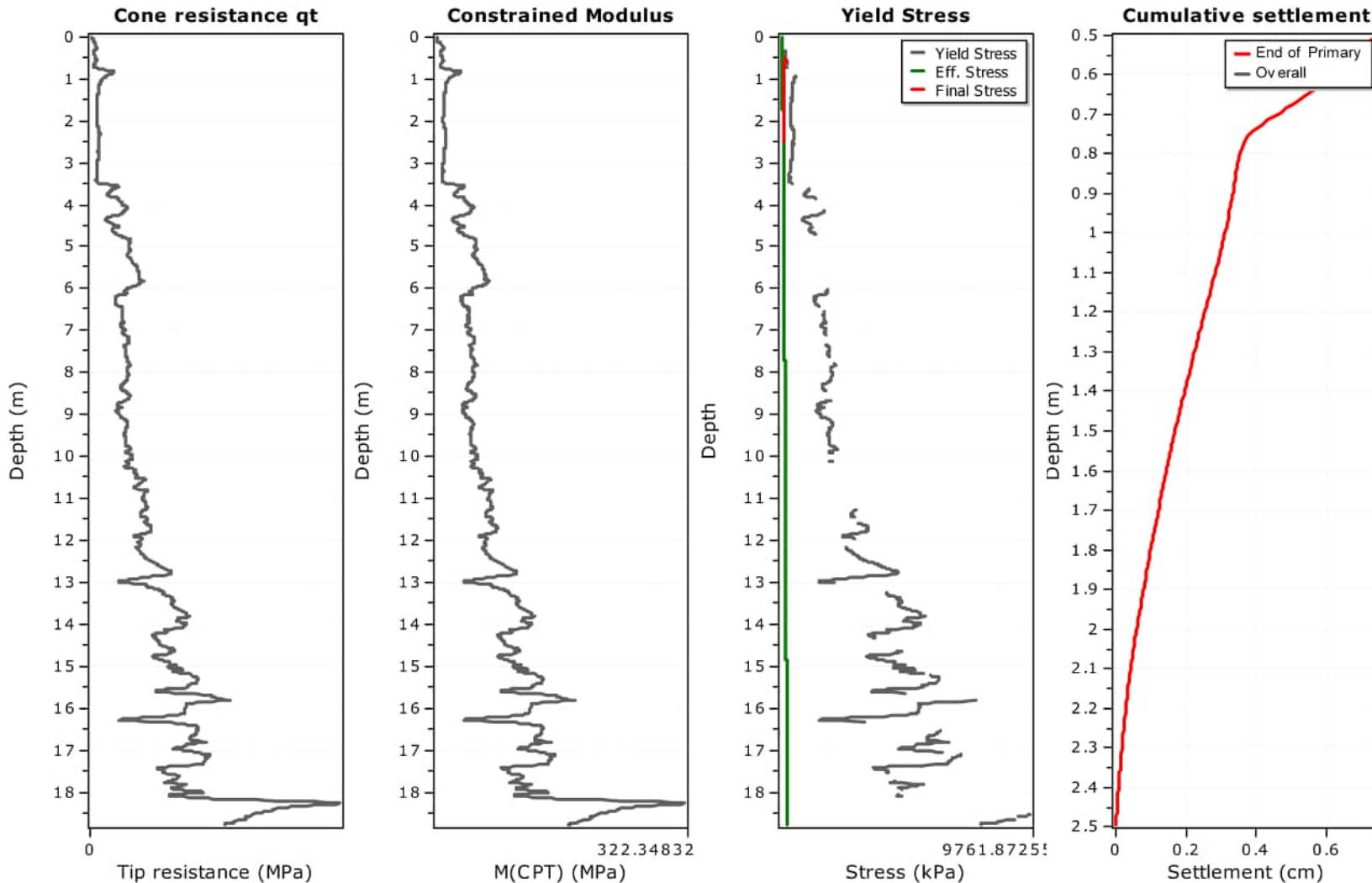
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-012

Total depth: 18.77 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 2.80 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

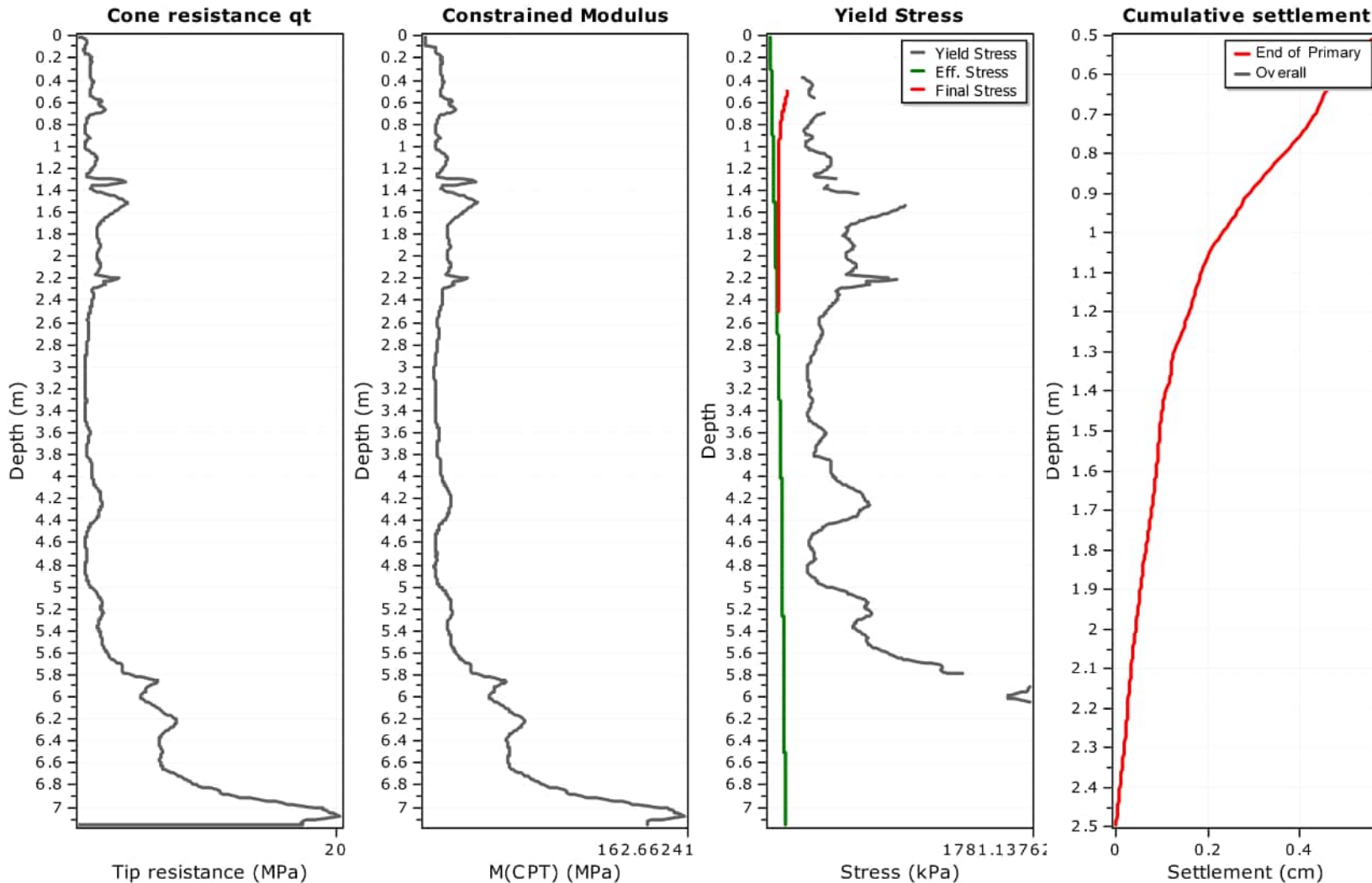
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

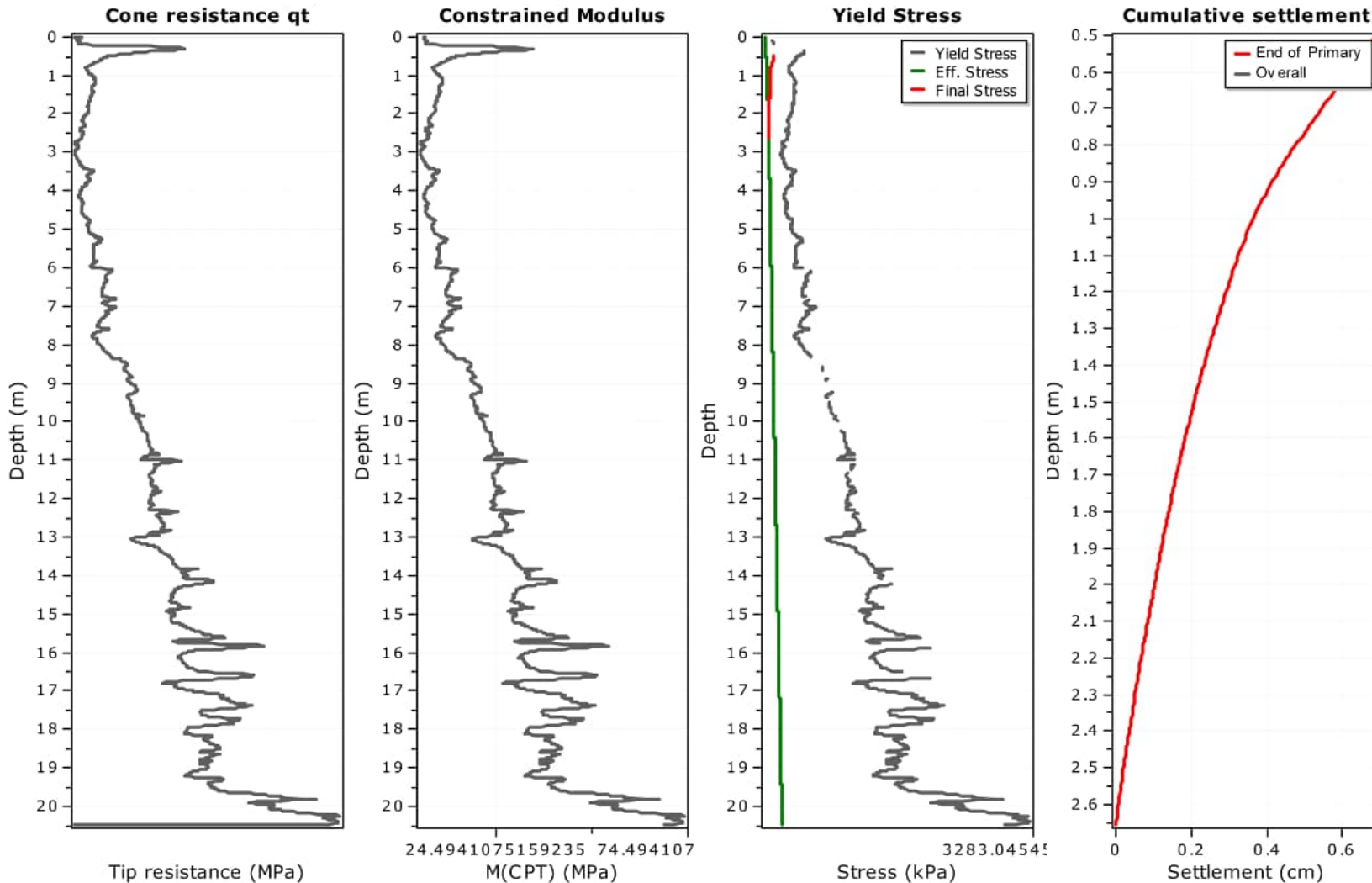
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

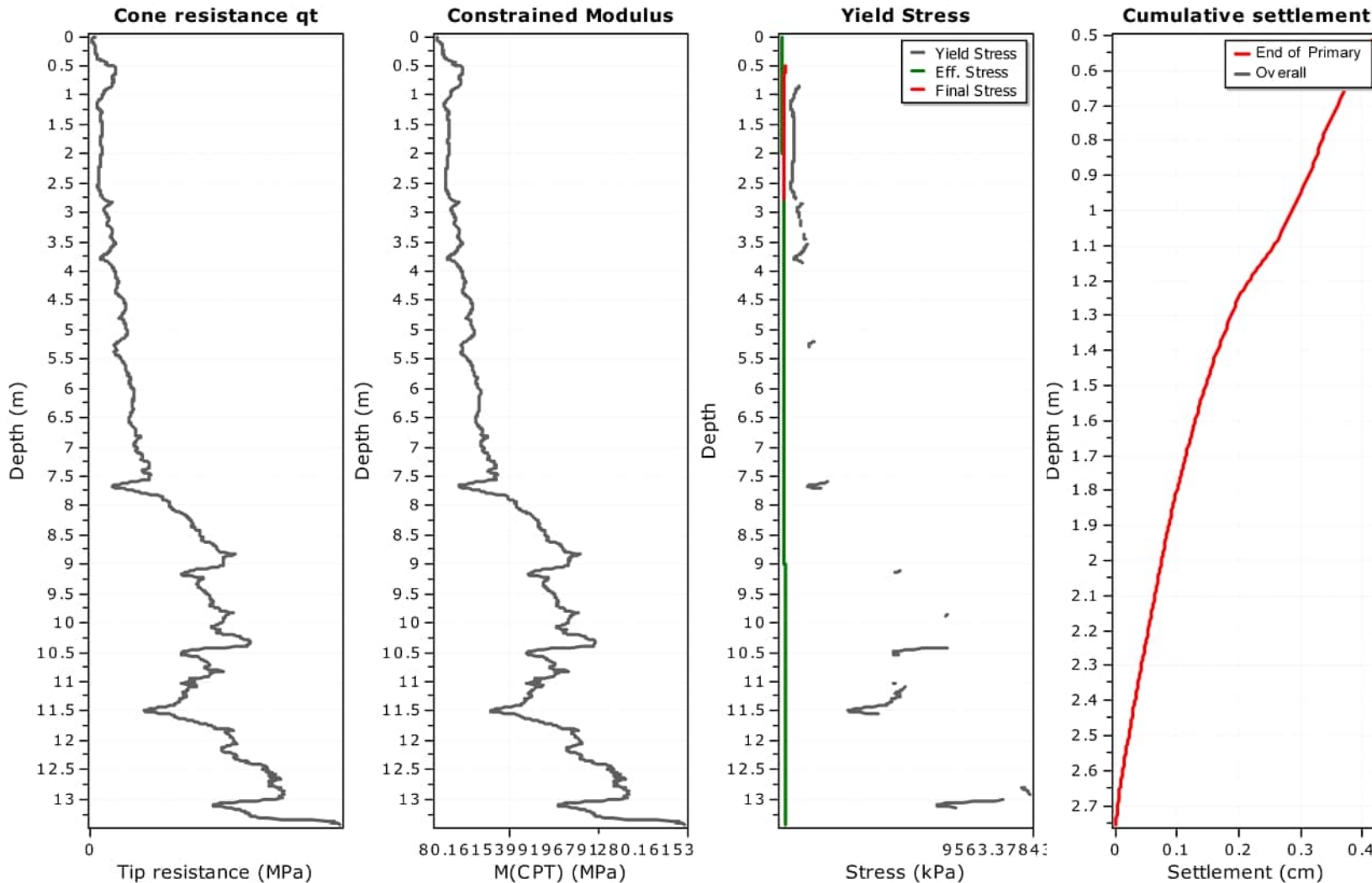
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-015

