Geotechnical Investigation Report

Proposed Dwelling Extensions, Pool & Shed

55 Kingfisher Drive, Kerikeri

Lot 2, DP 311542 & Lot 4, DP 317854

For

Ian & Vicki Smith

Haigh Workman reference 25 023

March 2025

Phone: +64 9 407 8327 • Fax: +64 9 407 8378 • info@haighworkman.co.nz • www.haighworkman.co.nz

PO Box 89 • 6 Fairway Drive • Kerikeri 0245 • New Zealand

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Prepared By

Craig Nelder

Geotechnical Engineer
BE(Hons)

Reviewed By

Wayne Thorburn

Senior Geotechnical Engineer
CPEng, CMEngNZ

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Executive Summary

Haigh Workman Limited (Haigh Workman) were engaged by Ian & Vicki Smith (the Client) to undertake a geotechnical investigation for proposed external additions / extensions on an existing dwelling at 55 Kingfisher Drive, Kerikeri (Lot 2, DP 311542 & Lot 4, DP 317854). We understand that the client intends to develop the site with deck additions, a boat shed, cellar / storage under an existing deck, new roof / pergola areas, a pool, and retaining walls.

The soils directly underlying the site comprise natural soils of the Kerikeri Volcanic Group, below a thin veneer of topsoil. The natural soils were typically described as being very stiff silts and clays, becoming hard with depth. However, some firm to stiff soils were encountered across and below the main development sites. Foundations may be designed for moderately expansive (Class M) soils.

The majority of the earthworks will be undertaken along the northern side of the existing dwelling and across the proposed pool area, which will involve up to 3.0m of engineered hardfill. Minor cutting is proposed at the southern side for a proposed spa pool on a concrete patio (up to 0.5m in height), which may be battered back at a maximum angle of 1V:3H or supported by a retaining wall. Landscaping earthworks up to a maximum height of 1.5m are also proposed, which will be retained behind engineered retaining walls which has been covered by a separate letter report prepared by Haigh Workman Ltd, dated 18 February 2025 and is exempt from building consent.

All cuts and fills along the northern side of the dwelling shall be supported by an engineered retaining wall, designed by a Chartered Professional Engineer. If earthworks are proposed that are outside of that included within our stability assessment, then further assessment and engineered design will be required.

The proposal to build the pool on engineered fill, at its current proposed location, will require and In-ground retaining wall and retaining of fill below the pool. Alternatively, we have demonstrated through our slope stability assessment that lowering the elevation of the pool by 1.4m and removing the proposal to fill down-slope of the pool will not worsen the existing stability of the site and satisfactory factors of safety will be achieved. In-ground retaining will still be required to mitigate shallow soil creep on downslope side of pool.

The proposed retaining wall supporting the fill and outdoor kitchen, fireplace and pergola areas shall be designed to accommodate both global stability and active earth pressures. A deflection-based design methodology will be required should the proposed builds be located within the influence zone of the wall. For the current proposal, the design forces will likely require reinforced concrete or steel. Retaining wall design parameters and recommendations are included within Section 6.3.

Settlement

Fill material encountered across the proposed dwelling extensions and additions on the northern side of the existing dwelling is considered non-engineered fill and is therefore particularly prone to settlement. Non engineered fill beneath the proposed building additions shall be removed and replaced with engineered hardfill.

Surface settlement behind the wall can also be expected with wall deflections and therefore, the structural design of the retaining wall elements will be deflection based. The proposed outdoor kitchen and pergola area is located at the edge of the retaining wall and careful consideration in retaining wall and foundation design is required. The 3 metres of filling beneath the proposed building additions is also likely to result in consolidation

settlement of the underlying Kerikeri volcanic soils. Due to the extent of filling proposed, we recommend that a site-specific settlement analysis (i.e., settle 3D) is undertaken to determine angular distortion / differential settlement across the building platform, which will require CPT testing. However, due to the nature of residual Kerikeri Volcanic Group soils, consolidation settlement from the proposed hardfill is likely to reach 90% (T_{90}) within 3 months.

Where filling does not exceed 1.0m above existing ground level, we do not consider consolidation settlement to cause any undue risk to the building development.

Foundations

Based on our findings, we consider the natural ground conditions (below topsoil and any fill material) are expected to be consistent across the proposed development area and are considered suitable for supporting foundations subject to ground verification during construction. They however considered to be expansive and therefore outside the criteria for "Good Ground" as outlined on NZS3604:2011. It is considered that the natural in situ soils are able to provide an Ultimate Bearing Capacity of 300 kPa and foundation depths should allow for the expansive nature of the soil. A summary of the foundation recommendations are as follows:

Boat Shed, Dwelling Additions / Extensions, Decking & Fireplace

Where foundations are located within the influence zone of any retaining walls, and the retaining wall provides unsatisfactory deflections, then the foundations shall be subject to specific engineered design.

Concrete encased timber post foundations can be designed in accordance with NZS3604:2011, provided the embedment depth is increased to 1.0m to mitigate seasonal shrink/swell effects, and embedment depths are taken into the natural Kerikeri Volcanic Group soils. All other foundation types shall follow the recommendations of B1/AS1 or be subject to specific engineered design following AS2870:2011.

Foundations can be designed using an ultimate bearing capacity of 300kpa and a geotechnical reduction factor of 0.5. The foundations should be founded into the natural soils or engineered hardfill and may be designed as follows:

- Ultimate bearing capacity of 300kPa.
- Geotechnical strength reduction factor – 0.5.
- Soil expansivity – Site Class M (Moderately expansive soils)
- Designed in accordance with NZS3604:2011, provided a minimum foundation embedment depth of 1.0m is adopted.
- All other foundation types shall follow the recommendations of B1/AS1 or be subject to specific engineered design following AS2870:2011.

Pool

Pool foundations and pool walls will be subject to specific engineered design by a Chartered Professional Engineer (Structural) who is familiar with the contents of this report. The design of the foundations shall follow the recommendations outlined within this report. A bearing capacity of 300 kPa can be used, provided the

bearing stratum comprises natural Kerikeri Volcanic Group soils or engineered hardfill. Provided the foundations are founded into the natural soils or engineered hardfill, they may be designed as follows:

- Ultimate bearing capacity of 300kPa and/or using the design parameters set out in Table 3.
- Geotechnical strength reduction factor – 0.5.
- Soil expansivity – Site Class M (Moderately expansive soils)

Bearing capacity values included in this report are for vertical loads only and do not take into account horizontal shear or moment.

We consider the following specific items, but not limited to will need to be addressed prior to and at the time of construction to ensure the foundation soils are consistent with the assumptions made in this geotechnical report:

- Geotechnical drawing review prior to undertaking construction observations;
- Observe building excavations (subgrade), removal of unsuitable material, and confirm location of the building are in accordance with our recommendations.
- Observe any fill being placed with testing undertaken at regular intervals prior to preparing foundations.
- Observe all foundation excavations for the building prior to foundations being poured.

Provision should be allowed for modifying the foundation solution at this time should unforeseen ground conditions be encountered.

1 Introduction

1.1 Project Brief and Scope

Haigh Workman Limited (Haigh Workman) has been commissioned by Ian & Vicki Smith (the Client) to undertake a geotechnical investigation for proposed external additions / extensions on an existing dwelling at 55 Kingfisher Drive, Kerikeri (Lot 2, DP 311542 & Lot 4, DP 317854). The proposal also includes proposed retaining walls, a pool and a new boat shed. This report presents the information gathered during the site investigation, interpretation of data obtained and site-specific geotechnical recommendations relevant to the site.

The scope of this report encompasses the geotechnical suitability in the context of the proposed development as defined in the Short Form Agreement dated 31 January 2025. The design and recommendations for the proposed retaining walls have been covered in a separate letter report prepared by Haigh Workman Ltd, dated 18 February 2025, and is therefore excluded from the scope of this report. This appraisal has been designed to assess the subsoil conditions for foundation design and identify geotechnical constraints for the proposed development.

This report provides the following:

- A summary of the published geology with reference to the geotechnical investigations undertaken;
- Analysis of the data obtained from site investigations;
- Foundation recommendations;
- Identification of any additional geotechnical risks and/or hazards.

1.2 Proposed Development

We understand that the Client intends to develop the site by adding proposed deck additions, a boat shed, cellar / storage under an existing deck, new roof / pergola areas, a pool and retaining walls. This geotechnical investigation and report consider the geotechnical aspects of the proposed development with particular reference to the proposed development location (Refer provided development plans appended – Appendix B).

Based on the architectural plans provided, we understand the additions located off the northeastern corner of the existing dwelling will be constructed at the existing ground level, with the down-slope portion being built-up to form a level platform.

Should the proposed development vary from the proposals described above and/or be relocated outside of the investigated area, further investigation and/or amendments to the recommendations made in this report may be required.

1.3 Site Description

The subject site is legally described as Lot 2, DP 311542 & Lot 4, DP 317854 with a total land area of 16,826m². The property is located along the northern side of Kingfisher Drive. The surrounding area comprises similar sized coastal living lots.

The site is generally moderately to steeply sloping towards the north / northeast. The northern part of the site (Lot 4, DP 317854) is flat, which encompasses part of a wetland. The existing dwelling is located on a flat cut & fill platform.

At the time of investigations, the proposed development areas typically comprised grassed or landscaping areas. During our second visit to site, a ling of landscaping trees located to the north of the existing dwelling was in the process of being removed.

Figure 1: Site Location

2 Desktop Study

2.1 Published Geology

Sources of Information:

- Institute of Geological & Nuclear Sciences 1:250,000 Geological Map 2, 2009: "*Geology of the Whangarei area*";
- NZMS 290 Sheet P04/05, 1: 100,000 scale, 1982: *"Rock types map of the Whangaroa - Kaikohe area",*
- NZMS 290 Sheet P04/05, 1: 100,000 scale, 1980: *"Soil map of the Whangaroa - Kaikohe area".*

The site is within the bounds of the GNS Geological Map 2 "Geology of the Whangarei area", 1:250,000 scale[*]. The published geology shows the site to be underlain by the Kerikeri Volcanic Group (Pvb).

An extract of the geological map is shown in Figure 2 below, with geological units presented in Table 1 below.

[*] Edbrooke, S.W; Brook, F.J. (compilers) 2009. Geology of the Whangarei area.

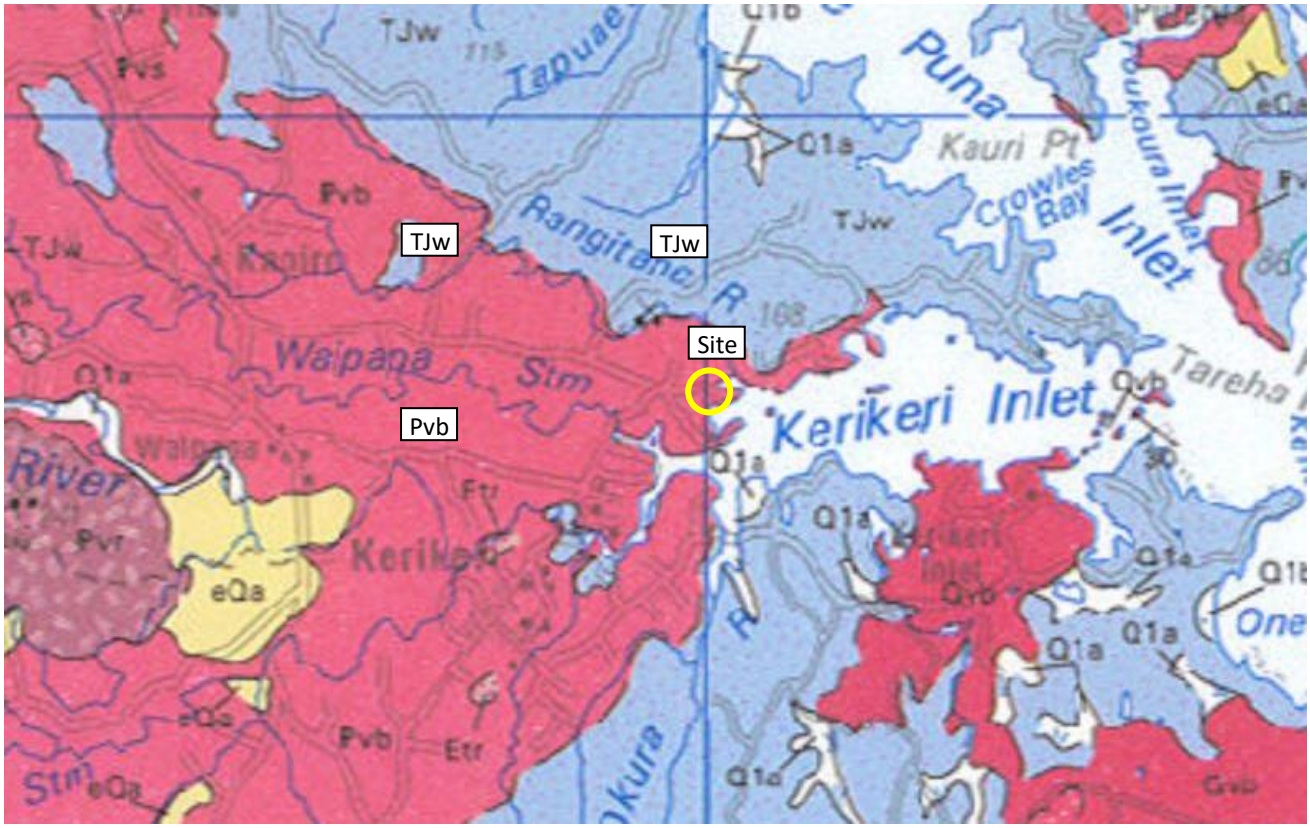


Figure 2: Geological Map (Whangarei Map, 1:250,000)

Table 1: Geological Legend

Symbol	Unit Name	Description
Pvb	Kerikeri Volcanic Group	Older flows and flow remnants of Late Miocene to Pliocene age.
TJw	Waipapa Group	Massive to thin bedded, lithic volcaniclastic metasandstone and argillite of Jurassic to Permian age.