Total depth: 13.44 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 1.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

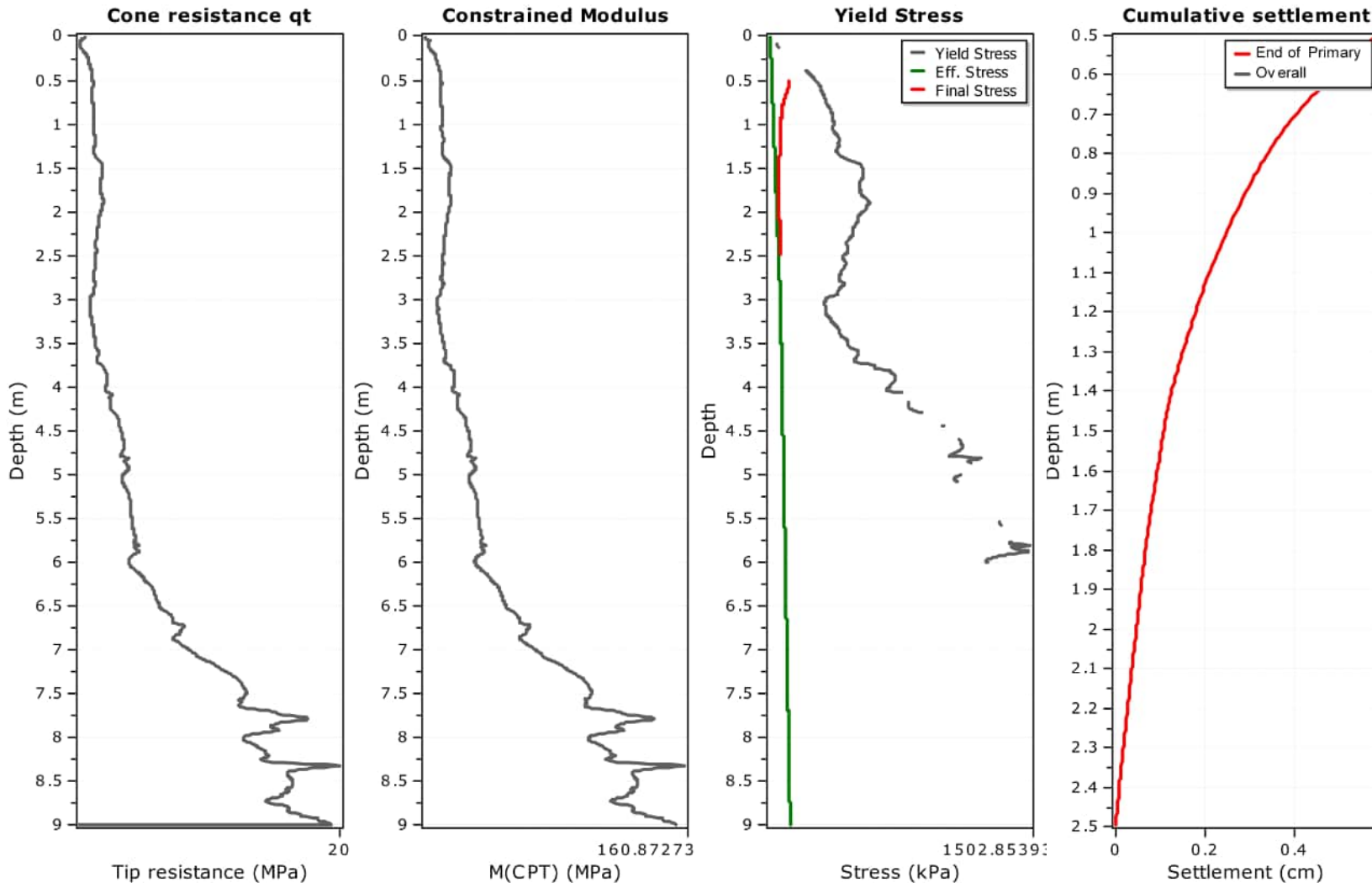
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

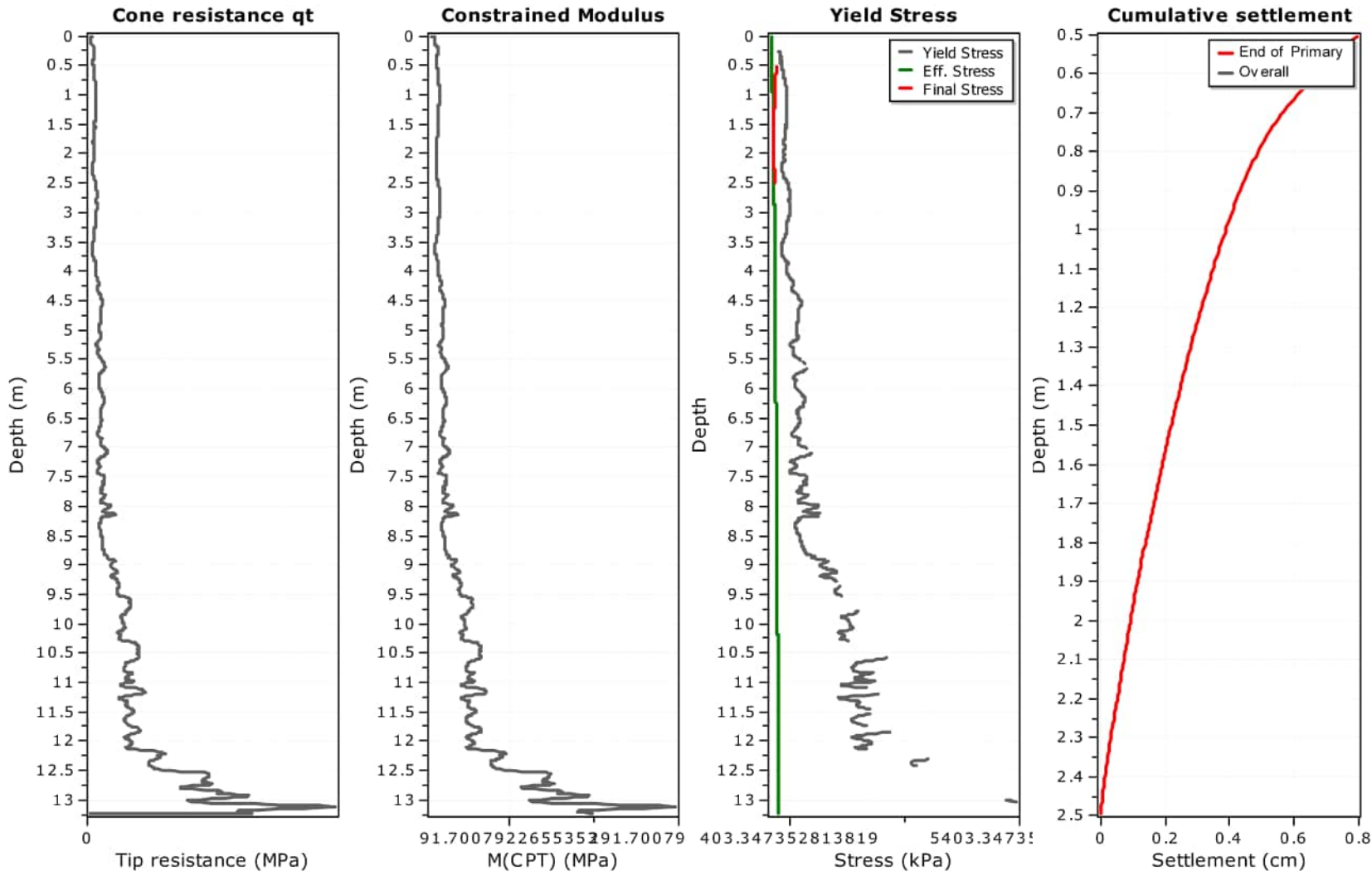
Project:

Location:

CPT: CPT-017

Total depth: 13.23 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 3.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

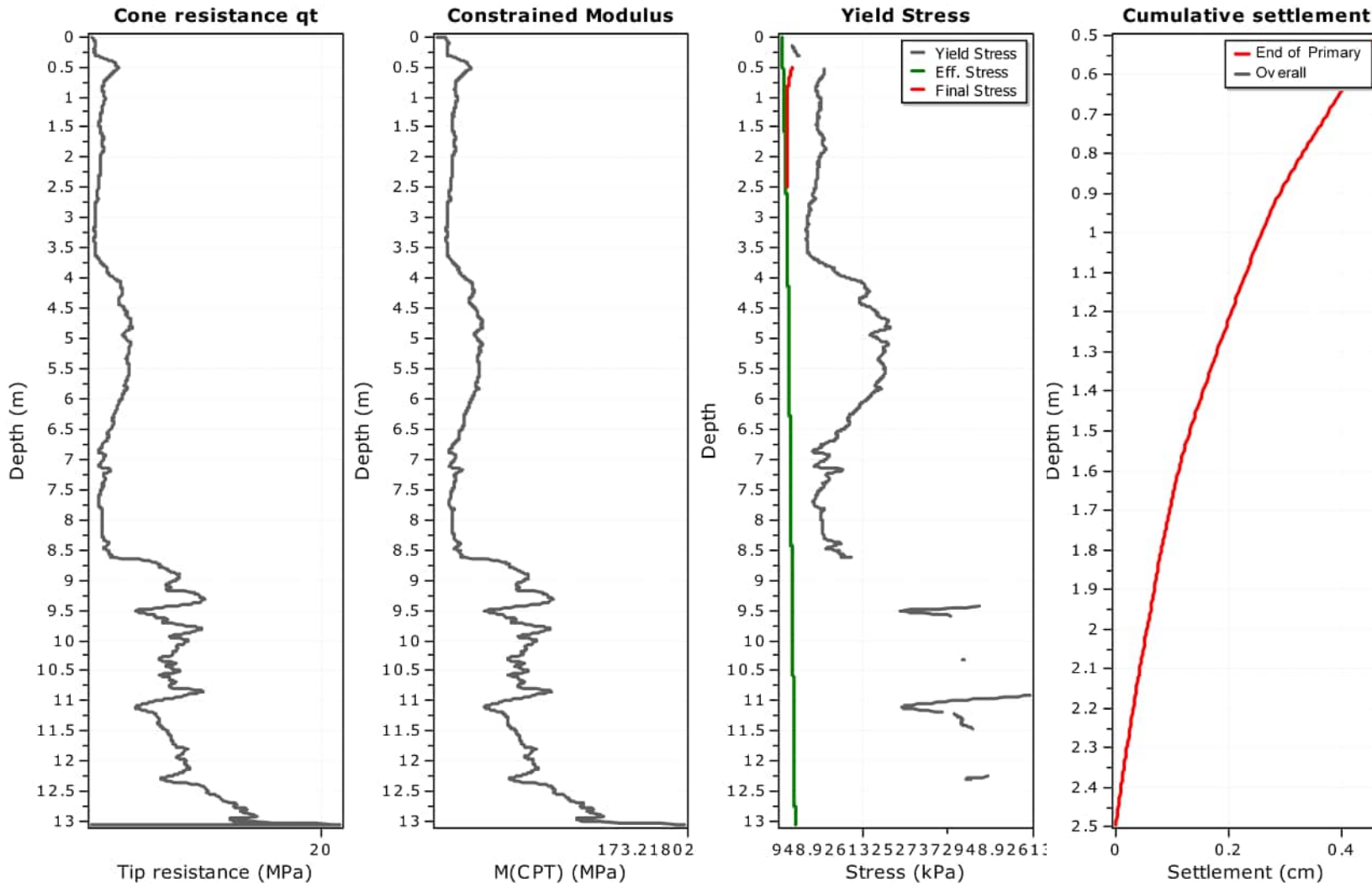
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-018

Total depth: 13.05 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 3.20 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

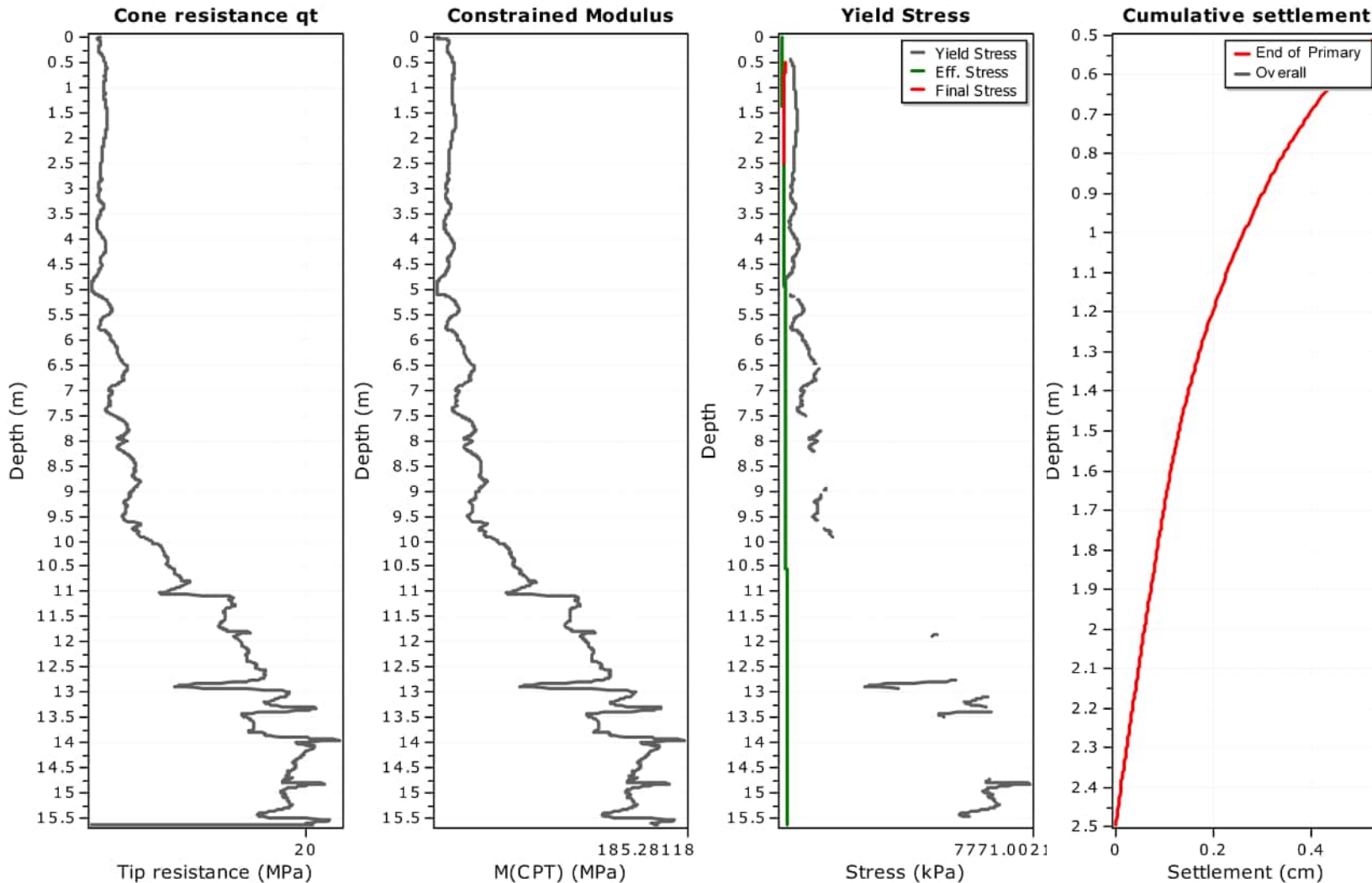
where t_p is the duration of primary consolidation

Project:
Location:

CPT: CPT-019

Total depth: 15.62 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 3.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

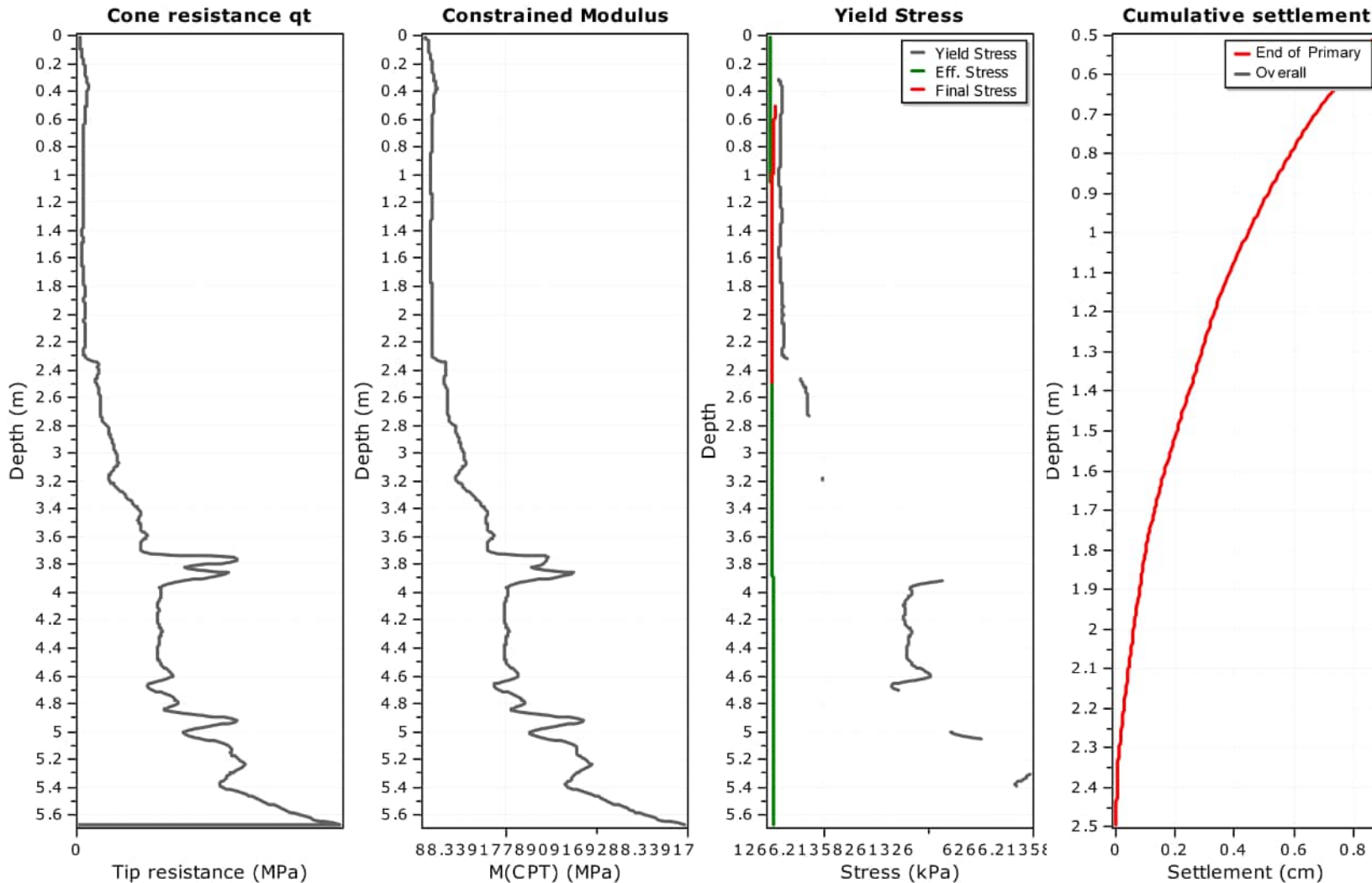
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

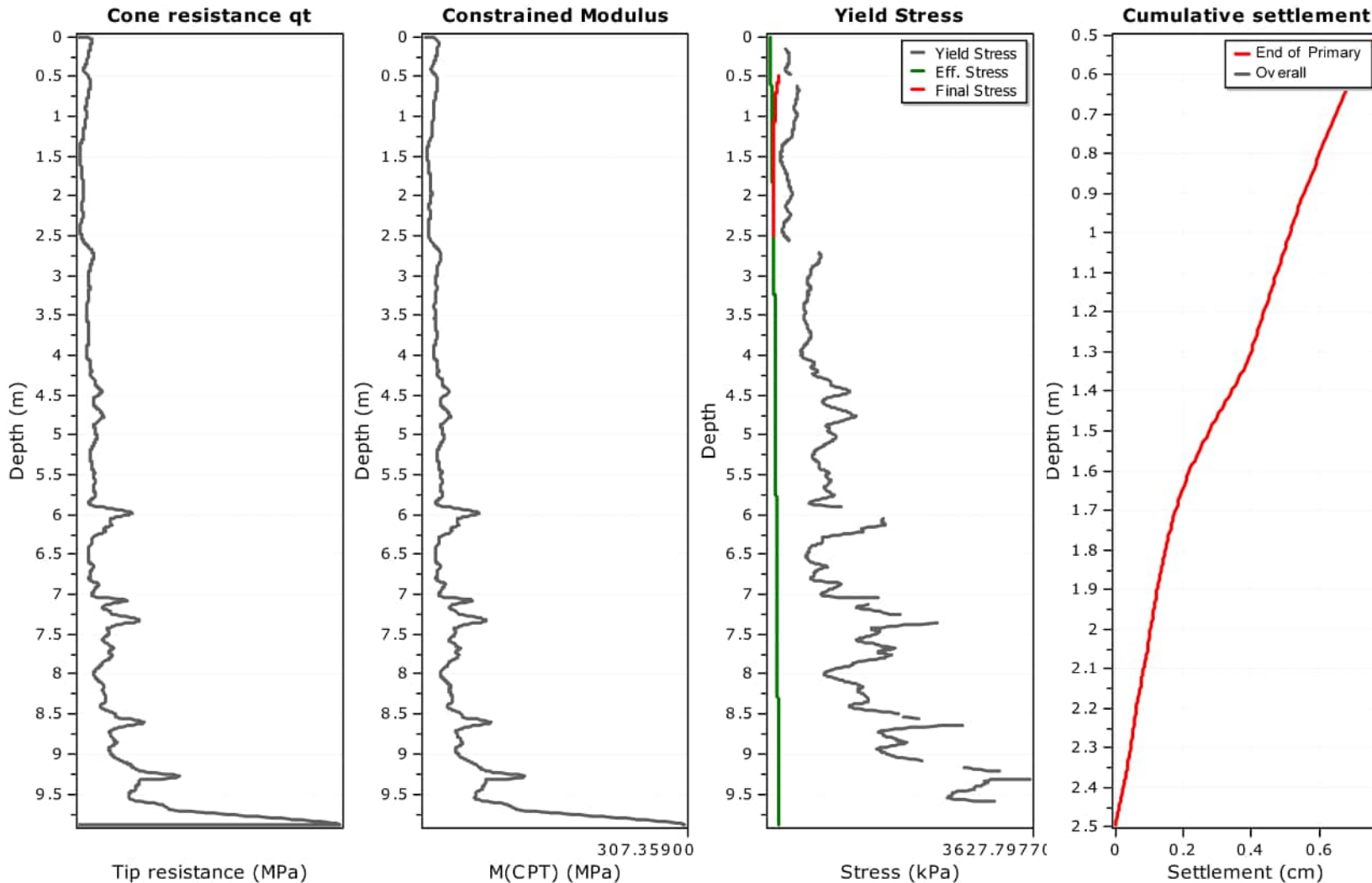
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

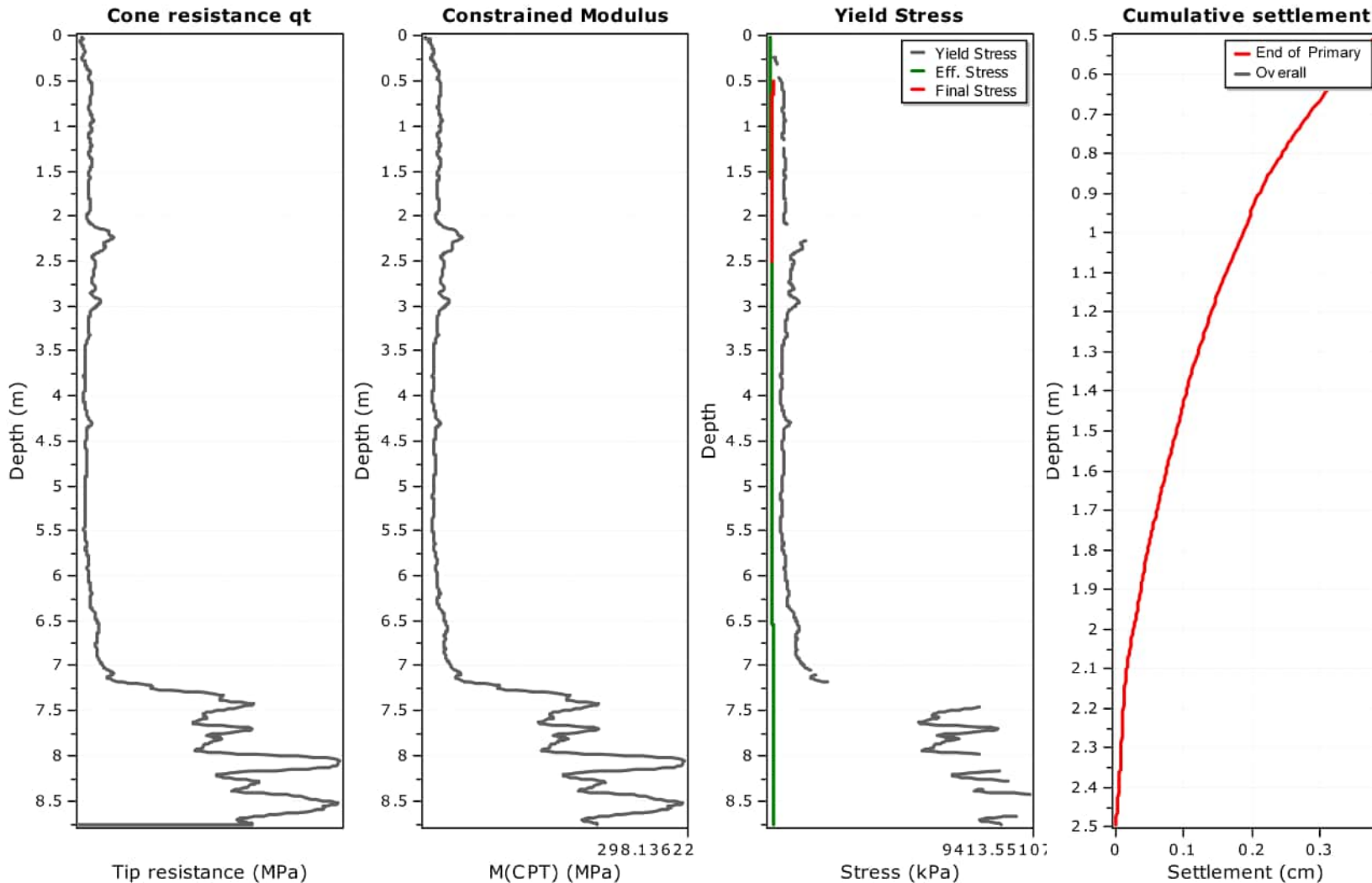
Project:

Location:

CPT: CPT-022

Total depth: 8.77 m, Date: 30/04/2026
Surface Elevation: 0.00 m, Est. GWL: 3.10 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

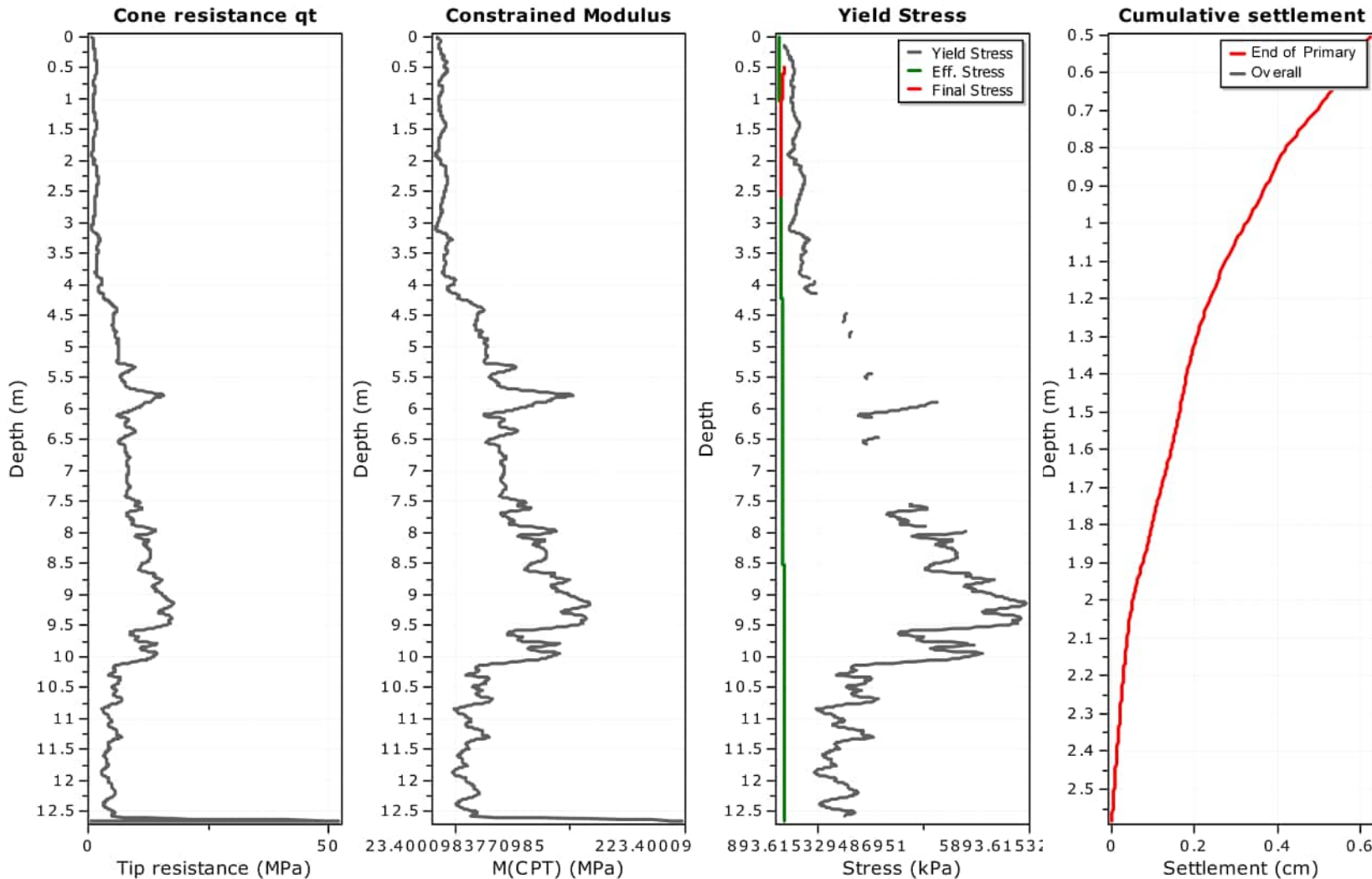
* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 1.00 (m)
L/B: 1.0
Footing pressure: 100.00 (kPa)
Embedment depth: 0.50 (m)
Footing is rigid: Yes
Remove excavation load: No
Apply 20% rule: Yes
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-t/t_p} \right)$$

where t_p is the duration of primary consolidation

Appendix G Draft Geotechnical Works Specification

G1 General

This Geotechnical Works Specification outlines the general requirements for the Site development and is intended for use by Designers and Contractors. The scope includes:

- a Site clearance and preparation, including topsoil stripping and stockpiling;
- b Geotechnical stabilisation works such as undercuts;
- c Subsoil drainage installation;
- d Cut-to-fill earthworks operations;
- e Fill material specification and testing requirements;
- f Earthworks finishing and topsoil resspreading; and
- g As-built documentation and reporting.