Based on the results of our site investigation, the property is underlain by the Kerikeri Volcanic Group.

Further reference to the published New Zealand Land Inventory maps (Whangaroa - Kaikohe), indicates the site is underlain by *'soils of the rolling and hilly land, well to moderately well drained Kerikeri friable clay (KE)' and/or drained Kerikeri friable clay with large boulders* (Keb), weathered to *'soft red brown or dark grey brown clay to depths of 20m with many rounded corestones'.*

2.2 Geomorphology

Signs of slope instability observed within the vicinity of the site are typical for creep behaviour, with irregular ground surfaces observed across large areas of moderate slopes with no obvious escarpment. The area immediately below the proposed pool location is more evident of this, with small, shallow-seated slump failures and terracette formations. Refer Figure 3 below. This area is also shown to have a light concave nature

compared to the surrounding topography – refer Figure 4. No signs of deep-seated instability features were observed within the vicinity of the investigated area.

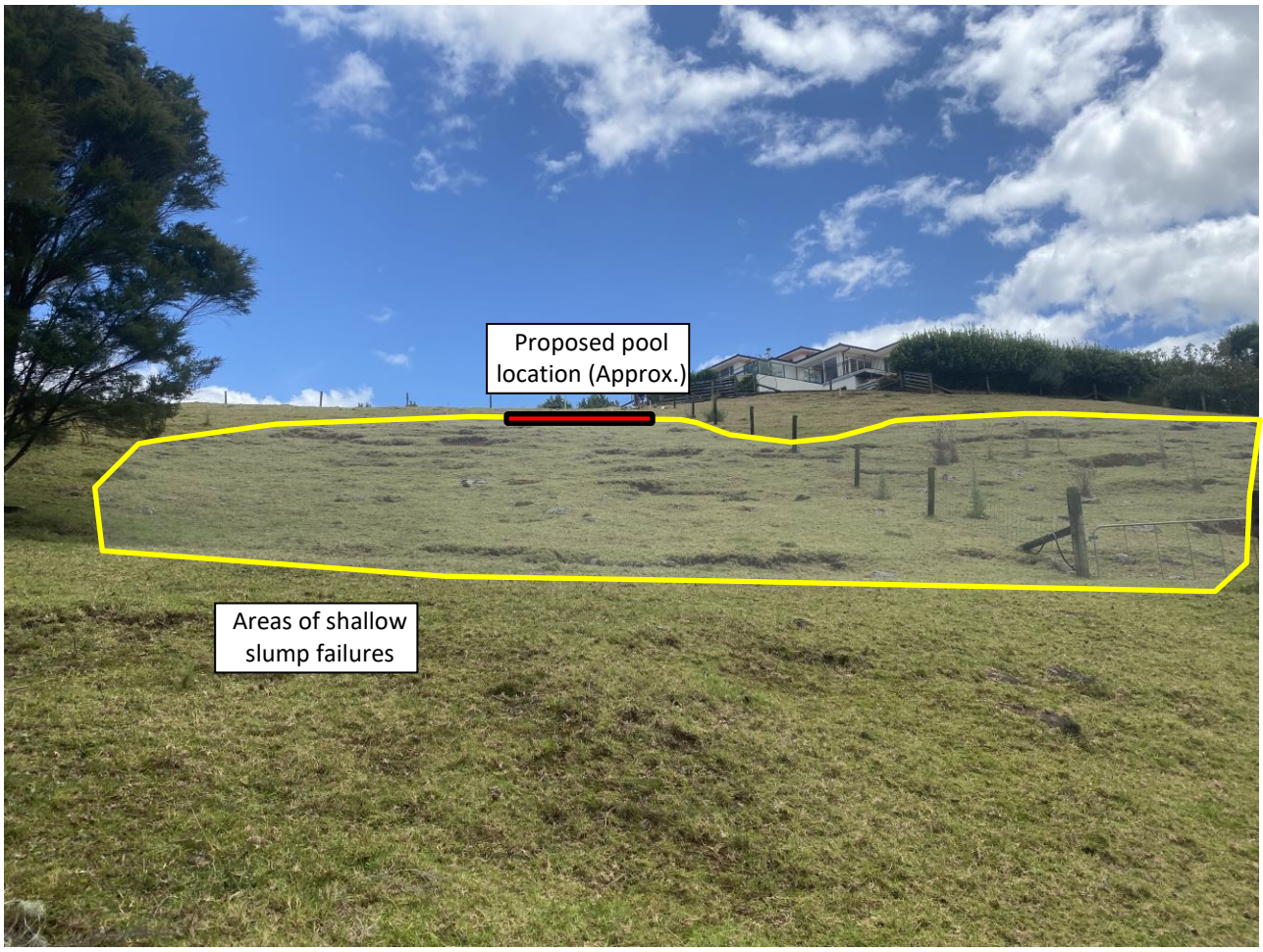


Figure 3: Instability Features

The slopes immediately below the proposed pool & eastern half of the existing dwelling average approximately 20°. The subject area has also likely undergone toe erosion in extreme weather events / coastal flooding events due to the nearby water courses. The overall site contour across and below the proposed pool location shows a slight concave feature which will concentrate stormwater flows from the above catchment. Due to the above reasons, this area of the site shows more obvious signs of shallow instability. The steeper portion of the site, located within the regenerated bush-clad slopes at the eastern extent of the site, averages approximately 24°.

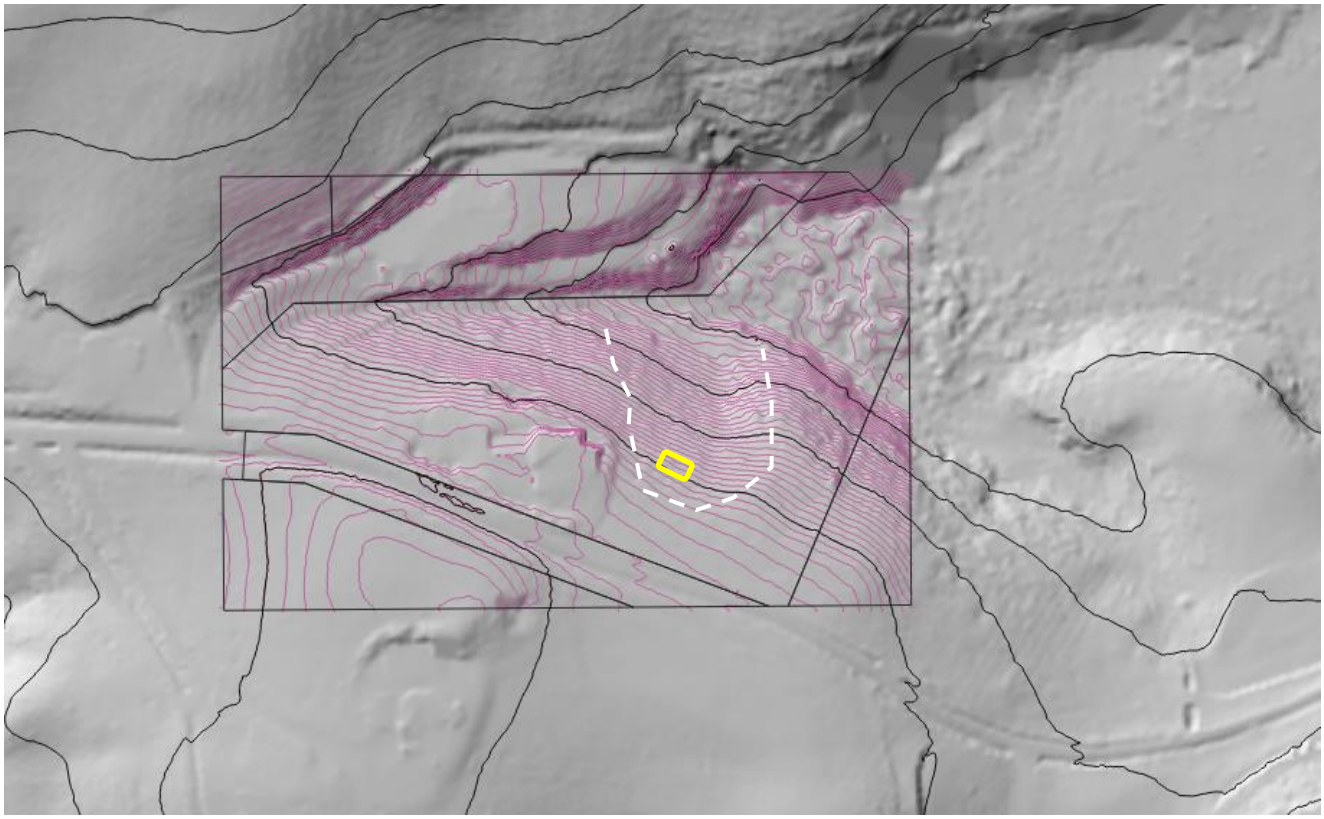


Figure 4: Site Features (LIDAR DEM & 0.5m Contours)

3 Ground Investigations

3.1 Subsurface Investigations

Haigh Workman undertook geotechnical investigations on 05 February 2025. The investigations comprised the drilling of ten hand auger boreholes (BH01 and BH10), located across and down-slope the general building addition areas. An additional hand auger borehole (BH11) was undertaken on 25 February 2025 to help with modelling of the critical slope below the proposed pool location.

Hand auger boreholes were undertaken to a maximum depth of 5.0 metres below ground level (mbgl), with Scala penetrometer testing undertaken within some boreholes, to a maximum depth of 5.9mbgl. A hand shear vane with 19 mm blade was used to measure the Vane Shear Strength of the in-situ material. Vane shear tests were undertaken at regular intervals during the advancement of the hand auger. All shear strengths shown on the appended logs are Vane Shear Strengths in accordance with NZGS; "Guideline for hand held Shear Vane test", 2001.

Investigations were logged in accordance with The New Zealand Geotechnical Society, "Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes" (2005). Investigation locations are shown on the drawings in Appendix A and investigation hand auger logs are included in Appendix C.

3.2 Ground Conditions

Based on the results of the geotechnical investigation conducted by Haigh Workman and review of published geological maps, it is considered that the soils directly underlying the site comprise typically very stiff natural soils of the Kerikeri Volcanic Group, below a thin veneer of topsoil. Varying depths of fill was encountered within landscaping areas and adjacent the existing dwelling. For the purposes of this report, subsoil conditions on the site have been interpolated between the boreholes and some variation between borehole positions are likely. Table 2 summarises the materials encountered, with depth to base of each unit provided.

Table 2: Summary of Borehole Results

Borehole Number	Fill (mbgl)	Topsoil (mbgl)	Residual Kerikeri Volcanic Group Soils (mbgl)	Soil Moisture Observations
BH01	N.E	0.0 to 0.2	0.2 to > 2.6 (UTP)	Groundwater not encountered. *Moist at surface, becoming moist to wet from 2.0mbgl.*
BH02	N.E	0.0 to 0.2	0.2 to > 2.0 (Target Depth)	Groundwater not encountered. *Moist throughout.*
BH03	N.E	0.0 to 0.1	0.1 to > 2.0 (Target Depth)	
BH04	0.0 to 0.9	NE	0.9 to > 1.9 (UTP)	
BH05	0.0 to 0.5	NE	0.5 to > 1.9 (UTP)	
BH06	0.0 to 0.8	0.8 to 1.0	1.0 to > 3.8 (UTP)	Groundwater not encountered. *Moist at surface, becoming moist to wet from 3.1mbgl.*
BH07	NE	NE	0.0 to >4.8 (Target Depth)	Groundwater not encountered. *Moist throughout.*
BH08	NE	0.0 to 0.2	0.2 to > 3.0 (Target Depth)	Groundwater not encountered. *Moist at surface, becoming wet from 2.6mbgl.*
BH09	NE	0.0 to 0.15	0.15 to > 4.9 (Target Depth)	Groundwater not encountered. *Moist at surface, becoming moist to wet from 2.6mbgl.*
BH10	NE	NE	0.0 to >4.1 (UTP)	Groundwater not encountered. *Moist throughout.*

BH11	NE	0.0 to 0.1	0.1 to > 4.0 (Target Depth)	Slight groundwater seepage encountered at 3.3m to 3.5mbgl. *Groundwater not encountered at completion of drilling. Moist to wet from 1.9mbgl.*

Note: Depths measured from existing ground surface level. N.E = Not Encountered.

3.2.1 *Topsoil*

A thin veneer of topsoil was encountered within the majority of the boreholes to a depth of between 0.1m and 0.2m. The topsoil was generally described as a dark brown silt of no plasticity. Topsoil within BH06 was buried beneath fill material.

3.2.2 *Fill*

Fill material was encountered within boreholes BH04, BH05 and BH06. BH04 and BH05 were undertaken within the landscaping areas, used for the design of a retaining wall which has been covered in a separate letter report prepared by Haigh Workman Ltd. BH06 is located within the proposed dwelling addition area.

Fill material typically comprised intermixed topsoil and/or buried topsoil with variable measured shear strengths ranging from 66 kPa to 144 kPa. Due to the presence of topsoil and in-situ shear strengths, the existing fill material is considered non-engineered fill.

3.2.3 *Kerikeri Volcanic Group*

Residual Kerikeri Volcanic Group was encountered within all boreholes and were generally consistent across the proposed building platform. However, firm to stiff layer was encountered within boreholes BH09 and BH11. This layer was typically moist to wet and encountered between 2.6mbgl to 4.0mbgl. Such layers are not uncommon in the Kerikeri Volcanic group residual soils.

The near-surface residual soils generally comprised very stiff, medium plasticity clayey silt. With depth, the residual soils became less plastic with higher gravel content. The recovered soils were generally described as being brown, orange-brown, reddish brown and/or grey in colour.

Volcanic boulders were observed at surface across the site, with boulder density increasing towards the eastern extent of the proposed development.