Unless otherwise directed on site by the Geotechnical Engineer, the requirements set out in this Specification must be satisfied to enable the Geotechnical Engineer to issue a Geotechnical Completion Report (GCR).

G2 Relevant documents

The following standards, guidelines and consents shall be read in conjunction with this Specification:

- a NZS 1170:2004 Structural Design Actions
- b NZS 3604:2011 Timber-Framed Buildings
- c AS 2870:2011 Residential Slabs and Footings – Construction
- d NZS 4431:2022 Engineered Fill Construction for Lightweight Structures
- e NZS 4402:1986 Methods of Testing Soils for Civil Engineering Purposes
- f Auckland Council Code of Practice for Land Development and Subdivision, Chapter 2: Earthworks and Geotechnical (Version 2.0, May 2023)
- g GD05 – Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (June 2016)
- h Health and Safety at Work Act 2015 and associated Regulations
- i Project-specific Resource Consent Conditions and Engineering Works Approvals

G3 Conflicting information

Where discrepancies arise between this Specification and documents listed in Section G2, the matter shall be referred to the Geotechnical Engineer for clarification and resolution.

G4 Geotechnical observation requirements

The following construction activities constitute hold points requiring observation, testing and written approval from the Geotechnical Engineer:

- a Foundations for filling following stripping of topsoil and unsuitable materials (and prior to fill placement);
- b Undercuts depth and extent prior to backfilling;
- c Subsoil drain excavations prior to placement of aggregate;
- d Any imported soil fill materials prior to placement on site;
- e Drainage aggregate quality prior to placement;
- f Geotextile layers once in place and prior to backfilling;

- g Filling placed at regular intervals to comply with the fill test frequency requirements in Section G5.8;
- h Compaction of backfilling in critical service trenches;
- i Flushing of the subsoil drainage system at the completion of earthworks;
- j Any unforeseen ground conditions that may impact on the construction works or future land use; and
- k Installation of any settlement monitoring plates or points, application of pre-load and approval prior to its removal.

It is the Contractor's responsibility to ensure that the Geotechnical Engineer is given reasonable notice (minimum 24 hours' notice) and opportunity to observe the above works and that the works do not proceed until approval has been gained from the Geotechnical Engineer.

G5 Construction specification

G5.1 Site preparation

The Contractor shall remove all vegetation from the site of the earthworks except for trees indicated for preservation either by marking on the site or noted on the drawings, and clear the remainder of the site.

Clearing shall mean the felling of all trees, except those indicated, removal of all growth other than grass and weeds, extraction of tree stumps, demolition of fences and other minor items remaining in the way of site stripping, and the complete disposal of all items. Stumping shall mean the removal of all roots greater than 25mm in diameter.

Cleared areas shall be stripped to remove all turf and organic topsoil to depths designated by the Geotechnical Engineer ahead of or during the stripping operations. Stripping shall also cover picking up any old topsoil stockpiles and any buried topsoil detected during the course of the works. The depth shall be sufficient to remove all materials considered unsuitable as fill or unsuitable to remain beneath fill but will not necessarily extend to the full limit of organic penetration.

G5.2 Erosion and sediment control

The works shall be carried out in accordance with the project Erosion and Sediment Control Management Plan and associated drawings.

The Contractor shall ensure good control of surface water runoff at all times by shaping of the surface in cut and fill areas to prevent ponding during rainfall events.

The location of temporary Sediment Retention Ponds (SRP) on sloping ground shall be decided upon with input from the Geotechnical Engineer. Where comment of SRP stability is sought by Auckland Council, then all fill materials used to form batters must be placed as engineered fill and tested accordingly unless advised otherwise by the Geotechnical Engineer.

When decommissioning temporary sediment ponds, all water softened material in the bases and sides of the ponds shall be removed and undercut to the satisfaction of the Geotechnical Engineer. Backfilling of temporary ponds shall be to the compaction standard for general filling unless otherwise specified.

G5.3 Stockpiles

Topsoil stockpiles can add significant driving force for slope instability when placed at or near the crest of a slope. The location of all temporary stockpiles must be approved by the Geotechnical Engineer

prior to placement. Where stockpiles cannot be avoided above sloping ground, they should be placed over a wide area with the height restricted under the direction of the Geotechnical Engineer.

G5.4 Fill foundations and benching of slopes

The foundation on which filling is to be placed must be observed by the Geotechnical Engineer following clearing and prior to the placement of any filling to confirm the strength of the underlying soils is sufficient.

Where it is found, after clearing and stripping operations as specified, that the foundation on which filling is to be placed is unstable, or in cuttings if it is found after the excavation has been cut down to the levels shown in the drawings that unstable ground is encountered, then the Geotechnical Engineer may direct that the soft, yielding or unstable materials causing such instability shall be removed to such depth as directed.

Benching of slopes prior to the placement and compaction of filling should be carried out in accordance with the requirements of NZS 4431 and related documents as mentioned above, especially on the steeper areas of the site, to ensure that the filling placed is keyed into the underlying natural ground. This would involve the cutting of benches approximately the width of a bulldozer, with a slight reverse gradient back into the slope. The optimum depth of each bench is best confirmed by careful Engineering inspections during construction.

G5.5 Temporary batters and excavation stability

The temporary stability of the works is the responsibility of the main contractor.

Slope instability during construction is a significant risk where earthworks may cause changes to slope geometry or groundwater conditions.

The causes of instability during earthworks may include:

- a Removal of toe support due to excavation;
- b Over steepening of slope angles in temporary batters;
- c Geological defects in the soil or rock mass, particularly where these are exposed in excavation faces;
- d Elevated groundwater levels following rainfall, perched groundwater or rapid recharge due to the reduced distance to an impermeable layer (i.e. undisturbed rock) due to cut operations; and
- e Additional loading upslope of excavations (i.e. presence construction equipment or stockpiles).

To help mitigate these risks the contractor should consider:

- a Staging excavations which reduce support to slopes or create temporarily over-steepened slopes, to ensure large areas are not left unsupported. The allowable length of excavation to have open at any one time will vary and is dependent on a number of factors such as, local ground conditions, groundwater, length of time the excavation will be open, weather, depth of excavation, geological defects present and the earthworks equipment and methodology used;
- b Ceasing works in excavations during rainfall and assessing stability of excavations following rainfall events prior to resuming work;
- c Benching or battering back of excavation faces;
- d Ensuring good control of surface water runoff above excavations and batters;
- e Covering steep batters with impermeable covers where they may be left without support for any significant period of time;
- f Avoiding loading the crests of slopes and excavations (including loading with working plant);

- g Putting in place comprehensive risk identification and management procedures and work methodologies for temporary excavation stability;
- h Carrying out regular inspections of the areas upslope of excavations and the excavation slope to look for signs of instability such as ground displacement and the development or propagation of cracks; and
- i Seeking advice from the Geotechnical Engineer where there is doubt as to the stability of a slope or excavation.

G5.6 Undercut, fill drainage key, and buttress fill excavations

All undercuts are to be constructed in accordance with the design drawings and standard details. The key/buttress base width, lateral extent and benching requirements need to be confirmed on site by the Geotechnical Engineer during construction. In most cases this requires detailed logging of the excavation faces by a geo-professional. The contractor should make allowance for the time required for these inspections in their work programme.

G5.7 Fill materials and conditioning

G5.7.1 Soil fill, rock fill, or soil and rock mixed fill

Site won materials used as engineered filling shall be free of topsoil, organic matter, rubbish and other unsuitable materials. The maximum particle size for soil and rock blended fill shall be 200mm and mixing and/ or crushing shall be carried in a manner that ensures that significant voids are not present in the filling between rock fragments.

For rock fill without soil blending, crushing is to occur to comply with the requirements for blended fills and needs to ensure that uniform compaction can occur without significant voids between particles in the absence of the soil fill.

G5.7.2 Blending of unsuitables

The blending of 'unsuitables' into structural fills may be undertaken only at the discretion of the Geotechnical Engineer following a request by the contractor and with sufficient time for appropriate consideration. Approval for any such blending must be sought from and provided by the Geotechnical Engineer in writing prior to the commencement of any blending.

In consideration of any such requests, the Geotechnical Engineer will need to be able to assess the composition of the materials requested to be blended, the location on the site for the proposed fills, the fill depths and the elevation of the blended materials within the fills and any environmental constraints.

As a minimum, it is expected that any blended fills will be directed to comply with the following conditions:

- a All significant, solid organics (such as roots and stumps) to be removed prior to blending;
- b All inclusions of suitable man-made materials (e.g. concrete) and any excavated rock must comply with the normal compaction requirements specified herein in terms of size and ability for appropriate compaction to be achieved in close vicinity to the inclusions.
- c All blended materials must be appropriately mixed/blended normal fill materials to the specified ratio. Un-mixed interlayering of normal engineered filling with unsuitables will not be accepted.
- d As a preliminary indication, it is expected that the ratio of unsuitables to suitable fill will not exceed 1 in 20 by volume.

It is expected that the Geotechnical Engineer will also need to apply limits to the location/depth of blended fills within any specified fill area.

G5.7.3 Hardfill

Hardfill used as structural filling shall be a graded, unweathered, durable, crushed rock product approved by the Geotechnical Engineer, with a grading suitable for compaction.

G5.7.4 Material conditioning

The cut materials on site may require some drying prior to compaction to achieve the required specification. This may be done by harrowing (such as with discs) and air drying when conditions permit or by the addition of hydrated lime.

The rock cut materials on site may require blending with soil cut materials on-site to allow for adequate compaction.

The addition of lime and/or cement to engineered filling in concentrations greater than 3% requires the approval of the Geotechnical Engineer.

All additives such as lime or cement proposed for use in backfill materials in contact with geosynthetics must be approved and monitored by the Geotechnical Engineer.

G5.8 Fill placement, compaction, and testing requirements

G5.8.1 Soil fill

Soil placed in fills shall be conditioned and compacted until the following conditions are satisfied. Alternative methods based on specified compaction techniques may be selected by the Geotechnical Engineer if the method below is considered inappropriate due to the granular nature of the materials.

There are two classes of filling defined:

- a General Fill: Structural engineered fill;
- b Landscape Filling: Lower strength filling (than General Filling) may be specified on a case by case basis by the Geotechnical Engineer where the strength and properties of General fill is not required and such filling is approved by the client and regulatory authorities.

It should be noted that the surface of the fill area prior to placement of subsequent fill lifts should be in a state so as not to create a break in the consistency of the fill material between lifts. For example, if surfaces are left to dry out, or rolled to seal them from rainfall infiltration then the surface must be broken up and scarified with rippers or by other means to ensure a good bond between fill lifts.

The maximum lift of filling placed before compaction is dependent on the size and nature of the compaction equipment. Typically, 300mm loose depth is considered the maximum for a Cat 815/820 type compactor. In any event, the contractor must ensure that the fill is placed and compacted to achieve even and adequate compaction throughout each layer/lift.

The test criteria and frequency for cohesive materials (Clays & Silts) are set out in Table G-1 and Table G-2 below. If non cohesive soils (i.e. Sands) are to be placed as engineered fill, the matter should be referred to the Geotechnical Engineer to define the testing requirements.

Table G-1: Cohesive materials (soil fill and soil/ rock blended fill) compaction test criteria for engineered filling

Fill Class	Air Voids ⁽¹⁾		Vane Shear Strength ⁽²⁾		Water Content ⁽³⁾	Dry Density ⁽³⁾
	Average	Maximum Single Value	Average	Minimum Single Value	Maximum	Minimum
General Fill	10%	12%	140kPa	120kPa	30%	1.40 t/m ³
Landscape Fill	To be confirmed by Geotechnical Engineer on a case by case basis					
Notes:						
(1) Air Voids Percentage (as defined in NZS 4402:1986).						
(2) Undrained Shear Strength (Measured by hand shear vane – calibrated using NZGS 2001 method).						
(3) Water content and minimum dry density non-compliance may be accepted on site by the Geotechnical Engineer on a case by case basis depending on the nature of the material and the other criteria results.						

Table G-2: Cohesive materials (soil fill and soil/ rock blended fill) compaction testing frequencies for engineered filling

Fill Class	Field Density & Air Voids %	Vane Shear Strength	Solid Density	Compaction Curve
General Fill	1 test per 1500 m ³ of fill placed with not less than 1 test per 500 mm lift of filling for each area.	1 set of tests (4 readings within 1m of each other) per 500 m ³ of filling placed with not less than 1 test per 500 mm lift of filling for each fill area.	1 test per material type per 50,000 m ³ or at least 1 test every 8 weeks.	1 test per material type per 30,000 m ³ or at least 1 test every 5 weeks.
Landscape Fill	To be confirmed by Geotechnical Engineer on a case by case basis			

The test criteria and/or frequency may be relaxed at the discretion of the Geotechnical Engineer for the project or in a discrete fill area subject to the consistency of the results achieved being acceptable over a specified period of time.

G5.8.2 Site-won rock fill

If required, a compaction specification is to be determined by the Geotechnical Engineer based on site trials.

G5.8.3 Compaction testing reporting requirements

- All test location coordinates to be recorded by hand-held GPS with reference to the NZTM projection. Test location coordinates, with date and test number reference are to be provided to the Geotechnical Engineer in electronic (Excel) format on a weekly basis. Alternatively, the Geotechnical Engineer may approve the use of site plans to mark the location of tests in lieu of GPS location.
- The volume of filling placed for each progress claim month (typically ending 20th of the month) including all filling placed (undercut and cut to fill) to be provided to the Geotechnical Engineer monthly by the contractor or Engineer to the Contract to allow assessment of test frequency adequacy.
- Interim fill test summaries are to be provided to the Geotechnical Engineer for review on a regular basis.

G5.8.4 Hardfill

A plateau compaction test shall be carried out on site under the supervision of the Geotechnical Engineer, for each type of hardfill placed to determine the achievable maximum dry density (MDD) with no more than 20% total voids unless a laboratory derived MDD can be provided. The Geotechnical Engineer shall be given the opportunity to approve the size and type of compaction equipment to be used prior to any plateau testing.

Hardfill shall be placed and compacted to 95% of the MDD determined from the plateau test or laboratory MDD. If these conditions are not able to be met, then appropriate adjustment of the moisture content or compaction equipment will be required.

In all cases, the dry density of the compacted fill at any one test site shall be not more than 5% below the minimum and the average of the dry densities of any ten consecutive test sites shall not be less than the specified minimum.

The Geotechnical Engineer may at their discretion, alter the compaction specification to a method compaction specification based on the plateau test result for materials with a maximum particle size greater than 65mm.

The test frequency shall be 1 test per 500m³ of hardfill placed with not less than 1 test per 500mm lift of filling for each fill area.

The test frequency may be relaxed at the discretion of the Geotechnical Engineer for the project or in a discrete fill area subject to the consistency of the results achieved being acceptable over a specified period of time.

G5.9 Subsurface drainage

G5.9.1 General

Drainage for undercuts, fill drainage keys, buttress fills, underfill gully drains and counterfort drains shall be constructed in accordance with the design drawings and standard details.

G5.9.2 Materials

Pipes

Drainage pipes used in subsoil drainage shall be 160mm diameter highway grade drain coil. Drain coil walls shall be perforated or solid as detailed in the design drawings or directed by the Geotechnical Engineer on site. Drain coils shall not have a geofabric filter sock unless requested by the Geotechnical Engineer on site.

Aggregate

Auckland Council now generally require that subsoil drainage has a 100-year design life and is essentially maintenance free, unless there is an entity such as body corporate or residents association that maintenance responsibility can be transferred to. Maintenance by individual owners is not practical as the subsoil drainage systems usually cross over, and generally benefit, multiple lots.

This requires a high-quality drainage aggregate with the following properties:

- a Self-filters against the soils present on site preventing loss of permeability over time; or, able to be practically wrapped in a suitable geofabric filter;
- b High permeability, which translates to a low fines content; and
- c Stable and not subject to crushing, weathering, internal erosion or piping, or significant loss of volume (settlement) over time.

Ideally the drainage aggregate should be a well graded self-filtering material such as a clean (free of significant cohesive fines) scoria SAP50 product or Transit F/2 specification filter media. Alternatively, for blanket drains, underfill drainage and all applications where full encapsulation with a geofabric filter cloth can be relatively simply and safely achieved, an open graded product, preferably 27/7 Scoria may be used. Care will need to be taken to ensure that the cloth fully encapsulates the aggregate. Observation of the cloth wrap should form an inspection hold point prior to backfilling over the drain. Drain coils in this instance do not require a filter sock.

For counterfort trench drains and applications where a full filter cloth wrap is not practical to construct, and the performance of the drain is not critical to maintaining slope stability then a SAP20 or SAP50 may be used without a filter cloth wrap. Drains which fall into this category must be defined and confirmed as such by the Geotechnical Engineer. Additionally, where such materials are used, regular visual inspections and approval of the aggregate quality and laboratory grading curves is required. This is to comprise visual inspection of each site stockpile prior to material being placed in the trench. One wet sieve grading curve from each site stockpile per week is required while material is being imported to site to monitor the fines content. Drain coils in this instance do not require a filter sock.

For counterfort trench drains and applications where a full filter cloth wrap is not practical to construct, and the performance of the drain is critical to maintaining slope stability then a TNZ/F2 or (approved) modified F2 aggregate must be used. In conjunction with this an approved high specification drainage pipe with filter cloth surround such as the Megaflo products may be specified.

Light compaction (i.e. tamping with back of excavator bucket) only is to be applied to drainage aggregates.

Filter Cloth

Any filter cloth surround specified on the drawings shall meet the requirements of Transit Specification TNZ/F7, Filtration Class 2 and Strength Class B unless otherwise specified on the drawings.

Trench backfill in service trenches

It is important on all sloping land that service trenches running parallel to contours are avoided where possible as they can permit the ingress of surface water and/or lateral movement of trench sides that could lead to progressive land slippage, help develop tension cracks and possibly lead to slope and building instability.

Backfilling of all trenches should be to the general fill standard above unless specifically varied in writing by the Geotechnical Engineer and where possible the pipe bedding in all trenches on steep ground should contain a 50mm diameter perforated drain coil that is connected into each manhole on the line. This is to help prevent instability arising from the ingress of surface water and/or lateral movement of trench sides that could lead to progressive land slippage and is especially important where the lines are in close proximity to buildings.

The subdivision drain laying contractor must be made aware of these requirements and of the need to contact us when trench backfilling is to take place.

G5.9.3 Depth and extent

The location, extent and depth of the drainage shown on the design drawings may be varied on site by the Geotechnical Engineer in response to the ground conditions encountered.

G5.9.4 Drainage outlets and inspection points

Outlets for subsurface drainage shall be provided at regular intervals shown on the drawings or as determined on site by the Geotechnical Engineer. Pipe outlets shall be specifically formed structures with adequate protection such as a headwall and/or rock rip rap. The position of all outlets shall be recorded on the as-built drawings.

Where possible it is good practice to include additional inspection and/or flushing points in the subsoil drainage system in the event that their performance needs to be confirmed in the future.

In any event, at least one temporary flush point is required for each subsoil drainage system to enable flushing of the system once the earthworks are substantially complete.

The flushing of the subsoil drainage system must be witnessed by the Geotechnical Engineer.

G5.10 Finishing works and topsoil respread

G5.10.1 Overcut

All areas cut to below finished level should be reinstated with engineered filling to the satisfaction of the Geotechnical Engineer.

G5.10.2 Topsoil depth

Topsoil respread depth should be between 100mm and 300mm, or as directed by the Engineer to the contract. On ground steeper than 1V:3H the surface should be roughened under the supervision of the Geotechnical Engineer prior to topsoil placement.

G5.10.3 Unsuitable materials

At the conclusion of earthworks, all surplus unsuitable materials should be removed from site or placed in designated permanent stockpiles. The size and location of such stockpiles must be approved by the Geotechnical Engineer and recorded on the as-built drawings.

G5.10.4 Road subgrades

Testing and formation of road subgrades will be carried out as part of the subdivision civil works package.

G6 Monitoring

G6.1 Settlement

Where filling is placed over materials suspected to be of a compressible nature or where a significant depth of filling is to be placed, then settlement monitoring points should be installed on the finished surface of the filling and monitored post construction to ensure ongoing settlement rates are within acceptable guidelines for residential building development.

The number and position of monitoring points and the frequency of post construction settlement monitoring is to be agreed with the Geotechnical Engineer during construction.

It is the contractor's responsibility to ensure the integrity of the monitoring points is maintained during the works.

To ensure appropriate quality settlement data is collected for analysis, the following principles and procedure for the works must be adhered to:

Instrument Installation:

- a Instruments must be installed on the stripped surface prior to the commencement of surcharge filling to capture the full effects of the surcharging. Partial placement of surcharge and excavation back down to install an instrument is not acceptable.
- b Upon installation, the instrument locations are to be fixed with GPS.
- c The RL must be recorded by precise levelling at that time.
- d Unless instructed otherwise by the Geotechnical Engineer to avoid bearing capacity failure, it is important that surcharge filling is placed to its design height and full lateral extents in its entirety in a single, rapid operation to allow for measurement of a single settlement curve.

During construction:

- a It is important that the surcharge surface RL is recorded and reported together with the instrument data.
- b Readings must be taken monthly or per 1m fill or pre-load lift height, whichever is more frequent.
- c GPS level readings can be taken during fill and pre-load construction.

Preload height:

- a Within 48 hours of full preload height being achieved, the RL must be recorded by precise levelling and the full extent of the surcharge must be surveyed and provided to the Geotechnical Engineer as soon as possible.
- b Fortnightly monitoring must be undertaken unless advised otherwise by the Geotechnical Engineer.

G6.2 Groundwater

The assumptions made in the design of the slope stabilising works with regard to long-term groundwater levels are important. It is therefore considered prudent to reinstall several of the groundwater monitoring piezometers removed during construction in key areas to confirm the assumption made in the design and the performance of the subsoil drainage network.

The location of these will be determined by the Geotechnical Engineer at the completion of the Earthworks.

G7 As-built information requirements

In order to provide a Geotechnical Completion Report (GCR), certain as-built information must be provided to T+T. It is the contractor's responsibility to ensure that all of the following items are surveyed prior to placing filling. The survey of these items should therefore form a hold point in the construction sequence.

- a The location and invert of all sub surface drainage; and
- b The depth of filling placed including all benching, undercuts, fill drainage keys and temporary ponds which have been backfilled.

T+T require the following as-built information to be provided for the GCR:

- a Cut and fill depth plan (including undercuts);
- b Final contour plan;
- c Drainage locations and inverts (surface and subsurface);
- d Drainage outlet locations (surface and subsurface);

- e Details of any defined overland flow paths;
- f Location and heights of any retaining walls;
- g Position and extent of any geogrid layers (in plan view);
- h Material data for imported products used such as draincoils, aggregates and geofabrics as well as confirmation that products installed comply with the requirements of the project drawings and this specification; and
- i Any settlement Monitoring Data.

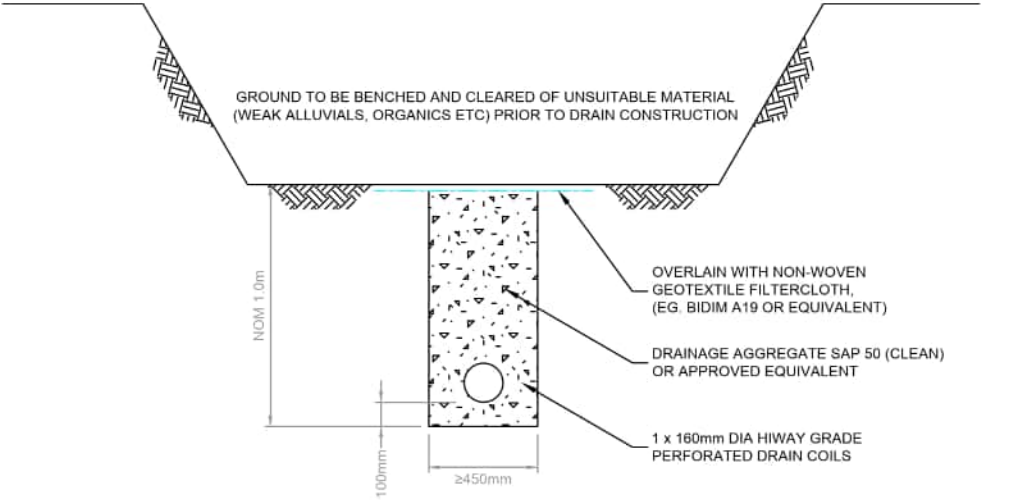
Appendix H HG Proposed Plans

HG's Drawings (DRAFT FOR INFORMATION ONLY):

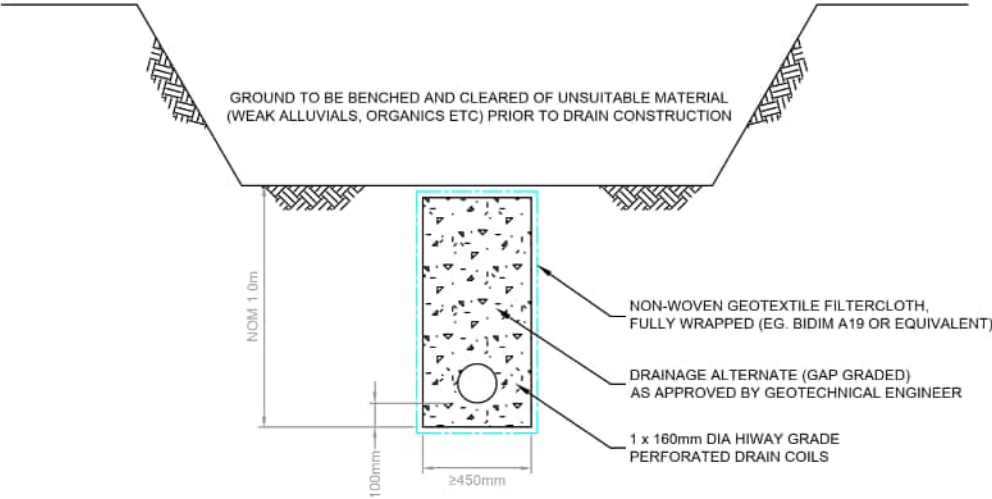
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|---|---|
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CONTOURS [Rev A, 05.2026] |
| • A2515591.00-HG-S1-SK-C-037 | CUT/FILL VOLUME
[Rev A, 25.05.2026] |
| • A2515591.00-HG-S1-SK-C-078 & -078A to -078J | RETAINING WALL PLAN
[Rev A, 25.05.2026] |
| • A2515591.00-2700 to -2707 | RETAINING WALL LONGSECTION
[Rev A, 25.05.2026] |
| • A2515591.00-HG-S-1-SK-C-076 & -076A to -076F | COASTAL AREA STORMWATER
PLAN [Rev A, 25.05.2026] |