3.2.4 *Groundwater*

Groundwater was not encountered in any of the boreholes during our site investigations. However, wet soils and minor seepage was encountered within some boreholes, more noticeably across the eastern extent of the investigated area. Investigations were undertaken following a prolonged time of generally dry weather and higher groundwater levels will be encountered following periods of prolonged or heavy rainfall.

4 Geotechnical Assessment

4.1 Geotechnical Design Parameters

Geotechnical design parameters recommended in this report are based on in-situ test results, empirical relationships, and observations of nearby slopes. Refer Table 3 below for soil parameters adopted within this report. Depths for the units are shown in Table 2 and on the appended drawings (Appendix A).

Table 3: Geotechnical Design Parameters

Soil Unit	Bulk Unit Weight γ kN/m^3)	Peak Undrained Shear Strength S_u (kPa)	Effective Cohesion c' (kPa)	Effective Friction Angle φ' (degrees)
Non-engineered Fill	17	>50	1	26
Engineered Hardfill	20	NA	38	0
Residual Kerikeri Volcanic Group (firm to stiff)	18	44 - >100	3	28
Hard / completely weathered Kerikeri Volcanic Group	18	>200	10	34

Note: Cohesion to be ignored within the upper 1.0m for foundation design

4.2 Geological Ground Model

Two geological ground models have been developed based on the site investigation data. The location of the potential building platform is shown on the drawings in Appendix A. The ground surface has been drawn using LINZ Data Service LiDAR information in conjunction with a topographical survey of the site, undertaken by Williams & King Surveyors.

4.3 Slope Stability Assessment

4.3.1 *Visual Assessment*

Signs of shallow soil creep and instability located across the moderately steep slopes (18° to 24°), more noticeably along the eastern slopes and within the regenerative shrub within northeastern extent of the property. The geomorphology and visual observations are covered within Section 2.2.

The proposed boat shed is located across gentle (approximately 3° to 5°) north-facing slopes, which becomes moderately steep (approximately 20°) 10m north of the shed footprint. Furthermore, a small (1.0m maximum) retaining wall is proposed here, which is exempt from building consent). No signs of instability were observed, and the proposed shed footprint is considered stable.

Other parts of the proposed development are located across and/or at the top of the moderately steep slopes, which shows signs of shallow instability. The two geological ground models outlined above have been assessed to determine any remedial works required to achieve satisfactory factors of safety. Refer Figure 4.

4.3.2 *Modelling Philosophy*

Slope stability analyses were undertaken along our geological cross sections A-A' & B-B' using computer software by Rocscience, Slide (Version 9.028). The soil parameters used are presented in Table 3.

Groundwater has been modelled using a phreatic surface. The worst-case phreatic surface was assumed based on observations made during the investigations, noting the groundwater seepage encountered at BH11 and wet soil conditions throughout the slope, and the wetland located at the base of the slope. For normal groundwater conditions, groundwater has been adjusted to generally lie upon the hard Kerikeri Volcanic Group layer, approaching surface further down-slope nearer the water course.

Soils above the estimated groundwater surface for the elevated conditions have been modelled using a pore water coefficient $R_{(U)}$ to represent a partial degree of saturation within the upper soils.

The purpose of the modelling is to determine if ground stabilisation is required to provide a safe building platform. A 10 kPa surcharge has been applied to the ground surface to represent a future building load, and 15 kPa has been adopted for the 1.4m deep pool. The criteria adopted for assessing the global stability is outlined in Table 4 below.

Table 4: Design Factors of Safety (FOS)

Load Case	Design Factor of Safety
Normal groundwater conditions	≥ 1.5
Elevated groundwater conditions	≥ 1.3
Seismic loading	≥ 1.0

Note: Design Factors of safety taken from Auckland Council – The Auckland Code of Practice for Land Development and Subdivision CH2: Earthworks and Geotechnical.
CH2 also requires an amenity area (the lesser of: 8m from the building footprint, or to the property boundary) with a FOS of 1.2 for normal groundwater, and 1.1 for elevated groundwater.

4.3.3 *Seismic Hazard*

Anticipated peak ground accelerations have been estimated assuming Site Class C, as per NZS 1170.5. The seismic coefficients for geotechnical design are based on the NZTA Bridge Manual SP/M/022 (NZBM) and NZS1170. Assuming a design working life of 50 years with an importance level 2 structure, the return period of an earthquake would be 1 in 500 years. Accordingly, the ULS peak ground acceleration for seismic analysis is 0.13 g. In accordance with the NZBM we have also checked a lower-bound PGA of 0.19 g to ensure there are no step changes in overall performance, i.e. failure surfaces do not result in catastrophic failure.

4.3.4 *Analyses Results*

The stability analyses carried out for all scenarios are outlined in the tables below, with analyses summary sheets for all scenarios are included in Appendix D.

Table 5: Stability Results

Section I.D.	Scenario	Result at development	Required	Outcome	Notes
A-A'	Existing site conditions - elevated	1.3	-	-	• As expected for 20° slopes. However, site subject to shallow soil creep.
	Proposed pool - Elevated groundwater	1.2	1.3	NOT OK	• Minimum FOS = 1.21 within proposed fill below pool, and 1.22 across pool. • Remedial measures required. Failure surfaces approximately 4.5m deep which would need to be retained. • Remedial measures may include: - In-ground retaining wall and retaining of fill below the pool. - Lowering the elevation of the pool and no filling down-slope of the pool (some retaining will still be required to mitigate shallow soil creep on downslope side of pool). This option is cheapest and has been included below:
	Proposed pool - Elevated groundwater **(reduced pool elevation by 1.4m)**	1.3	1.3	OK	• Minimum FOS = 1.31 across proposed pool. • By lowering the proposed pool elevation by 1.4m, and undertaking no filling down-slope of the pool, the existing site conditions are not worsened, and factors of safety meet the required criteria set out in Table 4. • In-ground retaining will still be required on down-slope end of pool to mitigate soil creep.
	Proposed Pool - Normal Groundwater **(reduced pool elevation by 1.4m)**	1.8	1.5	OK	• Satisfactory factor of safety achieved – elevated groundwater worst case. • Mitigation measures required as per elevated groundwater conditions scenario.
	Proposed pool - Seismic (PGA =	1.3	1.0	OK	• Satisfactory factor of safety achieved – elevated groundwater worst case. • Mitigation measures required as per elevated groundwater conditions scenario.

	0.13g) **(reduced pool elevation by 1.4m)**				• Step-change behaviour checked using a Peak Ground Acceleration (PGA) = 0.19g – FOS = 1.17. step change behaviour not observed and still meets minimum factor of safety. OK.

B-B'	Existing site conditions - elevated	1.37	-	-	• As expected for 20° slopes. However, site subject to shallow soil creep which will affect retaining wall design.
	proposed dwelling addition - Elevated groundwater	1.3	1.3	OK	• OK, **provided** the proposed retaining wall supporting the fill can accommodate global stability. A minimum design of 55kN distributed over a total height of 5.4m shall be accounted for. **This is discussed in more depth in Section 6.3**. 55 kN is factored and may be used in design. Estimated Bending Moment = (5.4m / 2 + 1.5 x Ds) * 55kN. • Retaining wall toe-slope is subject to shallow soil creep which will affect retaining wall design.
	Proposed dwelling addition – Normal groundwater	1.6	1.5	OK	• OK, **provided** the proposed retaining wall supporting the fill can accommodate global stability. A minimum design of 55kN distributed over a total height of 5.4m shall be accounted for. **This is discussed in more depth in Section 6.3**. 55 kN is factored and may be used in design. Estimated Bending Moment = (5.4m / 2 + 1.5 x Ds) * 55kN.
	Proposed dwelling – Seismic (PGA = 0.13g)	1.2	1.0	OK	• OK, **provided** the proposed retaining wall supporting the fill can accommodate global stability. A minimum design of 55kN distributed over a total height of 5.4m shall be accounted for. **This is discussed in more depth in Section 6.3**. 55 kN is factored and may be used in design. Estimated Bending Moment = (5.4m / 2 + 1.5 x Ds) * 55kN. • Step-change behaviour checked using a Peak Ground Acceleration (PGA) = 0.19g – FOS = 1.11. step change behaviour not observed and still meets minimum factor of safety. OK.

4.3.5 *A-A' (Proposed Pool)*

Global stability can be retained, provided the elevation of the pool is reduced by 1.4m (i.e., FL is reduced from 20.33m to 18.9m – refer concept plan sheet A102 attached (Appendix B)), and that no filling down-slope of the pool is undertaken. Should filling be required, then further stability assessment and specific engineered retaining walls will be required.

To mitigate shallow creep behaviour of the slope, then an in-ground retaining wall (i.e., soldier pile wall) will be required down-slope of the proposed pool. Refer Section 6.3.

4.3.6 *B-B' (Proposed Dwelling additions / outdoor kitchen and pergola)*

The proposed retaining wall extending along the front (north) of the proposed building additions shall be designed to satisfy both active earth pressures and global stability.

To satisfy global stability, the retaining wall shall be designed to withstand a minimum 55kN over a retained height of 5.5m. For design using earth pressures, the design should allow for a minimum of 1.0m of soil creep away from the toe of the wall.

4.4 Liquefaction Potential

Liquefaction potential has been assessed using MBIE guidance: *planning and engineering guidance for potentially liquefaction prone ground*. The published geology and investigation data indicates the site is underlain by residual Kerikeri Volcanic Group soils of Late Miocene to Pliocene age and is not part of a landform that is commonly susceptible to liquefaction. Furthermore, subsoil investigations generally encountered very stiff, fine-grained clayey soils. We consider the soils beneath the site too plastic to liquefy. No further assessment is required.

4.5 Settlement

4.5.1 *Boat Shed*

The proposed development area is underlain by residual Kerikeri Volcanic Group soils. The residual soils were generally described as being very stiff soils with measured vane shear strengths in excess of 100kPa. No filling is anticipated across the proposed boat shed footprint, and we do not consider consolidation settlement to cause any undue risk to the building development.

4.5.2 *Proposed pool*

The proposed development area is underlain by residual Kerikeri Volcanic Group soils. The residual soils were generally described as being very stiff soils with measured vane shear strengths in excess of 100kPa, however some firm to stiff soils (44 kPa – 100 kPa) were encountered between approximately 2.5mbgl to 4.0mbgl across and downslope of the proposed pool location. Provided filling beneath the proposed pool is kept to a minimal (i.e., the elevation of the pool is reduced as required by the stability analysis), consolidation settlement is not considered to cause any undue risk to the proposed pool.

4.5.3 *Dwelling extensions & additions (northern side)*

Fill material was encountered across this area which is considered non-engineered fill and is therefore particularly prone to settlement. Non engineered fill beneath the proposed building additions shall be removed and replaced with engineered hardfill.

Settlement can be induced due to retaining wall deflections. A 3m high retaining wall is proposed at the northeastern corner of the proposed welling additions, tapering down to 0m towards the west and south. Surface settlement behind a wall can be expected with wall deflections and therefore, the structural design of the retaining wall elements will be deflection based. The proposed outdoor kitchen and pergola area is located at the edge of the retaining wall and careful consideration in retaining wall and foundation design is required.

The 3 metres of filling beneath the proposed building additions is also likely to result in consolidation settlement of the underlying Kerikeri volcanic soils.

Based on in-situ test results, consolidation settlement may be in the order of 35mm to 100mm, assuming a surcharge of 70 kPa (3m of hardfill + 10 kPa building surcharge) and a depth of potentially compressible soil of 5.0m. This is outside the allowable range of a typical development, and we therefore recommend that a site-specific settlement analysis (i.e., settle 3D) is undertaken to determine angular distortion / differential settlement across the building platform, which will require CPT testing. However, due to the nature of residual Kerikeri Volcanic Group soils, consolidation settlement from the proposed hardfill is likely to reach 90% (T_{90}) within 3 months.

Where filling does not exceed 1.0m above existing ground level, we do not consider consolidation settlement to cause any undue risk to the building development.

4.6 Shrink Swell Soil Characteristics

Based on our site investigations and Atterberg limits testing on similar soils nearby, the underlying soils are considered susceptible to swelling and shrinking under seasonal variations of water content, i.e., volume change. For the purpose of design, the site may be designated as moderately reactive (Class M) in accordance with B1/AS1 and AS2870:2011.

5 Foundation Recommendations

5.1 General

We understand that the proposed development will comprise both shallow slab-on-grade foundation types, and post / pile foundation types (e.g. the pergola and deck areas will be supported on pile foundations whilst the proposed pool and cellar will be supported on a footing system)

Based on our experience with similar Kerikeri Volcanic Group soils, foundations may be designed for moderately expansive (Class M) soils.

Based on our findings, we consider the natural ground conditions (below topsoil and any fill material) are expected to be consistent across the proposed development area and are considered suitable for supporting foundations subject to ground verification during construction. They however considered to be expansive and

therefore outside the criteria for "Good Ground" as outlined on NZS3604:2011. It is considered that the natural in situ soils are able to provide an Ultimate Bearing Capacity of 300 kPa and foundation depths should allow for the expansive nature of the soil.

5.2 Seismic Site Subsoil Category

The site conditions have been assessed to be consistent with seismic subsoil Class C (Shallow site soils) in accordance with NZS1170.5.

5.3 Foundations

5.3.1 *Boat Shed, Dwelling Additions / Extensions, Decking & Fireplace*

Where foundations are located within the influence zone of any retaining walls, and the retaining wall provides unsatisfactory deflections, then the foundations shall be subject to specific engineered design.

Concrete encased timber post foundations can be designed in accordance with NZS3604:2011, provided the embedment depth is increased to 1.0m to mitigate seasonal shrink/swell effects, and embedment depths are taken into the natural Kerikeri Volcanic Group soils.

All other foundation types shall follow the recommendations of B1/AS1 or be subject to specific engineered design following AS2870:2011.

Foundation conditions will be subject to site verification and approval by a chartered professional engineer (geotechnical) during construction and that foundation recommendations outlined within this report are followed.