Refer to PDF Volumes 3 to 5

Appendix I Subsoil Drainage Typical Details



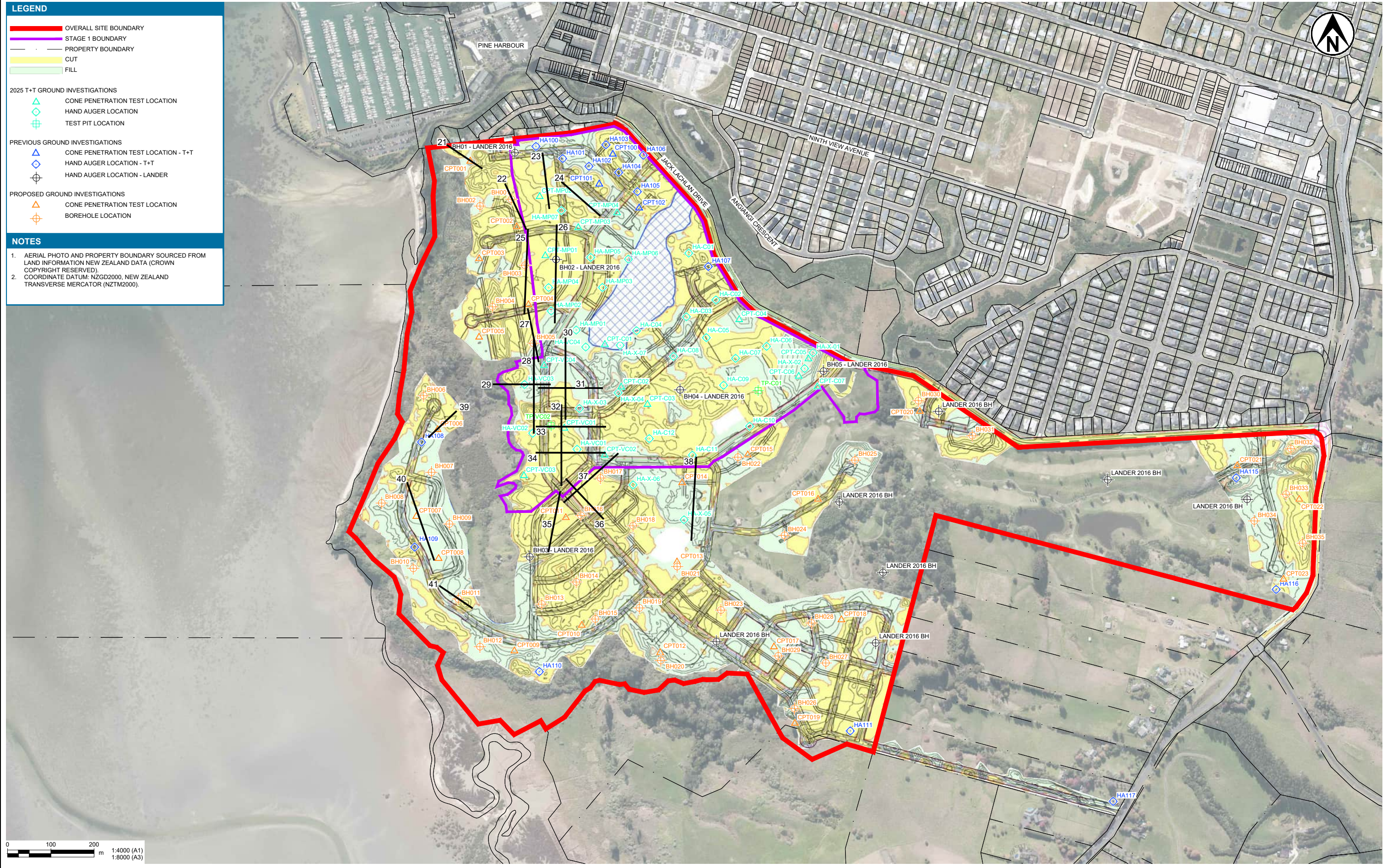
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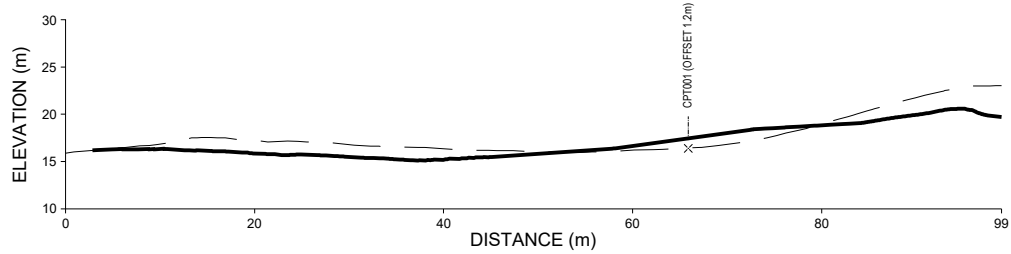


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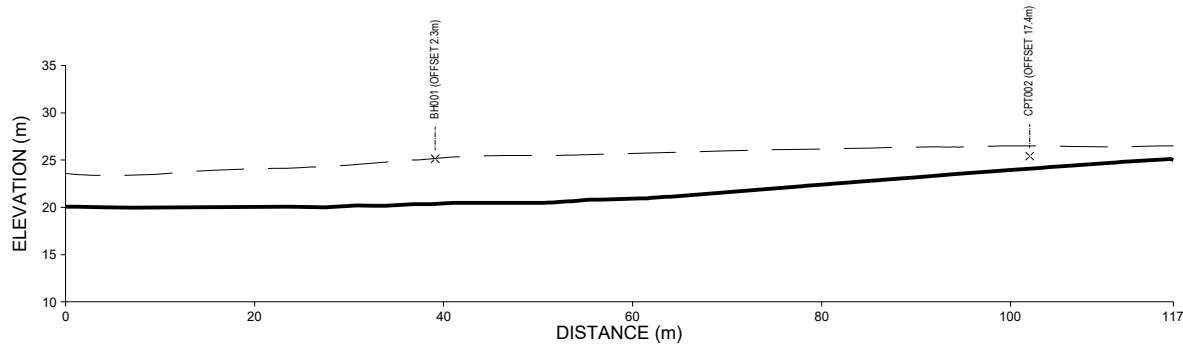
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					DRAWING CHECKED		MRT	JUN 26	1014358.3200						
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												FIGURE 13			
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Appendix J Cross-Sections at Proposed Basements Locations

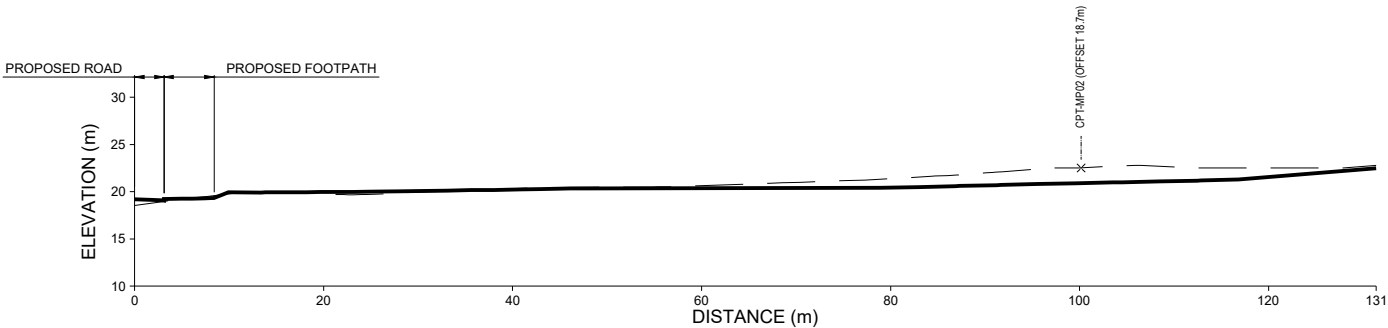




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22 SECTION
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SCALE (A3) 1:800



23 SECTION
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SCALE (A1) 1:400
SCALE (A3) 1:800

LEGEND

— EXISTING GROUND
— PROPOSED GROUND

NOTES

1. COORDINATE DATUM: NZGD2000, NEW ZEALAND
TRANSVERSE MERCATOR (NZTM2000).



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DESIGNED JXXL APR.26
DRAWN ALPO APR.26
DESIGN CHECKED
FIGURE CHECKED

FIGURE STATUS
PRELIMINARY DRAFT
PROJECT PHASE
PROJECT PHASE

CLIENT **BEACHLANDS SOUTH LIMITED PARTNERSHIP**
PROJECT **BEACHLANDS SOUTH BALANCE LIVE-ZONE**

TITLE GEOTECHNICAL CROSS-SECTIONS
SHEET 1

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FIG No. FIGURE 15

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UNLESS SIGNED AS APPROVED

APPROVED

DATE

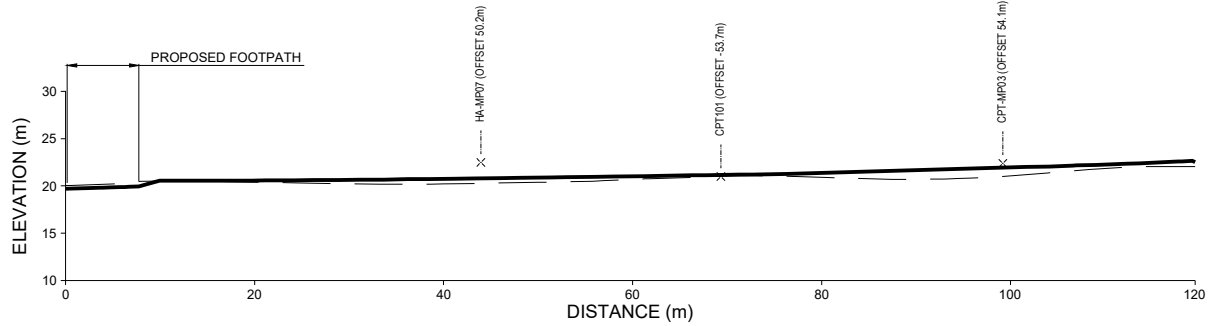
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EXISTING GROUND

PROPOSED GROUND

NOTES

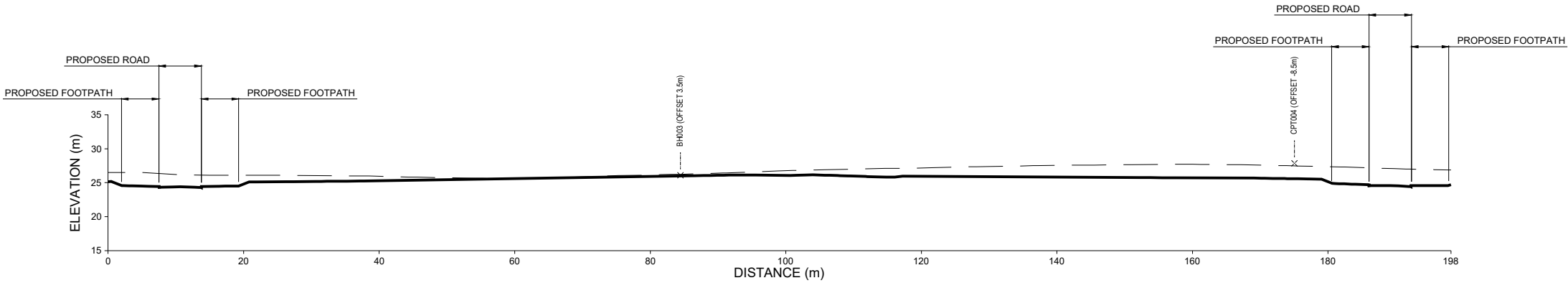
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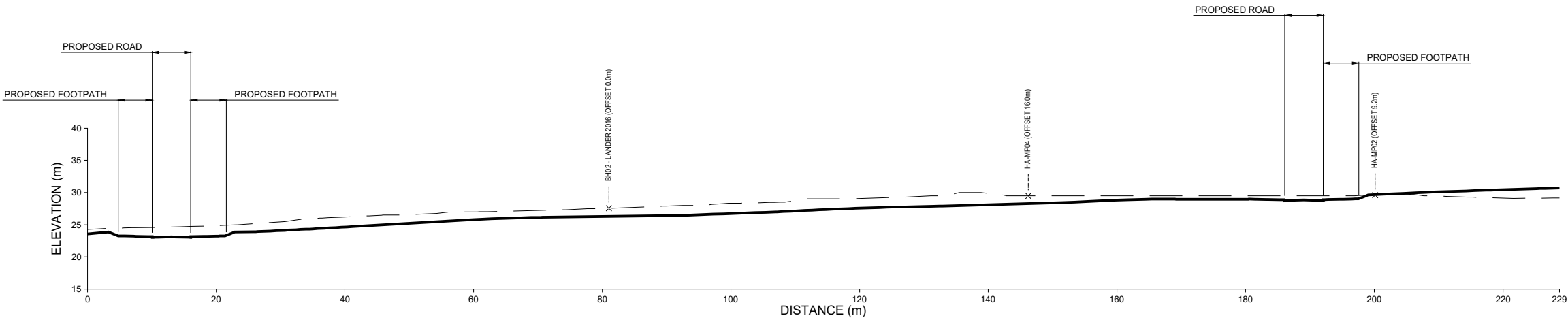
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25 SECTION

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26 SECTION

F2

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1:400 (A1)
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CLIENT	BEACHLANDS SOUTH LIMITED PARTNERSHIP
PROJECT	BEACHLANDS SOUTH BALANCE LIVE-ZONE
TITLE	GEOTECHNICAL CROSS-SECTIONS SHEET 2
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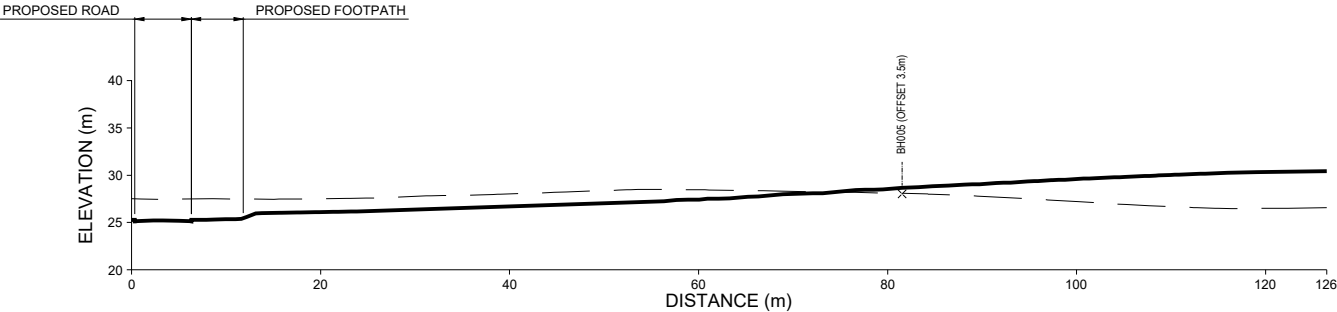
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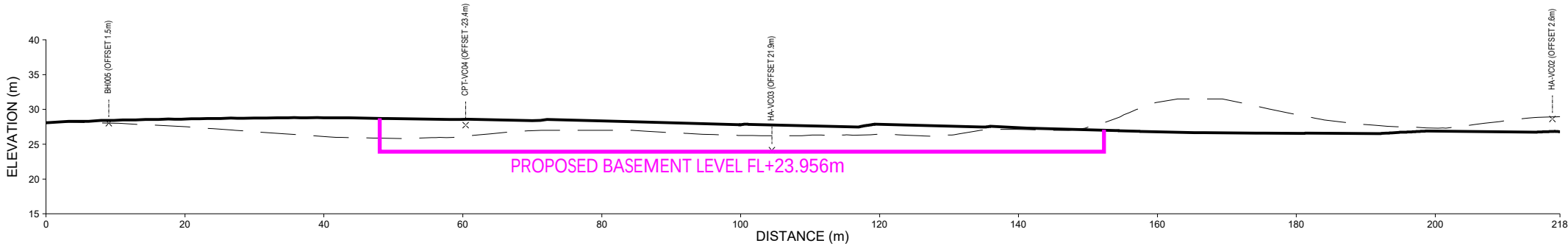
PROPOSED GROUND

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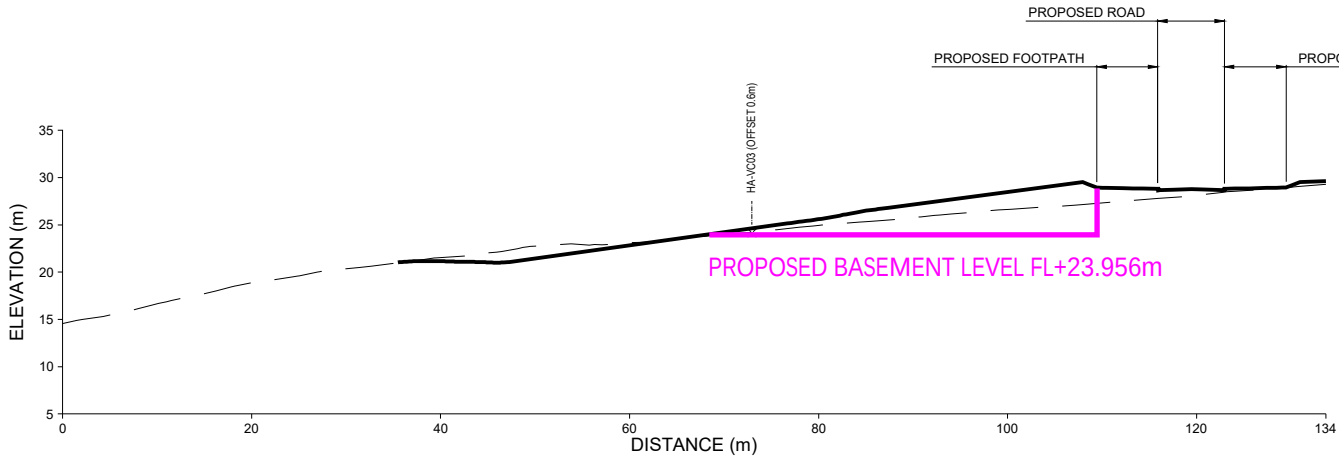
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28 SECTION
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29 SECTION
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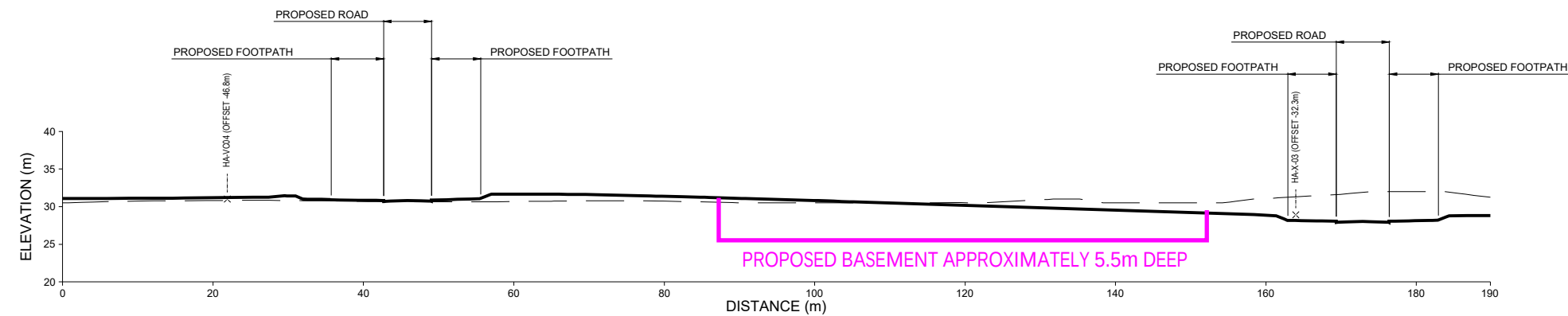
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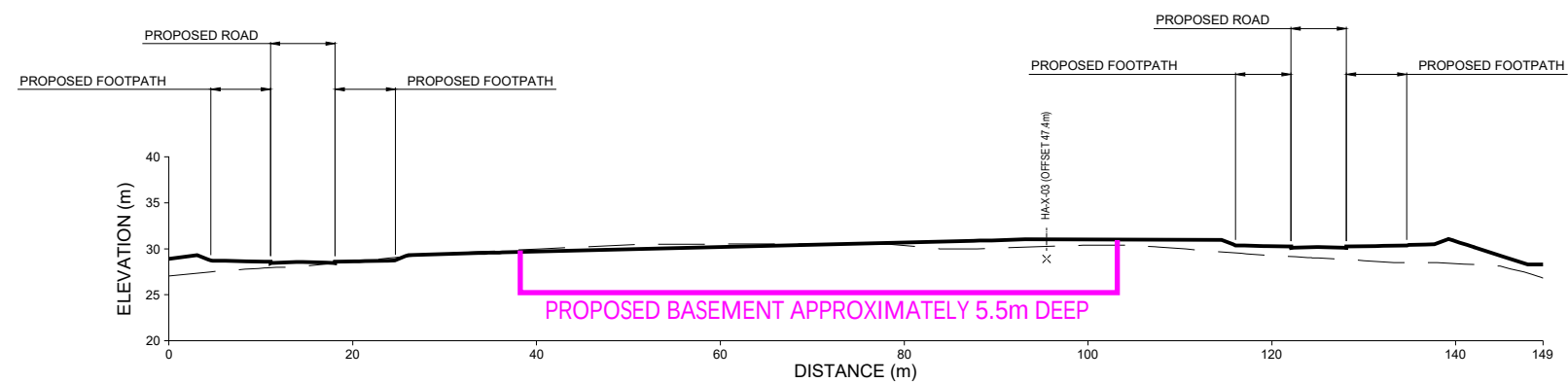
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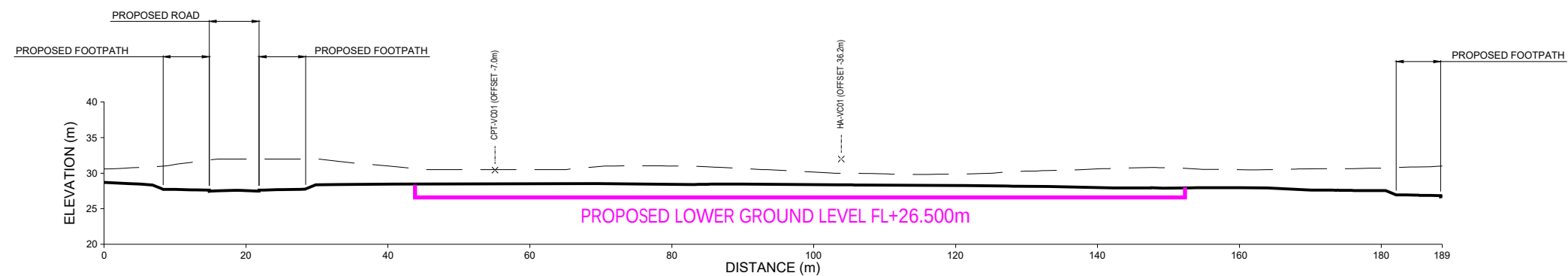
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PROJECT	BEACHLANDS SOUTH BALANCE LIVE-ZONE
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FIG No.	FIGURE 17
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SCALE (A3) 1:800



31 SECTION
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SCALE (A1) 1:400
SCALE (A3) 1:800



32 SECTION
F2
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LEGEND

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EXISTING GROUND

PROPOSED GROUND

NOTES

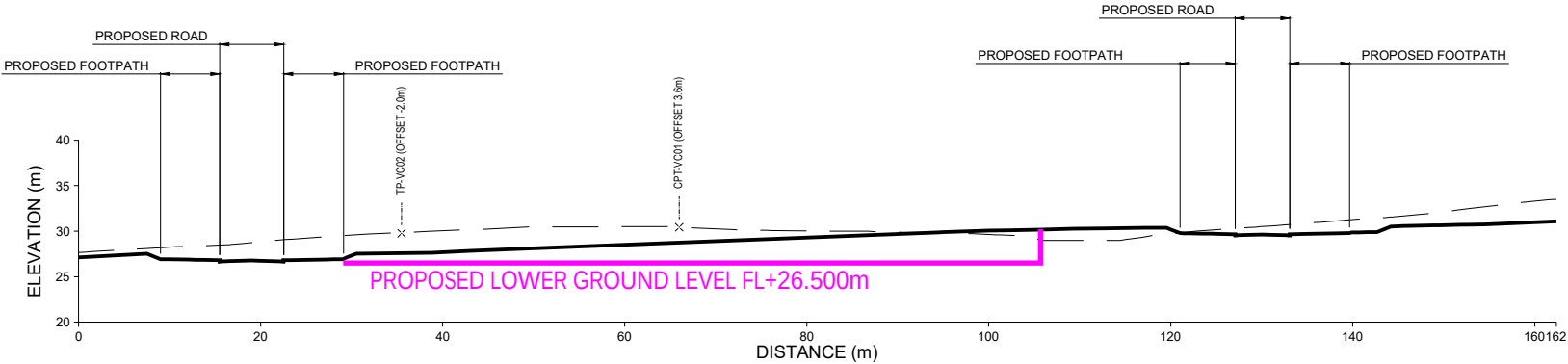
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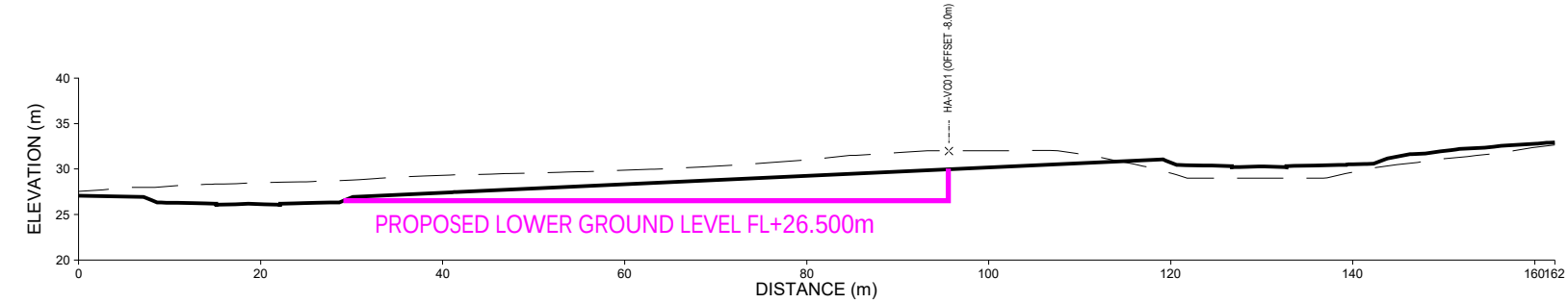
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NOT FOR CONSTRUCTION		THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED AS APPROVED	
APPROVED		DATE	

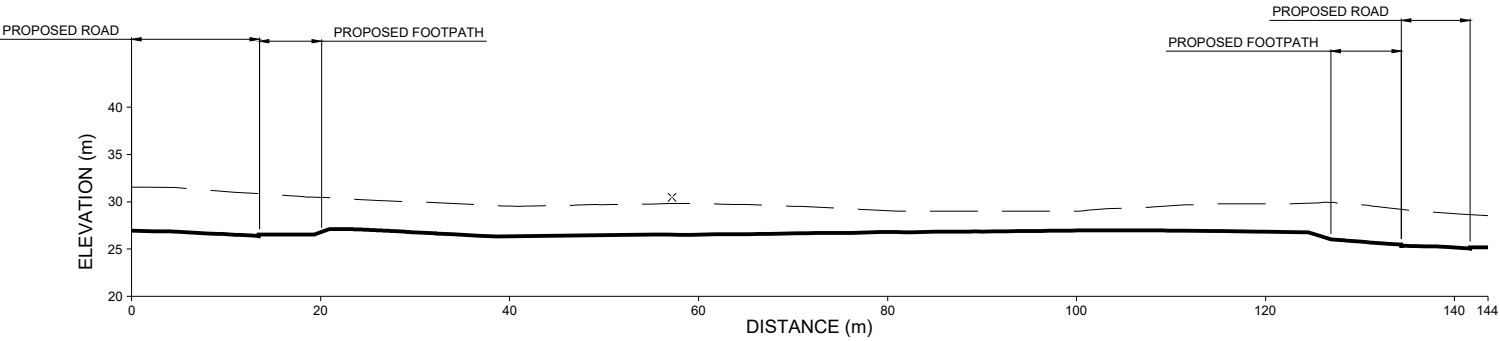
CLIENT	BEACHLANDS SOUTH LIMITED PARTNERSHIP
PROJECT	BEACHLANDS SOUTH BALANCE LIVE-ZONE
TITLE	GEOTECHNICAL CROSS-SECTIONS SHEET 4
SCALE (A1)	1:400
FIG No.	FIGURE 18
REV	0



33 SECTION
F2
SCALE (A1) 1:400
SCALE (A3) 1:800



34 SECTION
F2
SCALE (A1) 1:400
SCALE (A3) 1:800



35 SECTION
F2
SCALE (A1) 1:400
SCALE (A3) 1:800



1:400 (A1)
1:800 (A3)