Foundations can be designed using an ultimate bearing capacity of 300kpa and a geotechnical reduction factor of 0.5. The foundations should be founded into the natural soils or engineered hardfill and may be designed as follows:

- Ultimate bearing capacity of 300kPa.
- Geotechnical strength reduction factor – 0.5.
- Soil expansivity – Site Class M (Moderately expansive soils)
- Designed in accordance with NZS3604:2011, provided a minimum foundation embedment depth of 1.0m is adopted.
- All other foundation types shall follow the recommendations of B1/AS1 or be subject to specific engineered design following AS2870:2011.

Bearing capacity values included in this report are for vertical loads only and do not take into account horizontal shear or moment.

5.3.2 *Pool*

Pool foundations and pool walls will be subject to specific engineered design by a Chartered Professional Engineer (Structural) who is familiar with the contents of this report. The design of the foundations shall follow

the recommendations outlined within this report. A bearing capacity of 300 kPa can be used, provided the bearing stratum comprises natural Kerikeri Volcanic Group soils or engineered hardfill.

Provided the foundations are founded into the natural soils or engineered hardfill, they may be designed as follows:

- Ultimate bearing capacity of 300kPa and/or using the design parameters set out in Table 3.
- Geotechnical strength reduction factor – 0.5.
- Soil expansivity – Site Class M (Moderately expansive soils)

Bearing capacity values included in this report are for vertical loads only and do not take into account horizontal shear or moment.

6 Construction

6.1 Earthworks

Proposed earthworks include cutting and filling. Filling recommendations are included in a separate section (Section 6.2 below).

We envisage only minor earthworks will be required across the proposed boat shed footprint, primarily cutting to create a level building platform.

The majority of the earthworks will be undertaken along the northern side of the existing dwelling and across the proposed pool area. Minor cutting is proposed at the southern side for a proposed spa pool on a concrete patio (up to 0.5m in height), which may be battered back at a maximum angle of 1V:3H or supported by a retaining wall. Landscaping earthworks are also proposed, which will be retained behind engineered retaining walls which has been covered by a separate letter report prepared by Haigh Workman Ltd, dated 18 February 2025.

All cuts and fills along the northern side of the dwelling shall be supported by an engineered retaining wall. Design parameters and recommendations for all retaining walls are covered in Section 6.3. If earthworks are proposed that are outside of that included within our stability assessment, then further assessment and engineered design may be required, and we should be given the opportunity to review the applicability of this report.

Existing fill across the proposed dwelling extensions and additions, and below any intended areas of fill placement shall be removed and replaced with engineered hardfill. Due to the nature of the site, subgrade preparation for the proposed building will need to be checked by an appropriately qualified engineer who is familiar with the contents of this report prior to filling.

6.2 Filling

All grass coverings, topsoil, uncertified fill material and loose material must be removed below any proposed areas of intended fill placement. Any fill placed beneath or within 1.0 m of the proposed developments and

exceeding 1.0m in depth (above natural ground level) will need confirmation by the engineer that settlement caused by filling will not cause adverse effects to the building.

Prior to commencing filling, a pre-fill inspection of the subgrade should be undertaken by a professional engineer. The fill material shall be imported granular hardfill, GAP40 or GAP65 and verification of compaction should be undertaken by a professional engineer at regular lifts. i.e., inspection at pre-placement and every 250mm thereafter. A minimum Clegg Impact Value (CIV) of 25 is recommended or 95% of the material's maximum dry density (MDD*).

No filling shall be undertaken on the moderately steep north-facing slopes shall be undertaken without being supported by an engineered retaining wall.

6.3 Retaining Walls

All retaining walls along the northern side of the development shall be subject to specific engineered design by a Chartered Professional Engineer (CPEng). Retaining walls that are incorporated into the structure should be designed using at-rest pressures (K_0), and where not incorporated can be designed for active earth pressures (K_a). Section 4 of the NZGS and MBIE Module 6: *Earthquake resistant retaining wall design* outlines typical situations where retaining walls are incorporated into the structure.

Gravity wall design may adapt an undrained shear strength, S_u of 80 kPa for calculating sliding and bearing resistance for natural Kerikeri Volcanic Group soils. A geotechnical strength reduction factor of 0.5 can be adopted for limit state design. The parameters within Table 3 are recommended for design.

The toe-kick and embedment length need to consider the effects of any sloping ground above and below the wall, e.g., reduction in passive support and increase in active earth pressures. The passive earth pressure coefficient (K_p) needs to account for any sloping ground at the toe of the wall and can be estimated using the charts after NAVAC (DM7, 1971). Slope angles should be confirmed by the designer.

Free draining granular backfill and a perforated drain coil should be provided behind all retaining walls to assist with lowering groundwater tables. Retaining walls should be constructed as soon as possible following excavation of steep site cuts. Steep cut faces left unprotected may be detrimental to the stability of the site.

To mitigate soil creep below the pool, an in-ground retaining wall (soldier pile wall) can be installed. This would be subject to specific engineered design by CPEng – geotechnical. This has been shown on Drawing G02 appended.

The proposed retaining wall supporting the fill and outdoor kitchen, fireplace and pergola areas shall be designed to accommodate both global stability and active earth pressures. A deflection-based design methodology will be required should the proposed builds be located within the influence zone of the wall. For the current proposal, the design forces will likely require reinforced concrete or steel sections. Cohesion should

* The MDD for the granular hardfill must be known prior to commencment of filling, we recommend requesting compaction curve test result information from the aggregate supplier before choosing the material to be used.

be ignored in the upper 1.0m due to shrinkage and gapping effects. 55 kN is factored and may be used in design. Estimated Bending Moment = (5.4m / 2 + 1.5 x Ds) * 55kN.

6.4 Wetting of Floor Slab

With potentially expansive soils, it is important that the soils at slab subgrade are not permitted to dry out as they may be susceptible to re-swell on wetting (in the months after pouring the slab), exerting significant swelling pressures and potentially causing damage to any floor slabs. We therefore recommend that any prepared pad be inspected by a geotechnical engineer and promptly covered with at least 100mm of GAP20 type material or periodically wet down for at least one week prior to slab placement. All excavations should be left open for the shortest possible time prior to pour and should be protected by covering/lining with polythene or similar within 24 hours of excavation. These measures will reduce the risk of 'hogging' and cracking of the slab

6.5 Services

At the time of writing, no known underground services cross beneath the proposed development area. We recommend that any new services are accurately located on site and the depth to invert be determined prior to the commencement of foundation excavations.

6.6 Planned and Existing Vegetation

The foundation designer and architect must take into account the proximity of trees when preparing designs as trees can exacerbate the normal seasonal variation of soil moisture levels and associated with that, the vertical and horizontal movement of the founding soils. Further, mechanical interference with foundations by tree roots should be considered.

6.7 Unexpected Ground Conditions

Cobbles and boulders were observed across the site and can be expected during foundation excavations.

6.8 Stormwater Control

Stormwater shall be piped well away from the development areas and shall not be dispersed onto the moderately steep slopes. All stormwater overflow drainages should be well channelled away from the development area to be disposed of in a controlled and dispersive manner.

6.9 Construction Observations

Specific engineering inspections of building platform preparation and/or foundation construction with certification by a Producer Statement, PS4, are often required by Council and outlined in the Building Consent documents. These observations are generally required to ensure that the foundation soils exposed at the time of construction are consistent with the assumptions made in this geotechnical report.

We consider the following specific items, but not limited to will need to be addressed prior to and at the time of construction to ensure the foundation soils are consistent with the assumptions made in this geotechnical report:

- Geotechnical drawing review prior to undertaking construction observations;
- Observe building excavations (subgrade), removal of unsuitable material, and confirm location of the building are in accordance with our recommendations.
- Observe any fill being placed with testing undertaken at regular intervals prior to preparing foundations.
- Observe all foundation excavations for the building prior to foundations being poured.

Provision should be allowed for modifying the foundation solution at this time should unforeseen ground conditions be encountered.

7 Limitations

This report has been prepared for the use of Ian & Vicki Smith with respect to the particular brief outlined to us. This report is to be used by our Client and their Consultants and may be relied upon when considering geotechnical advice. Furthermore, this report may be utilised in the preparation of building and/or resource consent applications with local authorities. The information and opinions contained within this report shall not be used in other context for any other purpose without prior review and agreement by Haigh Workman Ltd.

The recommendations given in this report are based on site data from discrete locations. Inferences about the subsoil conditions away from the test locations have been made but cannot be guaranteed. We have inferred an appropriate geotechnical model that can be applied for our analyses. However, variations in ground conditions from those described in this report could exist across the site. Should conditions encountered differ to those outlined in this report we ask that we be given the opportunity to review the continued applicability of our recommendations. Furthermore, should any changes be made, we must be allowed to review the new development proposal to ensure that the recommendations of this report remain valid.

Appendix A – Drawings

Drawing No.	Title
G01	Site Location Plan
G02	Site Features & Investigation Plan
G03	Cross Section A-A’
G04	Cross Section B-B’

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

Issue	Date	Revision
A	13/03/2025	FIRST ISSUE

DWG: Site Location Plan

Scale 1: 5000 @A3 | Date March 2025

Drawn CN | Checked WT | Approved WT

File T:\CLIENTS\IAN AND VICKI SMITH\25 023 55 KINGFISHER DRIVE\ENGINEERING\GEOTECH\DRAWINGS\GEOTECH DRAWINGS.DWG

6 Fairway Drive
Kerikeri, BOI
T: 09 407 8327
F: 09 407 8378
E: info@haighworkman.co.nz

Project: Geotechnical Investigation
55 Kingfisher Drive, Kerikeri (Lot 2, DP 311542, & Lot 4, DP 317854)

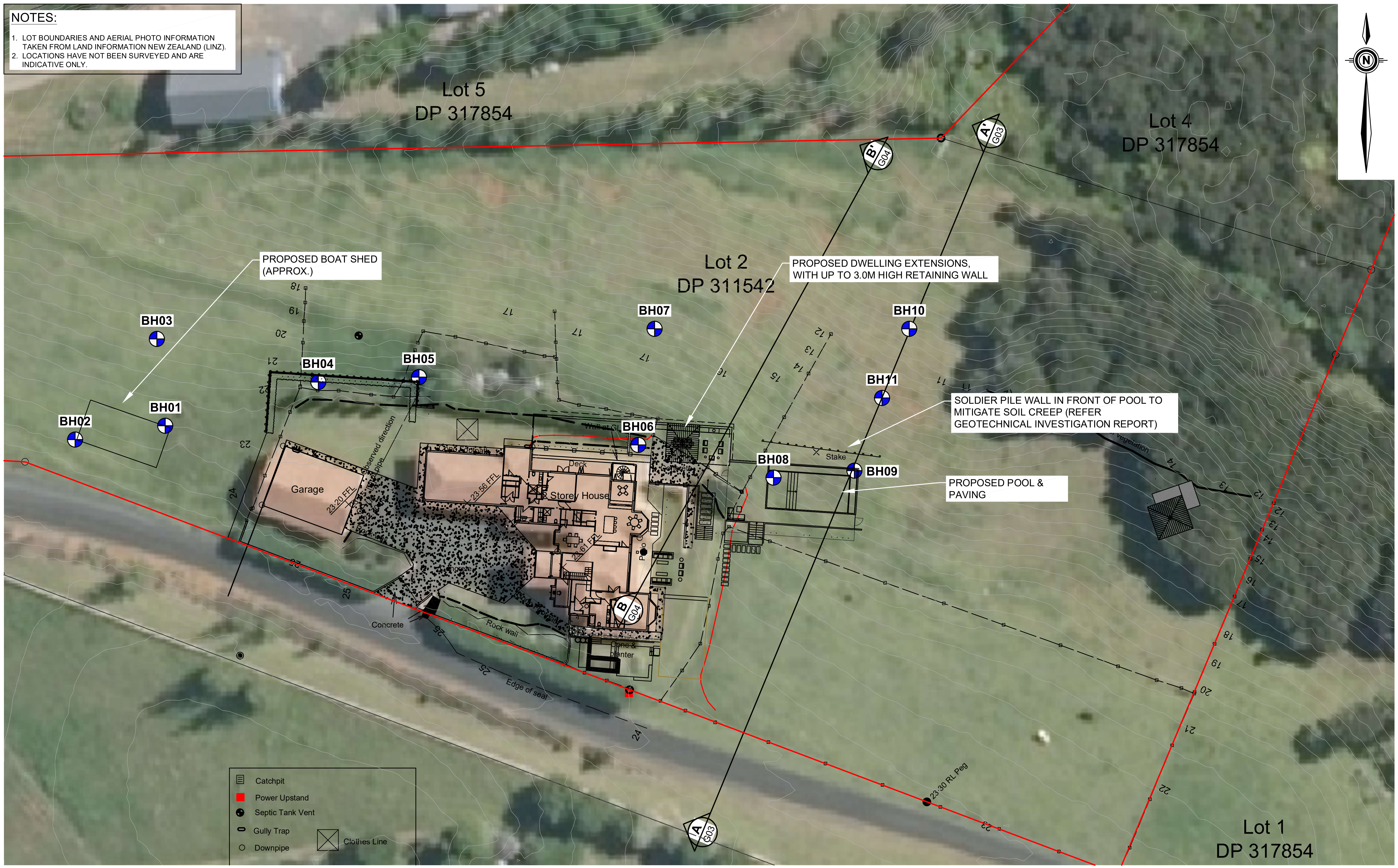
Client: Ian and Vicki Smith

Project No. 25 023 | RC no. N/A

DWG No. G01

Sheet No. 1 of 3

Plotted By Josh Curreen at 13/03/2025 1:25:55 pm



Issue	Date	Revision
A	13/03/2025	FIRST ISSUE

DWG	Site Features & Investigation Plan
Scale	1: 500 @A3
Date	March 2025
Drawn	CN
Checked	WT
Approved	WT
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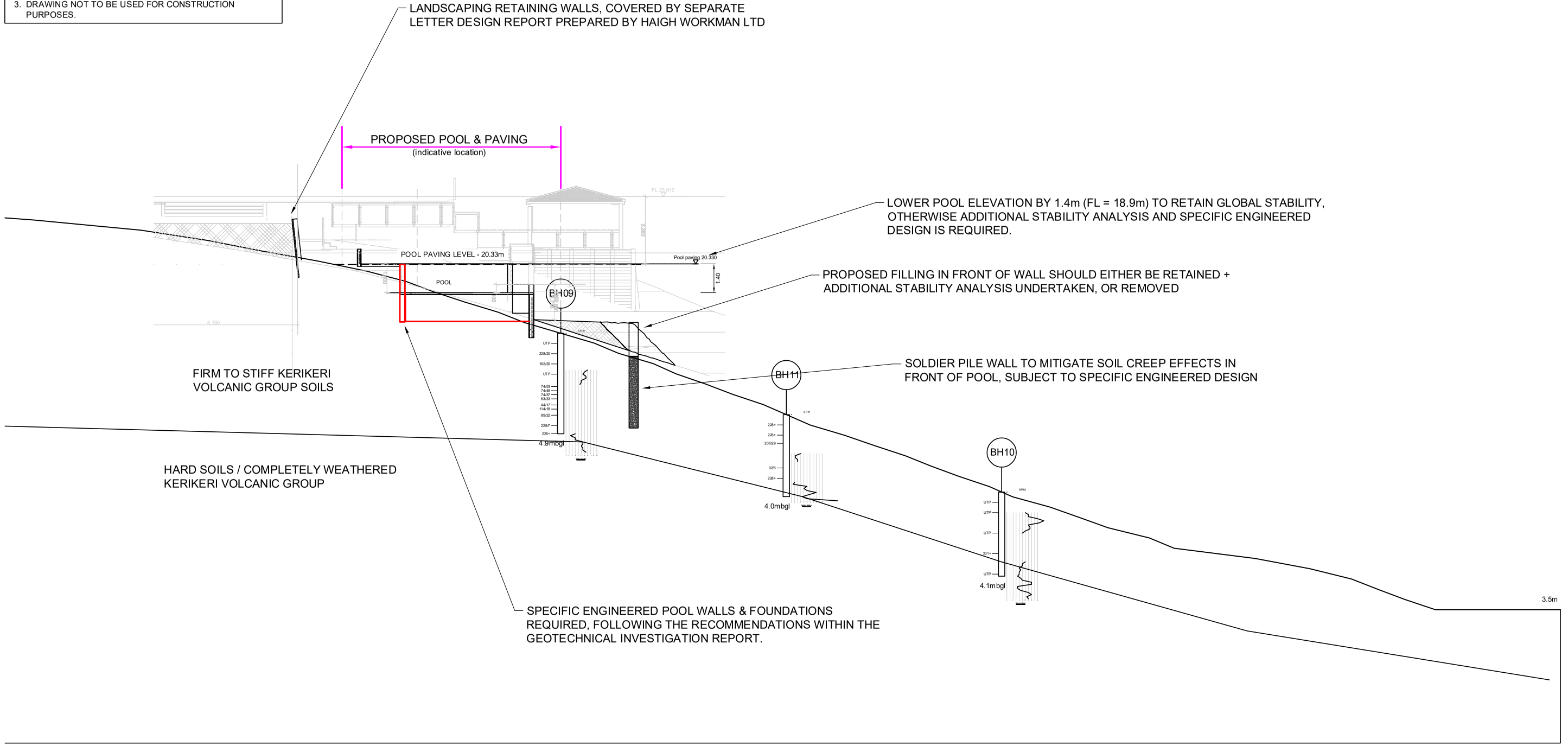
HAIGH WORKMAN LTD
Civil & Structural Engineers
6 Fairway Drive
Kerikeri, BOI
T: 09 407 8327
F: 09 407 8378
E: info@haighworkman.co.nz

Project	Geotechnical Investigation 55 Kingfisher Drive, Kerikeri (Lot 2, DP 311542, & Lot 4, DP 317854)
Client	Ian and Vicki Smith
Project No.	25 023
RC no.	N/A
DWG No.	G02
Sheet No.	2 of 4

Plotted By Craig Nelder at 14/03/2025 2:25:37 PM

NOTES:

1. THIS DRAWING IS BASED ON MEASUREMENTS BY TAPE AND CLINOMETER AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE DATA OBTAINED ON SITE. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.
3. DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES.



Issue	Date	Revision
A	07/03/2025	FIRST ISSUE

DWG: Geological Cross Section A-A'

Scale 1: 200 @A3 | Date March 2025

Drawn CN | Checked WT | Approved WT

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HAIGH WORKMAN Ltd
Civil & Structural Engineers
6 Fairway Drive
Kerikeri, BOI
T: 09 407 8327
F: 09 407 8378
E: info@haighworkman.co.nz

Project: Geotechnical Investigation
55 Kingfisher Drive, Kerikeri (Lot 2, DP 311542, & Lot 4, DP 317854)

Client: Ian and Vicki Smith

Project No. 25 023 | RC no. N/A

DWG No. G04

Sheet No. 3 of 4

Plotted By Craig Nelder at 14/03/2025 2:44:34 PM

NOTES:

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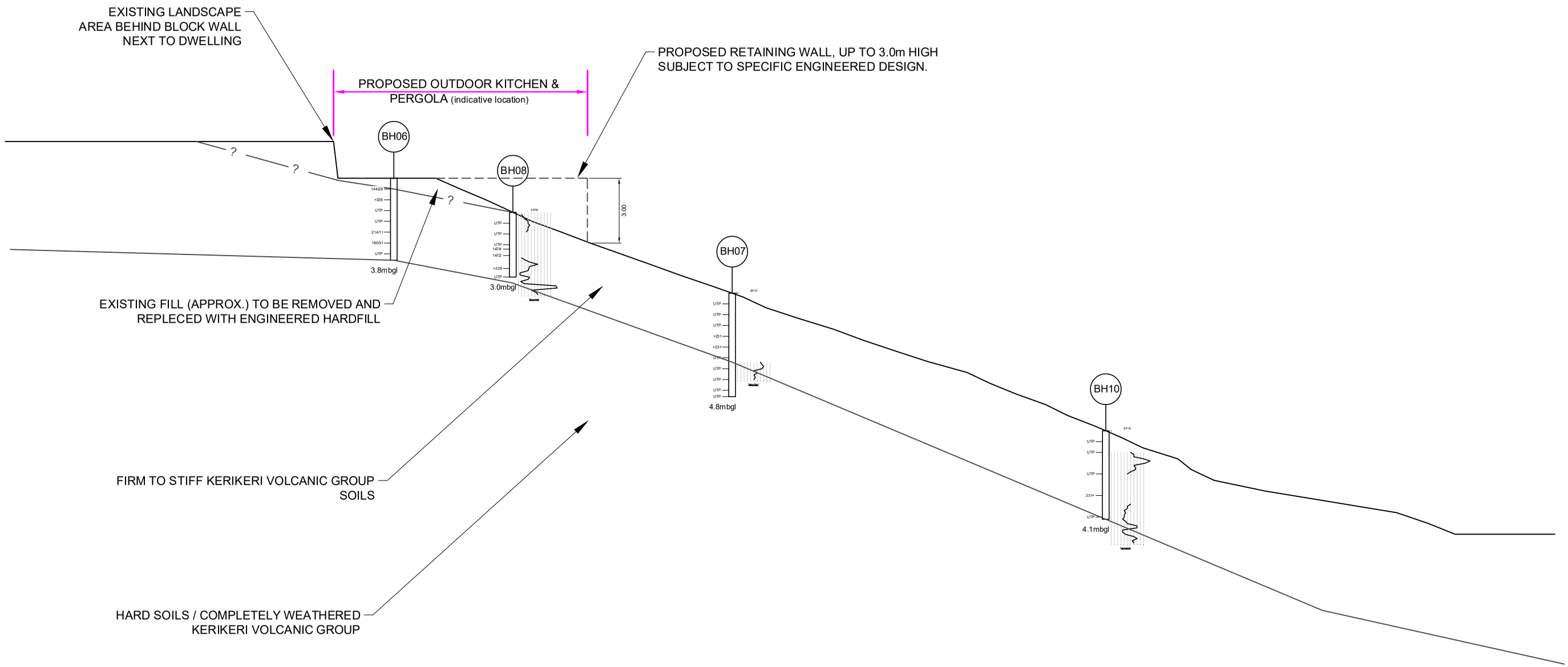
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE DATA OBTAINED ON SITE. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.
3. DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES.



Issue	Date	Revision
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DWG: Geological Cross Section A-A'

Scale 1: 200 @A3 | Date March 2025
Drawn CN | Checked WT | Approved WT
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HAIGH WORKMAN Ltd
Civil & Structural Engineers
6 Fairway Drive
Kerikeri, BOI
T: 09 407 8327
F: 09 407 8378
E: info@haighworkman.co.nz

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55 Kingfisher Drive, Kerikeri (Lot 2, DP 311542, & Lot 4, DP 317854)

Client: Ian and Vicki Smith

Project No. 25 023 | RC no. N/A

DWG No. **G04**

Sheet No. **4** of **4**

Plotted By Craig Nelder at 14/03/2025 2:26:59 PM

Appendix B – Provided Development Plans

PROPOSED BUILDING

FOR IAN AND VICKI SMITH
65A KINGFISHER DRIVE, KERIKERI 0294, NZ

	DRAWINGS LIST
1.0	SITE INFORMATION
1.2	FLOOR PLAN
2.0	ELEVATIONS
2.1	ELEVATIONS

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Powell Fenwick

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engineering@pfc.co.nz : Email
www.pfc.co.nz : Website

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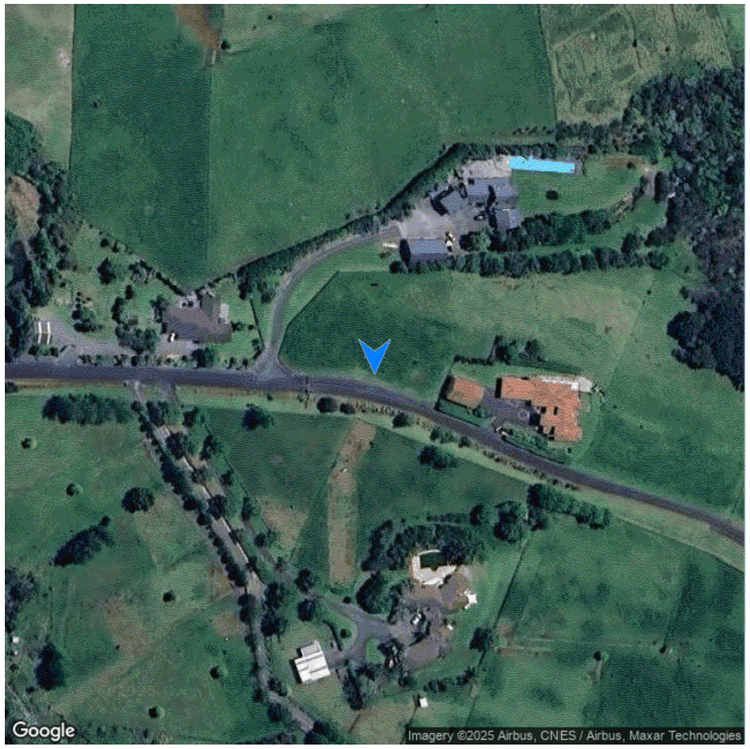
NORTH



SITE LOCATION - AERIAL PLAN

Not to scale

Client approval, please initial

Signature .....

Date .....
(note this is not a contract, but confirmation that the drawings herewith meet your approval)

DESIGNER

endeavour sheds

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PROJECT :

PROPOSED BUILDING

FOR IAN AND VICKI SMITH

65A KINGFISHER DRIVE, KERIKERI 0294, NZ

DRAWING TITLE :

SITE INFORMATION

REV	DATE	DESCRIPTION
-	4-3-2025	CONCEPT ISSUE

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DRAWN :	AUTO
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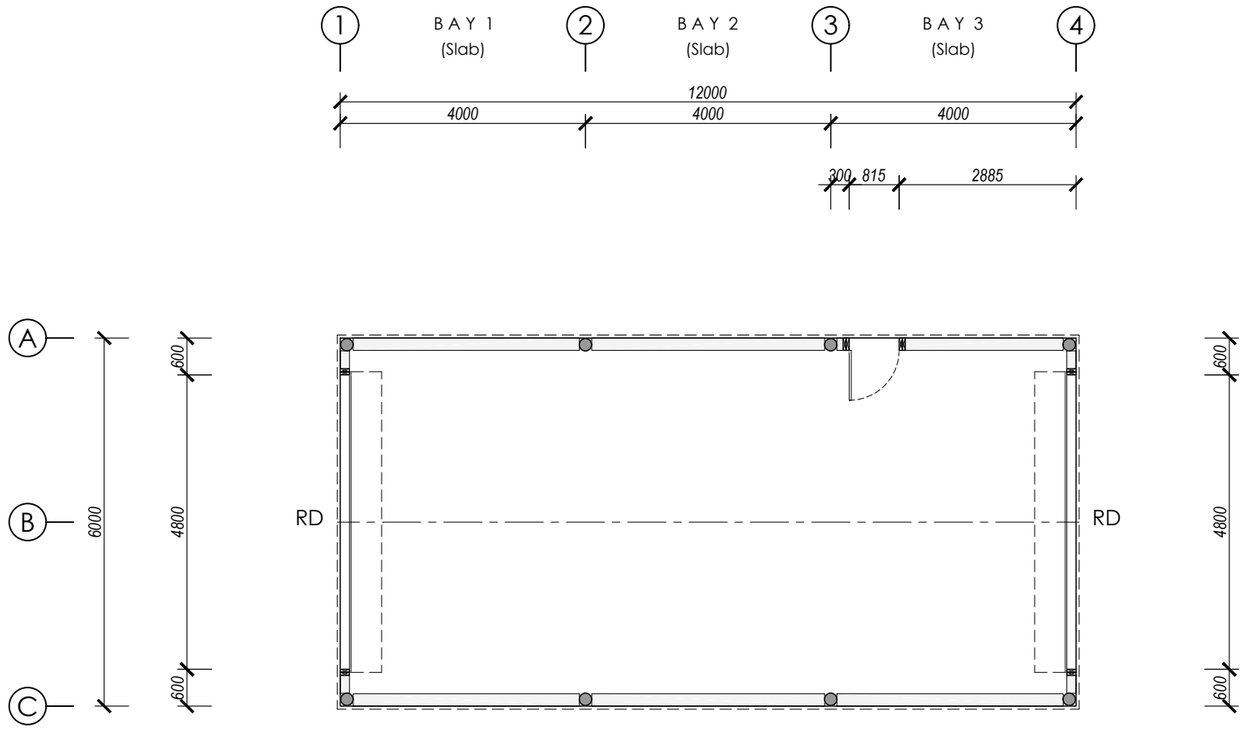
SHEET NO :	1.0
REV :	-



FLOOR PLAN

SCALE 1 : 100

Client approval, please initial

Signature .....