LEGEND

—

—

EXISTING GROUND

—

—

PROPOSED GROUND

NOTES

1. COORDINATE DATUM: NZGD2000, NEW ZEALAND TRANSVERSE MERCATOR (NZTM2000).

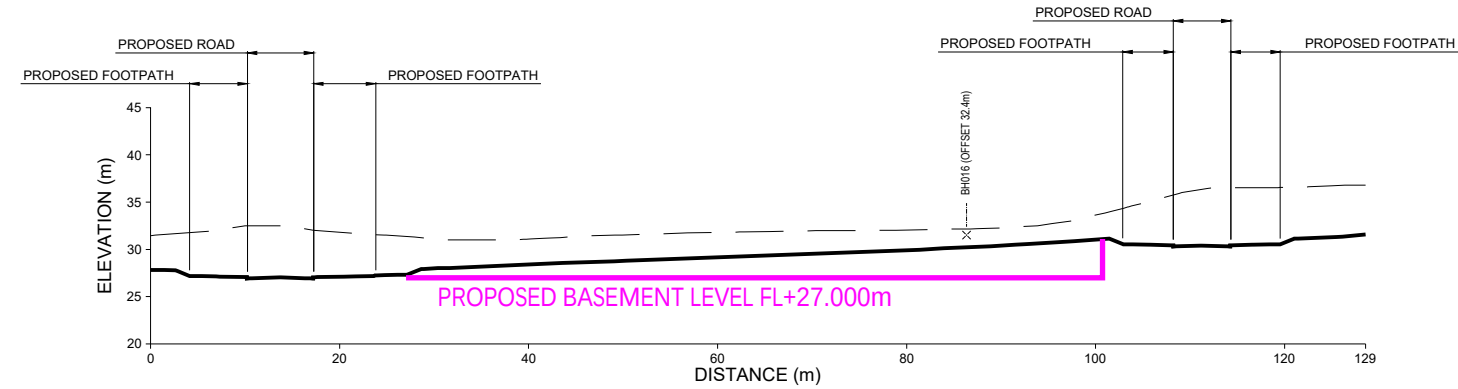
LEGEND

EXISTING GROUND

PROPOSED GROUND

NOTES

1. COORDINATE DATUM: NZGD2000, NEW ZEALAND
TRANSVERSE MERCATOR (NZTM2000).

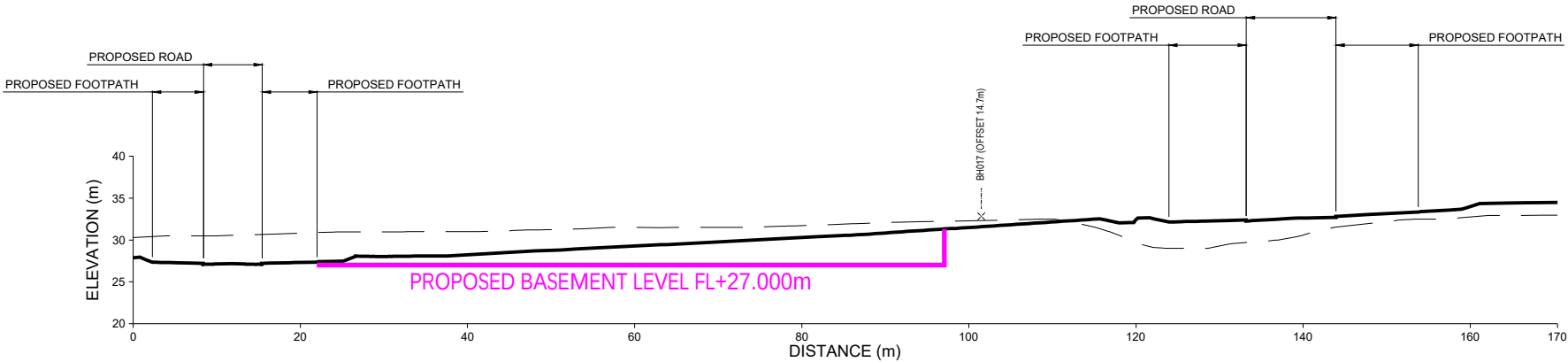


36 SECTION

F2

SCALE (A1) 1:400

SCALE (A3) 1:800

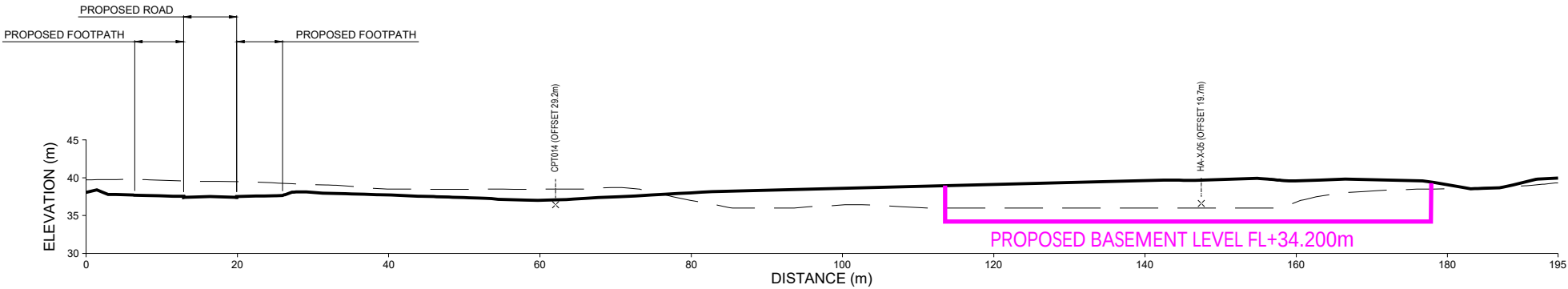


37 SECTION

F2

SCALE (A1) 1:400

SCALE (A3) 1:800



38 SECTION

F2

SCALE (A1) 1:400

SCALE (A3) 1:800



1:400 (A1)
1:800 (A3)



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DESIGNED	JXXL	APR.26	FIGURE STATUS
DRAWN	ALPO	APR.26	PRELIMINARY DRAFT
DESIGN CHECKED			PROJECT PHASE
FIGURE CHECKED			PROJECT PHASE
NOT FOR CONSTRUCTION		THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED AS APPROVED	
APPROVED		DATE	

CLIENT	BEACHLANDS SOUTH LIMITED PARTNERSHIP
PROJECT	BEACHLANDS SOUTH BALANCE LIVE-ZONE
TITLE	GEOTECHNICAL CROSS-SECTIONS SHEET 6
SCALE (A1)	1:400
FIG No.	FIGURE 20
REV	0

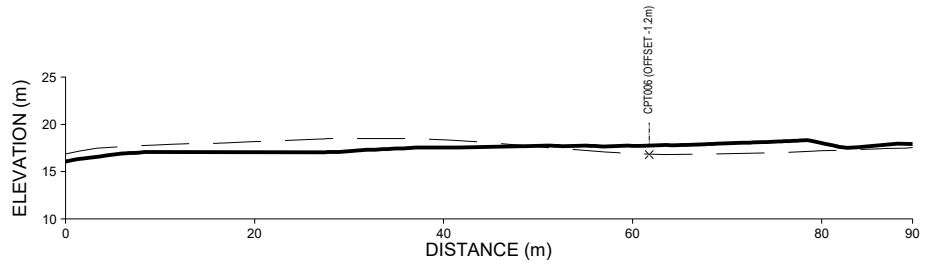
LEGEND

EXISTING GROUND

PROPOSED GROUND

NOTES

1. COORDINATE DATUM: NZGD2000, NEW ZEALAND
TRANSVERSE MERCATOR (NZTM2000).

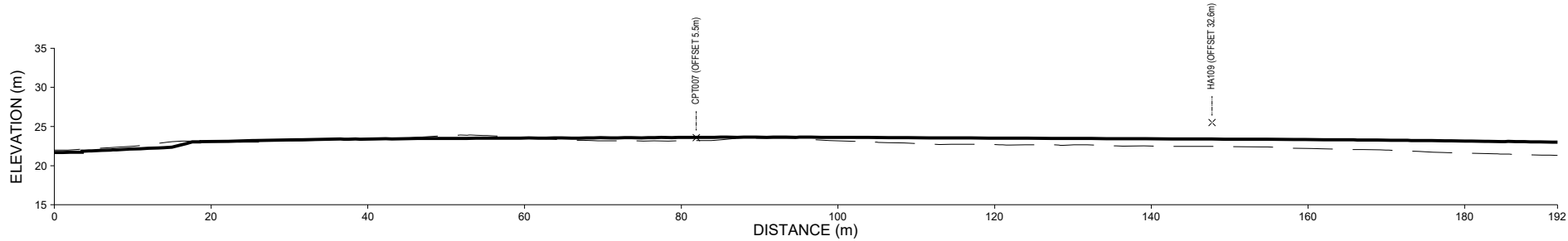


39

SECTION

F2

SCALE (A1) 1:400
SCALE (A3) 1:800

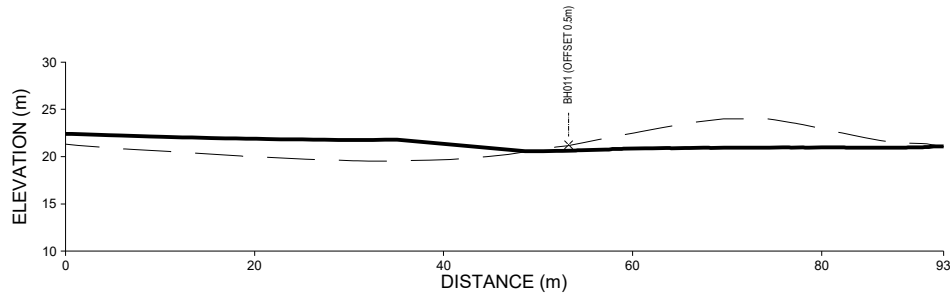


40

SECTION

F2

SCALE (A1) 1:400
SCALE (A3) 1:800



41

SECTION

F2

SCALE (A1) 1:400
SCALE (A3) 1:800



1:400 (A1)
1:800 (A3)



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DESIGNED	JXXL	APR.26	FIGURE STATUS
DRAWN	ALPO	APR.26	PRELIMINARY DRAFT
DESIGN CHECKED			PROJECT PHASE
FIGURE CHECKED			PROJECT PHASE
NOT FOR CONSTRUCTION		THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED AS APPROVED	
APPROVED		DATE	

CLIENT	BEACHLANDS SOUTH LIMITED PARTNERSHIP
PROJECT	BEACHLANDS SOUTH BALANCE LIVE-ZONE
TITLE	GEOTECHNICAL CROSS-SECTIONS SHEET 7
SCALE (A1)	1:400
FIG No.	FIGURE 21
REV	0

Appendix K Safety in Design Risk Assessment

Appendix L - Safety in Design Risk Assessment

Project Name	Beachlands South - Remaining Live-Zoned for Fast-Track Resource Consent Application
Project Number	1014358.3200
Design Phase	Geotechnical Investigation Report
Client	Beachlands South Limited Partnership
Last Update Date	5-Jun-26
Update By	JXXL
Reviewed By	MRT
File Location	P:\1014358\1014358.3200\WorkingMaterial\09. Reporting\01. Geotechnical Investigation Report\Appendices_v2\Appendix L_Safety in Design Risk Assessment_T+T.xlsx

Purpose of Health and Safety by Design
Health and Safety by Design (HSBD) aims to eliminate or minimise risks to people through better design. This register supports that goal by helping project teams:

1. Identify activities and situations where people interact with the design.
2. Recognize risks that could cause harm.
3. Assess and implement design changes to eliminate or reduce those risk, so far as is reasonably practicable.
4. Communicate any residual risks to downstream stakeholders.
5. Document decisions for transparency and assurance.

Step 1: Identification of HSbD Risks						Step 2: Initial Risk Assessment			Step 3: Actions to Address HSbD Risks	Step 4: Residual Risk		
Risk Number	Lifecycle Phase	Human Activities / Situation / Work	Risk to People	Harm / CONSEQUENCE of the Risk	Existing Design Features / How is this risk mitigated in current design?	Initial Likelihood	Initial Consequence	Risk	Proposed Actions	Residual Likelihood	Residual Consequence	Risk7
		What are the activities that people will carry out across the lifecycle of the building/structure/plant?	What are the safety risks that may cause harm/injury/ death to people undertaking these activities?	What is the potential level of harm to people if the risks occur?	List the design features already included that eliminate or reduce the identified risks?	Refer Risk Matrix Tab	Refer Risk Matrix Tab		What further actions can be made to eliminate or minimise the risk?	Refer Risk Matrix Tab	Refer Risk Matrix Tab	
R001	Bulk Earthworks	Cut/Fill Earthworks	Steep temporary batters/slopes during cut works	Collapse of temporary excavation faces; injury to workers or equipment damage	Specify maximum temporary batter angles; recommend staged excavation and supervision	3: Possible - The event could occur more than once every 3 years.	4: Major - Temporary major injury / illness (i.e. with full recovery).	18 High Threat	Contractor to monitor batter conditions daily; ensure compliance	2: Unlikely - The event could occur more than once every 10 years.	4: Major - Temporary major Injury / Illness (i.e. with full recovery).	15 Medium Threat
R002	Bulk Earthworks	Cut/Fill Earthworks	Differential settlement in fill areas	Post-construction settlement causing building/service damage	Specify engineered fill, compaction specifications, and testing requirements	2: Unlikely - The event could occur more than once every 10 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	12 Medium Threat	Install settlement monitoring points and monitor	1: Rare - The event could occur once in more than 10 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	7 Low Threat
R003	Bulk Earthworks	Undercuts	Unexpected soft/weak ground at depth	Loss of bearing capacity; safety hazard during construction	Require observation hold point by geotechnical engineer prior to excavation	3: Possible - The event could occur more than once every 3 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	13 Medium Threat	Notify geotechnical engineer if variability encountered	3: Possible - The event could occur more than once every 3 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	13 Medium Threat
R004	Bulk Earthworks	Undercuts	Excavation collapse during undercut works	Entrapment or burial of personnel	Specify safe slope geometry and access; identify no-go zones	3: Possible - The event could occur more than once every 3 years.	4: Major - Temporary major injury / illness (i.e. with full recovery).	18 High Threat	Enforce exclusion zones and use of trench shields	2: Unlikely - The event could occur more than once every 10 years.	4: Major - Temporary major Injury / Illness (i.e. with full recovery).	15 Medium Threat
R005	Bulk Earthworks	Subsoil Drainage Installation	Deep/narrow trench excavation	Collapse of trench walls; worker entrapment	Specify safe trench widths/depths; recommend laydown areas and trench support	3: Possible - The event could occur more than once every 3 years.	4: Major - Temporary major injury / illness (i.e. with full recovery).	18 High Threat	Trained personnel only; daily trench inspections; use shoring	2: Unlikely - The event could occur more than once every 10 years.	4: Major - Temporary major Injury / Illness (i.e. with full recovery).	15 Medium Threat
R006	Bulk Earthworks	Retaining Wall Construction	Inadequate bearing conditions under wall foundations	Wall instability or overturning	Require foundation inspection/approval before proceeding with wall construction	2: Unlikely - The event could occur more than once every 10 years.	4: Major - Temporary major injury / illness (i.e. with full recovery).	15 Medium Threat	Contractor to coordinate with geotechnical engineer	2: Unlikely - The event could occur more than once every 10 years.	4: Major - Temporary major Injury / Illness (i.e. with full recovery).	15 Medium Threat
R007	Bulk Earthworks	Retaining Wall Construction	Poor drainage and hydrostatic pressure	Increased loading on wall; wall failure	Include wall drainage design (drains, weepholes, drainage metal, geofabric)	2: Unlikely - The event could occur more than once every 10 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	12 Medium Threat	Verify construction of drainage elements before backfilling	2: Unlikely - The event could occur more than once every 10 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	12 Medium Threat
R008	Bulk Earthworks	Pavement Construction	Poor subgrade conditions	Premature pavement failure	Subgrade testing; specify capping layer or stabilisation	2: Unlikely - The event could occur more than once every 10 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	12 Medium Threat	Confirm subgrade quality prior to placement of basecourse	1: Rare - The event could occur once in more than 10 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	7 Low Threat
R009	Bulk Earthworks	General Earthworks	Contaminated land or unknown services	Exposure to hazardous material; service strike	Review existing site investigations; include service location and utility plans	3: Possible - The event could occur more than once every 3 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	13 Medium Threat	Contractor to verify utility locations; stop work on encountering contamination	3: Possible - The event could occur more than once every 3 years.	3: Moderate - Medical Treatment required (e.g. Doctor visit with treatment, Emergency Clinic.	13 Medium Threat
R010	Bulk Earthworks	Stormwater Swale Construction	Steep side slopes	Vehicle or pedestrian safety risk	Flatten slopes where possible; include barrier or signage	2: Unlikely - The event could occur more than once every 10 years.	2: Minor - First Aid Treatment	6 Low Threat	Install signage/barrier prior to operation	2: Unlikely - The event could occur more than once every 10 years.	2: Minor - First Aid Treatment	6 Low Threat