Date .....
(note this is not a contract, but confirmation
that the drawings herewith meet your approval)

DESIGNER

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PROJECT :

PROPOSED BUILDING

FOR IAN AND VICKI SMITH

65A KINGFISHER DRIVE, KERIKERI 0294, NZ

DRAWING TITLE :

FLOOR PLAN

REV	DATE	DESCRIPTION
-	4-3-2025	CONCEPT ISSUE

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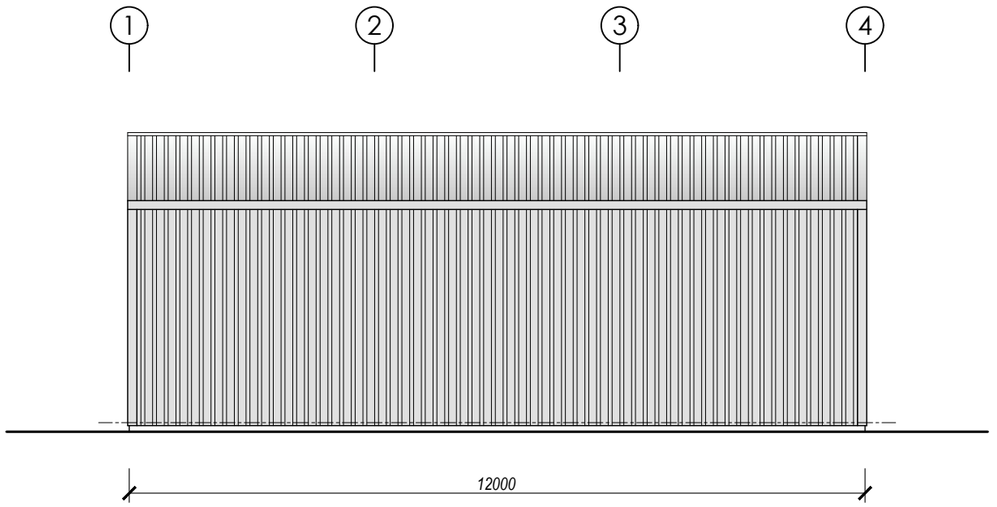

FRONT ELEVATION

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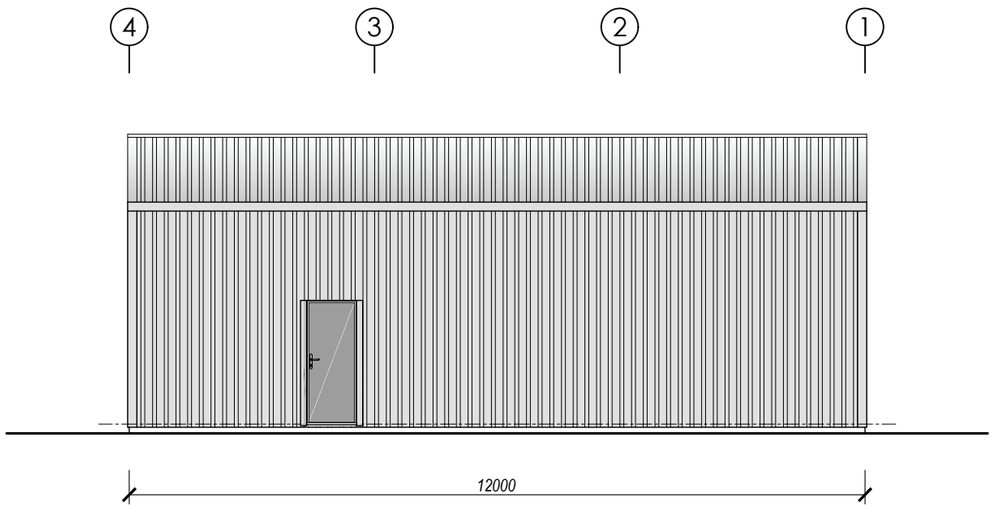

REAR ELEVATION

SCALE 1 : 100

Client approval, please initial

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PROJECT :

PROPOSED BUILDING

FOR IAN AND VICKI SMITH

65A KINGFISHER DRIVE, KERIKERI 0294, NZ

DRAWING TITLE :

ELEVATIONS

REV	DATE	DESCRIPTION
-	4-3-2025	CONCEPT ISSUE

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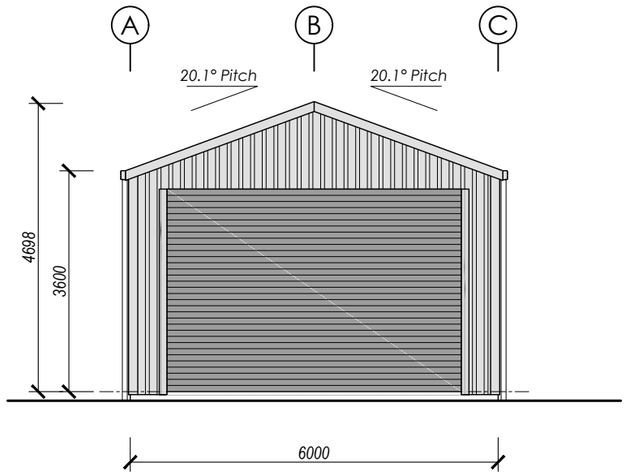

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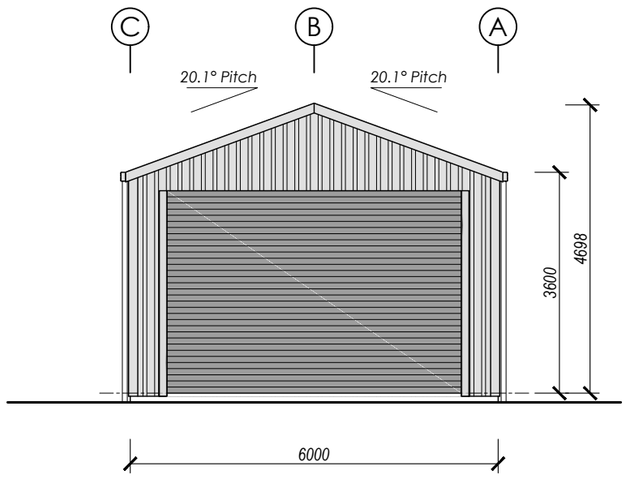

END ELEVATION 2

SCALE 1 : 100

Client approval, please initial

Signature .....

Date .....
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PROJECT :

PROPOSED BUILDING

FOR IAN AND VICKI SMITH

65A KINGFISHER DRIVE, KERIKERI 0294, NZ

DRAWING TITLE :

ELEVATIONS

REV	DATE	DESCRIPTION
-	4-3-2025	CONCEPT ISSUE

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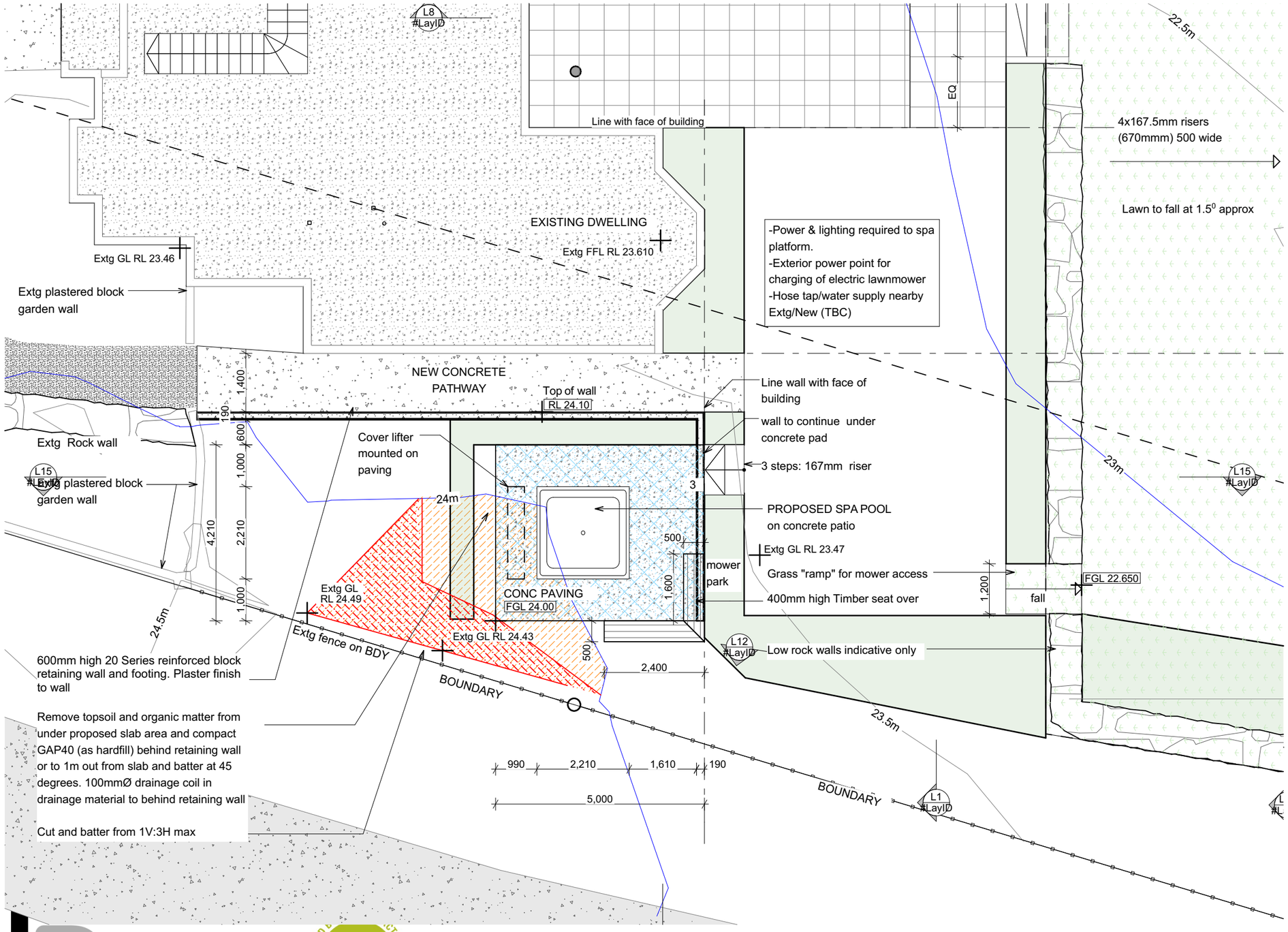

NOTES:

1) All construction to be in accordance with NZS3604:2011 the NZBC acceptable solutions unless specifically designed .

2) Durability of fixings and materials to comply with NZS3604:2011 Section 4 and NZBC B2/AS1 typically

3) ALL EXPOSED BRACKETS, BOLTS, NAILS & SCREWS to be S/Steel 304min

4) Ground levels and existing contours are from survey by Williams and King dated 17-01-2025. Levels to One Tree Point (Mean Sea Level)

5) All Extg structures are shown indicative only

6) All Services locations and connections shown indicative only.

7) Contractor to confirm all existing services runs on site prior to commencing construction

8) All plumbing & drainage to comply with AS/NZS 3500 & the NZBC G13/AS2 & E1/AS1

9) Plumbing& Drainage shown schematic only. All plumbing and drainage by registered plumber & drainlayer. Drainlayer and plumber to PROVIDE ABUILTS to Builder for LA where applicable

10) Surface stormwater to comply with E1/AS1 and LA requirements. Stormwater & Waste water drainage shown indicative only - refer to stormwater report by HAIGHWORKMAN

11) Earthworks to be undertaken in accordance with Geotech recommendations - refer to GEOTECH report by HAIGHWORKMAN

12) REFER TO LANDSCAPE PLAN BY "HAWTHORN LANDSCAPE ARCHITECTS" for all landscaping, garen lighting and planting garden

13) Retaining/steps and pathways low timber and rock (landscaping) walls <1.5m without surcharge, exempt works - shown indicative only - building consent not required.

14) Refer to consented documents/engineers documentation for retaining walls >1.5m or supporting loads/surcharge and structures requiring building consent - shown indicative only

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P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526

A D | N Z
ARCHITECTURAL DESIGNERS NZ

PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A102-a SPA POOL AREA

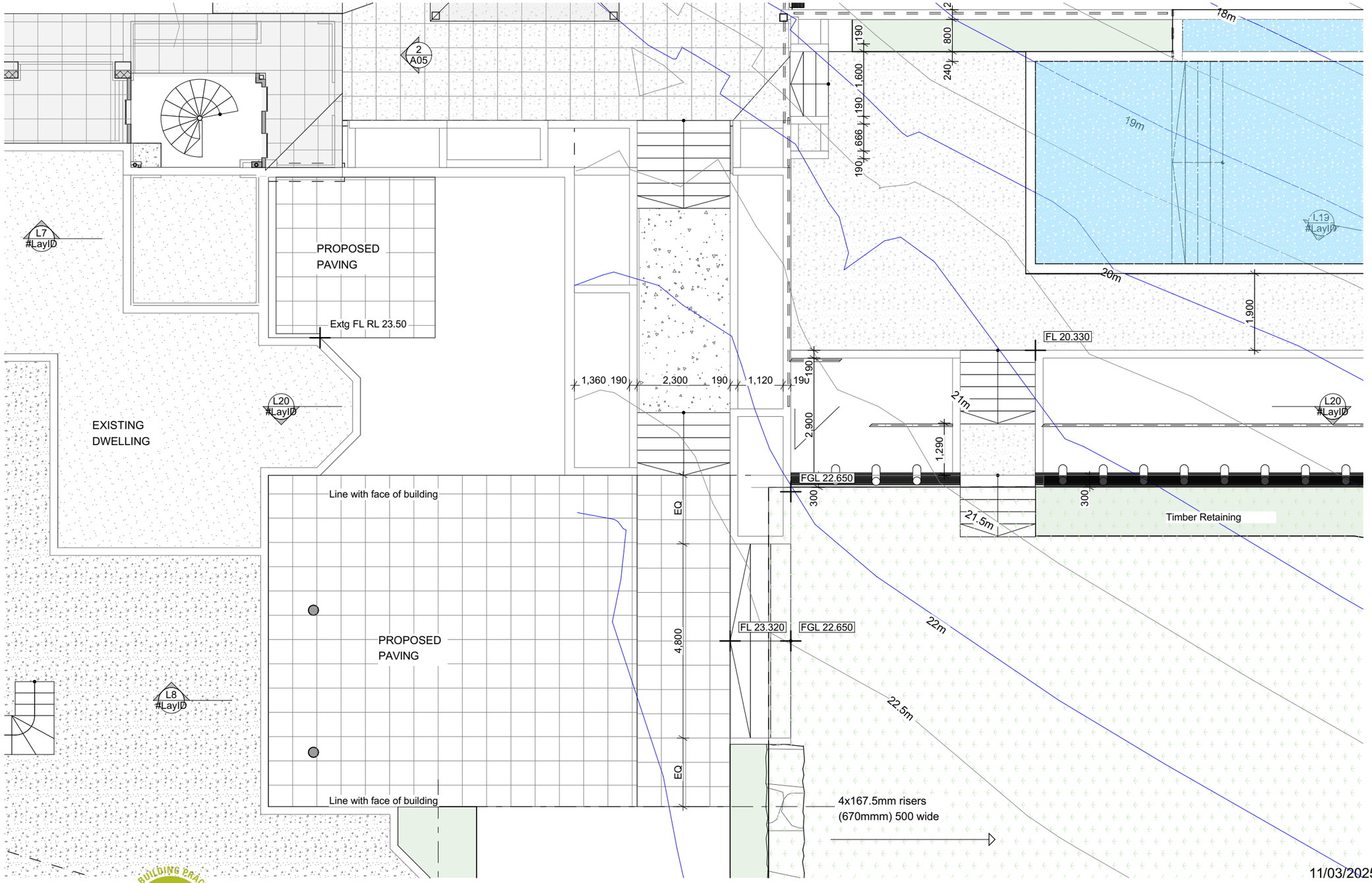
Date: Tuesday, 11 March 2025 SCALE: (A3) 1:100

H - WIP 11/03/2025

CONCEPT -FOR INFORMATION

DO NOT SCALE. Work only to figured dimensions. All dimensions are to be checked on site prior to commencing work. Any discrepancies are to be reported to designer prior to commencing work.

All construction to comply with NZS3604:2011 and the NZBC



11/03/2025

Lindholm design ARCHITECTURAL SERVICES

P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526

CERTIFIED BUILDING PRACTITIONER BUILDING CONFIDENCE

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1 Detailed areas 100 1:100

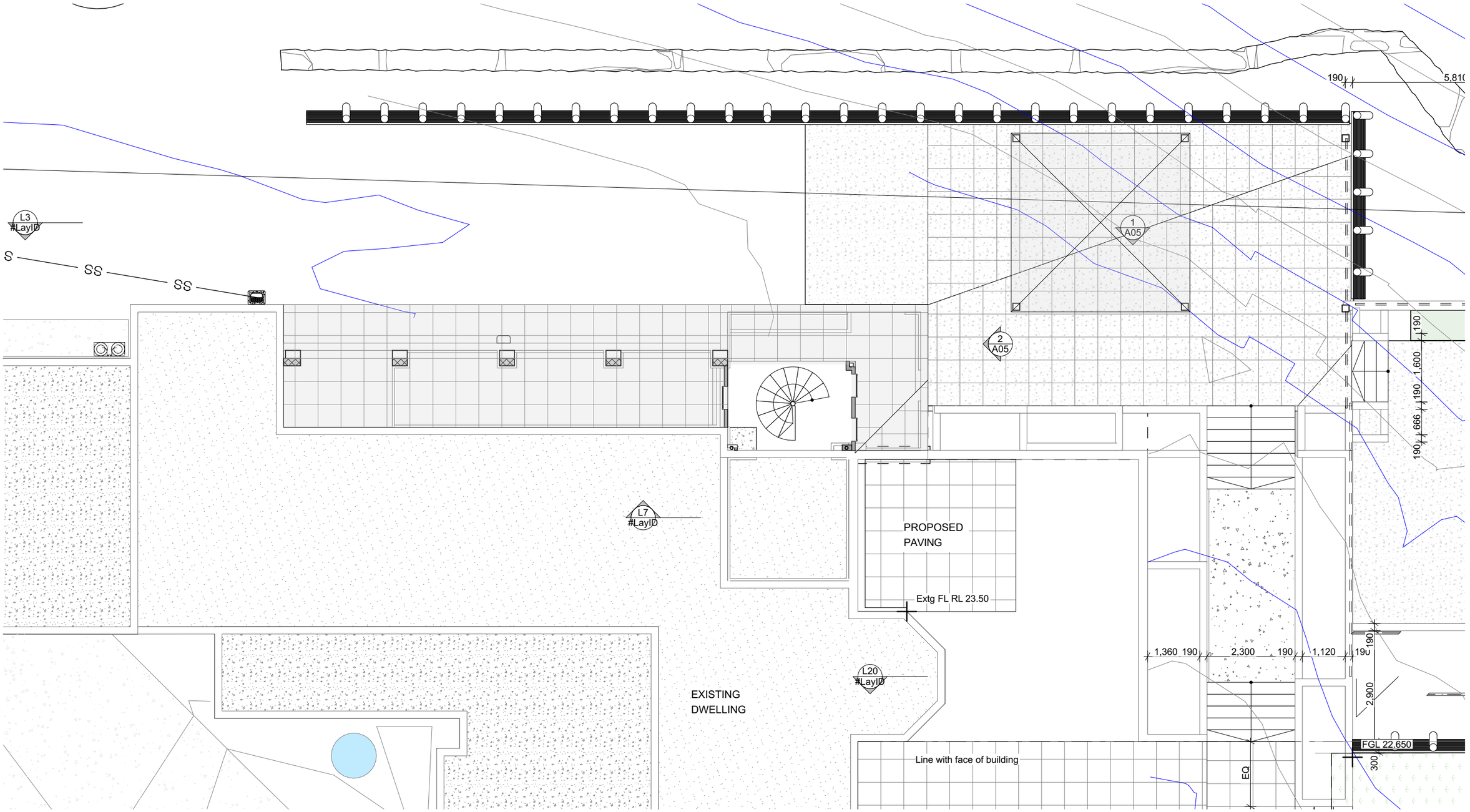
PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A102-B TASTING ROOM AREA

Date: Tuesday, 11 March 2025 SCALE: (A3) 1:100

CONCEPT -FOR INFORMATION



Detailed areas 100 1:100

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ARCHITECTURAL SERVICES

P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526

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PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A102-C PERGOLA & OUTDOOR KITCHEN

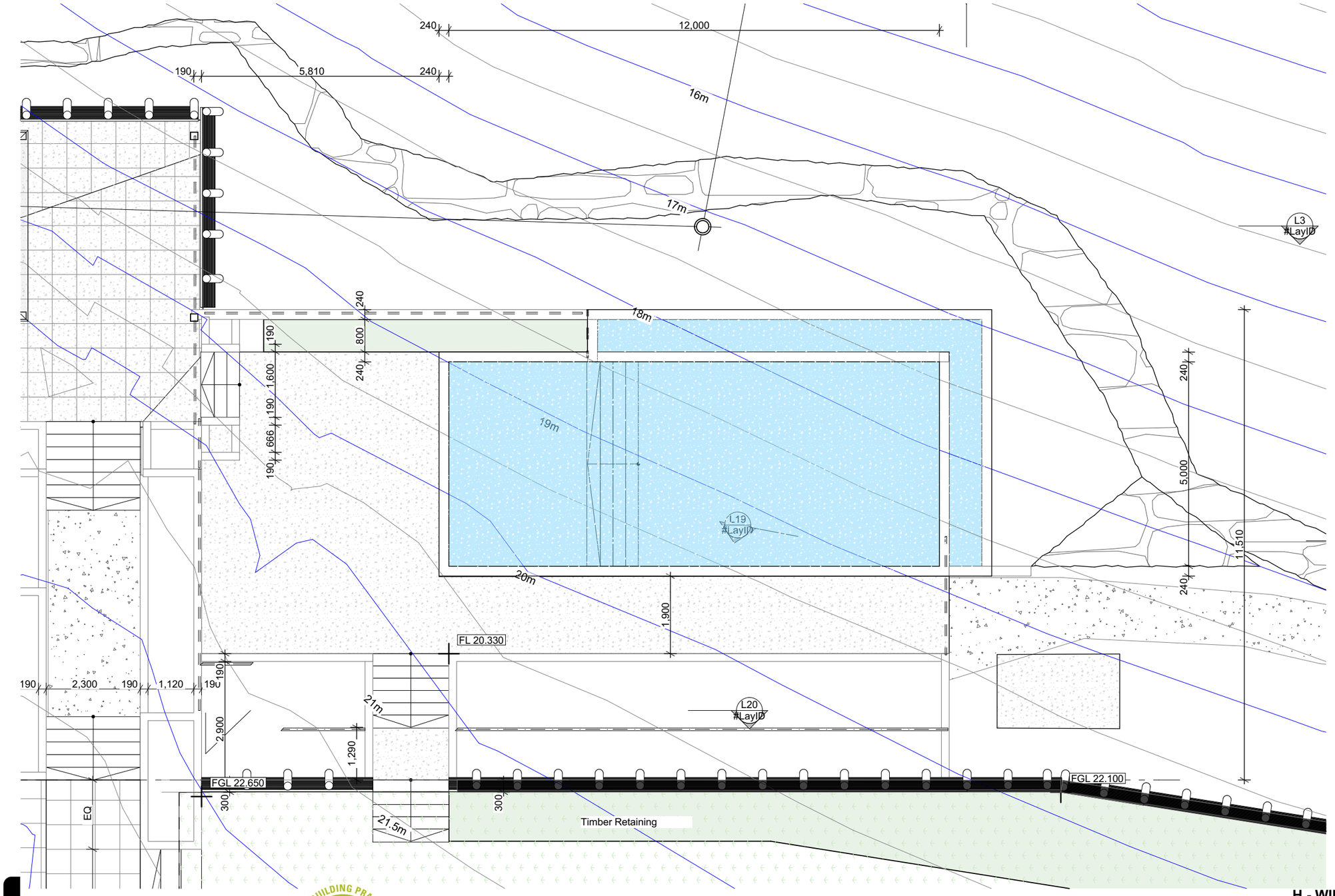
Date: Tuesday, 11 March 2025 SCALE: (A3) 1:100

11/03/2025

CONCEPT -FOR INFORMATION

DO NOT SCALE. Work only to figured dimensions. All dimensions are to be checked on site prior to commencing work. Any discrepancies are to be reported to designer prior to commencing work.

All construction to comply with NZS3604:2011 and the NZBC



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P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
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Karin Lindholm Andreassen
LBP: Design 2: 107526

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PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A102-D POOL AREA

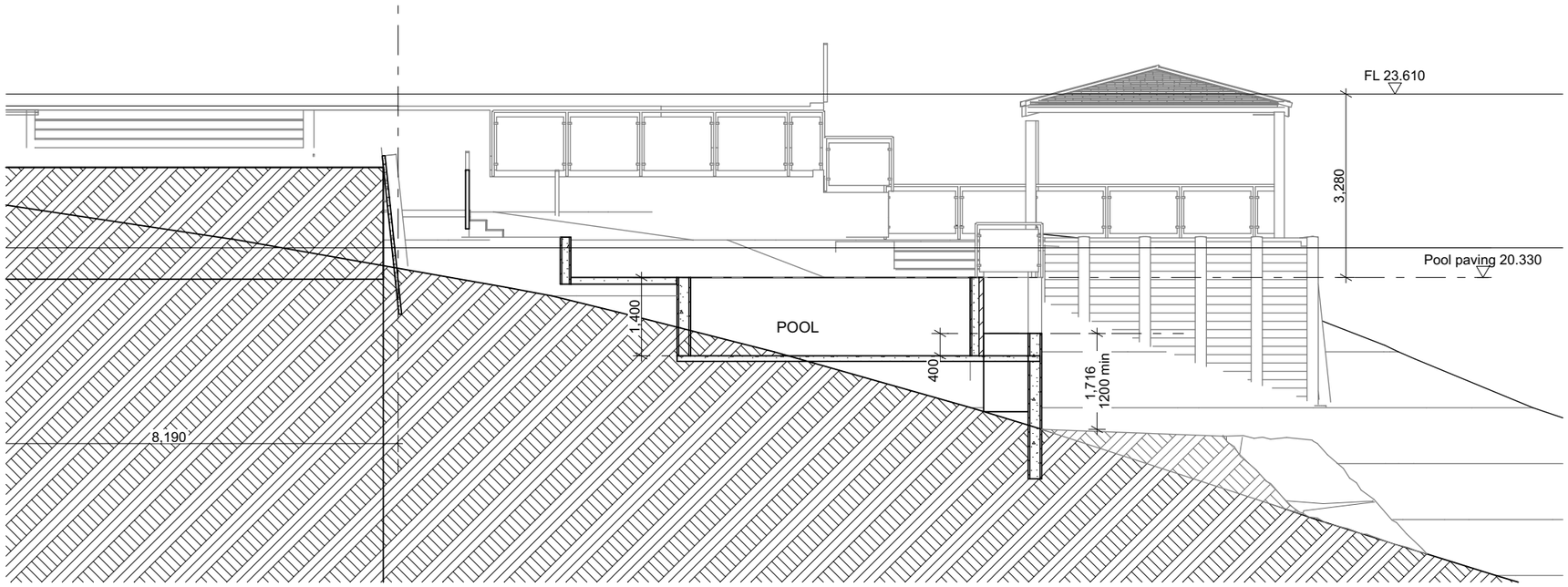
Date: Tuesday, 11 March 2025 SCALE: (A3) 1:100

H - WIP 11/03/2025

CONCEPT -FOR INFORMATION

DO NOT SCALE. Work only to figured dimensions. All dimensions are to be checked on site prior to commencing work. Any discrepancies are to be reported to designer prior to commencing work.

All construction to comply with NZS3604:2011 and the NZBC



1	Section thru pool	1:100

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LICENSED BUILDING PRACTITIONER
www.dbh.govt.nz
BUILDING CONFIDENCE
P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526
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ARCHITECTURAL DESIGNERS NZ

PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED
at 55 KINGFISHER DRIVE, KERIKERI
LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH
Sheet: A203 SECTION THRU POOL

Date: Tuesday, 11 March 2025 SCALE: (A3) 1:100

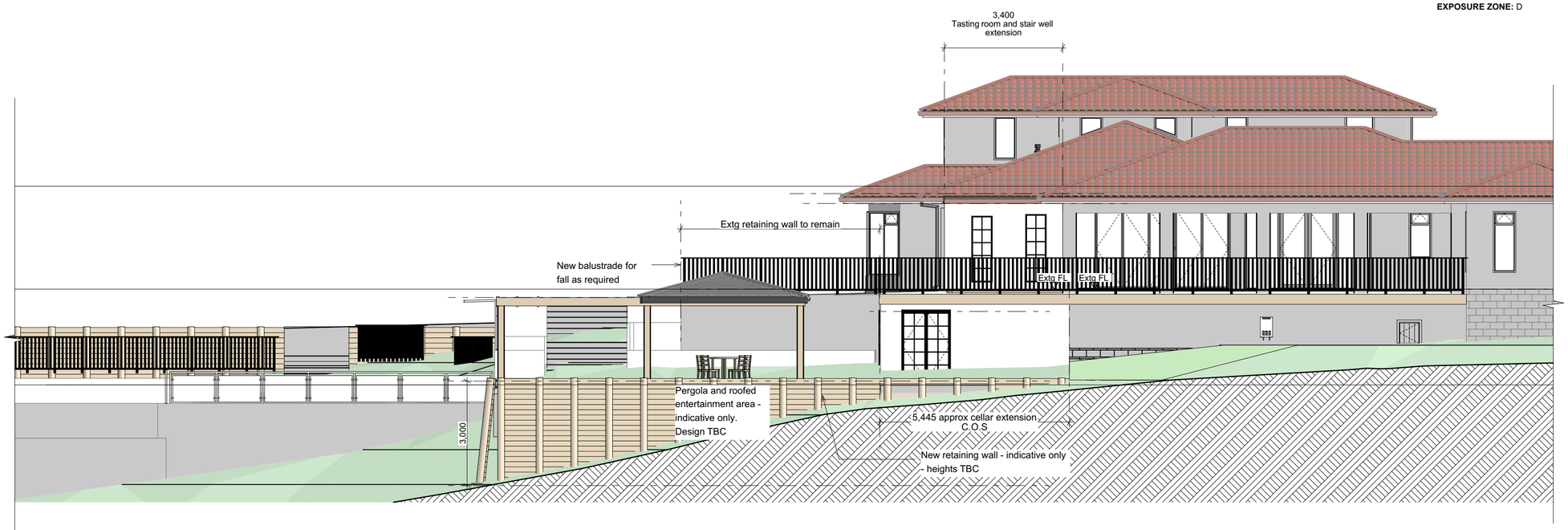
H - WIP 11/03/2025

CONCEPT -FOR INFORMATION

DO NOT SCALE. Work only to figured dimensions. All dimensions are to be checked on site prior to commencing work. Any discrepancies are to be reported to designer prior to commencing work.

All construction to comply with NZS3604:2011 and the NZBC

GENERAL NOTES:
WIND ZONE: HIGH (to BRANZ MAPS)
EXPOSURE ZONE: D



1 North Elevation 1:100

2 East Elevation 1:100

NOTES:

1) All works to be done in accordance with NZS3604:2011 and the NZBC Acceptable solutions unless specifically designed or accepted as an alternative solution by BCA

2)Durability of all construction materials, fixing and fastenings to comply with NZS 3604:2011 Section 4 & NZBC B2/AS1

3) Ground levels shown indicative. Extg. Contours are indicative only from FNDC Maps

3) Contractor/builder to check all dimensions, existing drain & services locations prior to commencing works

4) Builder to confirm any rebate required to slab for external doors with joinery manufacturer before construction. Joinery manufacturer to provide profiles for set out

5) Concrete to be **25MPa** to slab & footings at 28 days unless specifically stated.

6) BCA to inspect foundations prior to concrete being poured.

7) ENGINEER to inspect and certify foundations and Engineered designed aspects and provide PS4 as required by BCA Form 5 - refer to building consent documents

8) Certified compacted GAP 40 Granular fill underslab to NZS3604:2011

9) Do not build on uncertified fill

10) Remove all organic material, fill and topsoil from under footings/foundations & slab areas

12) Timber wall framing to be SG8 unless specified otherwise.

13) treatment to be:
H5 for timber embedded in concrete or ground,
H4 for timber in contact with ground and
H3.2 for timber exposed to weather and
H1.2 for enclosed timber

14) DPC to be provided between all timber and concrete/masonry

15)Built up members to comply with NZS3604:2011 Section 2.4.4.7

16) ALL BRACKETS, BOLTS, NAILS & SCREWS in "Sheltered" and "Exposed" situations to be S/Steel 304

17)External joinery shown indicative - refer to window manufacturers schedule for configurations. Contractor/Client to approve final schedule with window manufacturer.

18) All existing retaining structures are shown indicative only from consented documents

19) Timber wall framing to be H1.2 SG8 unless specified otherwise. Nogs at 800mm max ctrs typically, unless additional nogging required by cladding manufacturers specifications.

20) Cladding to be installed in accordance with cladding manufacturers requirements over drained and vented cavity - refer to later details

NOTE: DURABILITY ZONE D:
to comply with NZS3604:2011 Section 4

a) All structural fixings and fastenings in EXPOSED & SHELTERD situations to be type 304 S/steel to comply with NZS3604:2011 Durability Table 4.1

b)All nails and screws within 600mm of FGL and all nails and screws to exposed framing to table 4.3 or in contact with timber treated to H3.2 or above to be type 304 s/steel (ZONE D)

c) Cover to reinforcing steel:
75mm min to ground
30mm min mesh top cover to enclosed areas
50mm min mesh top cover to concrete exposed to weather
50mm min to formwork

d) Concrete strength:
-20MPa min for unreinforced concrete and reinforced concrete (not exposed to weather) OR AS SPECIFIED BY ENGINEER
-25MPa for reinforced concrete exposed to weather OR AS SPECIFIED BY ENGINEER

e) Concrete Masonry: to comply with NZS4210
25MPa grout strength blockwork in ZONE D

Lindholmdesign
ARCHITECTURAL SERVICES
P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526
LICENSED BUILDING PRACTITIONER www.dbh.govt.nz BUILDING CONFIDENCE
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PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A05 ELEVATIONS

SCALE: (A2) 1:100

H - WIP

11/03/2025

REVISION	DATE
CONCEPT -FOR INFORMATION	

12.53m, 88° 54' 0"
118.83m, 87° 5' 0"
11.55m, 47° 24' 0"
7.09m, 7° 14' 0"
20.15m, 87° 5' 0"
20.63m, 17° 24' 0"
BOUNDARY
EXISTING EFFLUENT TRENCH: 1x50m 450x450mm effluent trench following contour as per BOI drainage drawing from original consented documents
Proposed top of wall
FL RL 22.00
FGL RL 21.50
24.69m, 7° 14' 23"
Extg/FGL RL 21.50
PROPOSED TIMBER RETAINING (exempt works under schedule 1)
PROPOSED DRIVEWAY metalled driveway on compacted basecourse
Proposed top of wall
FL RL 22.00
20m
21m
21.5m
22m
22.5m
23m
EXISTING SEPTIC TANK
SS
EXISTING WATER TANKS
TIMBER RETAINING (exempt works under schedule 1)
Proposed top of wall
FL RL 22.90
111.51m, 95° 35' 0"
PROPOSED GLASSHOUSE
Easement BOUNDARY
Easement BOUNDARY
15.31m, 15° 22' 0"
BOUNDARY
BOUNDARY
5.75m, 89° 55' 0"
BOUNDARY
15.50m, 93° 3' 0"
6.000
12.32m, 7° 14' 0"
6.000
PROPOSED CONCRETE
PROPOSED BOATSHED
FFL RL 23.225
1.200 to pass
PROPOSED CONCRETE
FFL RL 23.075
23.5m
FGL RL 23.00
Extg FW drain approx
Extg SW drainage run
EXISTING SHED
FFL RL 23.20
Extg SW Sump
NEW AUTOMATIC GATE. (SOLAR/ELECTRIC) and fence
23.05m, 93° 3' 0"
BOUNDARY
PROPOSED ROCK WALL RETAINING (1m high max) (exempt works under schedule 1)
BOUNDARY
EXISTING FENCE CUT BACK to BOUNDARY with adj Lot 5. New Fenceline to suit
EXTG GATE/ENTRY to shared R.O.W
KINGFISHER DRIVE
10,000
12,000
14,000
18,000 to extg Shed
Top of wall RL 24.00
Top of tanks RL 24.5
24m
PROPOSED WATER TANKS - PARTIALLY BURIED
2x NEW 25,000 approx litre conc water tank buried to 2.1m max into ground with WP in proprietary cover adj or in Boatshed Connect overflow to extg shed SW drainage to discharge into household water supply
Extg indicative only
32.00m, 110° 39' 30"
EXISTING DRIVEWAY & TURNING
NEW CROSSING WITH CULVERT EXTENDED/ REPLACED - crossing to engineers design to comply with FNDC Engineering Standards.
Drainage from behind all proposed retaining walls and driveway/swales to discharge in accordance with Engineers recommendations
All Earthworks to be undertaken in accordance with Geotech Engineers recommendations

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P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526

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1 SHS ALL 200 1:200

PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A101 PART SITE PLAN -PROPOSED - SHEET 1 SCALE: (A2) 1:200

H - WIP 11/03/2025

REVISION	DATE
CONCEPT -FOR INFORMATION	

EXISTING
WATER TANKS

SS

SS

PROPOSED
PAVING

Extg FL RL 23.50

EXISTING
DWELLING

Line with face of building

PROPOSED
PAVING

Line with face of building

Extg GL RL 23.46

Extg FFL RL 23.610

Cover lifter
mounted on
paving

Top of wall
RL 24.10

24m

3

PROPOSED SPA POOL
on concrete patio

Extg GL RL 23.47

Extg GL
RL 24.49

FGL 24.00

Extg GL RL 24.43

24.5m

FL 23.320

FGL 22.650

FL 20.330

FGL 22.650

fall

FGL 22.650

FGL 22.100

FGL 18.150

FGL 19.230

FGL 21.230

FGL 21.85

FGL RL 21.50

Timber Retaining

4x167.5mm risers
(670mm) 500 wide

Lawn to fall at 1.5° approx

12x167mm risers
(2000mm total
approx)
500 wide treads

Lawn to fall to low point

Fall at 5° approx

Fall at 18°
approx

Lawn to fall at 7° approx

9°

BOUNDARY

45.23m 110° 39' 30"

29.10m 110° 39' 30"

13m

14m

L16
A203

15m

16m

17m

18m

19m

20m

21m

21.5m

22m

22.5m

23m

23.5m

240

12,000

190

5,810

240

800

240

240

240

5,000

11,510

240

1,900

190

2,800

1,200

300

24,800

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P.0 Box 960, 0245 Kerikeri
ph/fax: (09) 407 3037 , mob: 021 407390
email:Karin@lindholmdesign.co.nz
web: www.lindholmdesign.co.nz
Karin Lindholm Andreassen
LBP: Design 2: 107526

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Artistic Impression Only Site ALL 200 1:200

PROPOSED EXTENSION TO EXISTING DWELLING & NEW BOATSHED at 55 KINGFISHER DRIVE, KERIKERI

LOT 2 DP 311542 & LOT 4 317854 FOR IAN and VICKI SMITH

Sheet: A102 PART SITE PLAN - PROPOSED SHEET 2

SCALE: (A2) 1:200

H - WIP

11/03/2025

REVISION	DATE
CONCEPT -FOR INFORMATION	

Appendix C – Hand Auger Logs

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

HAIGH WORKMAN LTD
Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH01

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description
Based on NZGS Logging Guidelines 2005

SILT; dark brown. Stiff, dry, no plasticity. Rootlets. *[TOPSOIL]*

Clayey **SILT**; brown. Very stiff, dry to moist, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

From 0.4m: Becomes low to medium plasticity.

SILT, trace clay; brown to light orangish brown and light grey. Very stiff, moist, no to low plasticity.

From 0.9m: Becomes hard.

SILT, some clay; reddish brown to brown. Very stiff, moist, low plasticity.

From 1.4m to 1.6m: Mottled black and light grey.

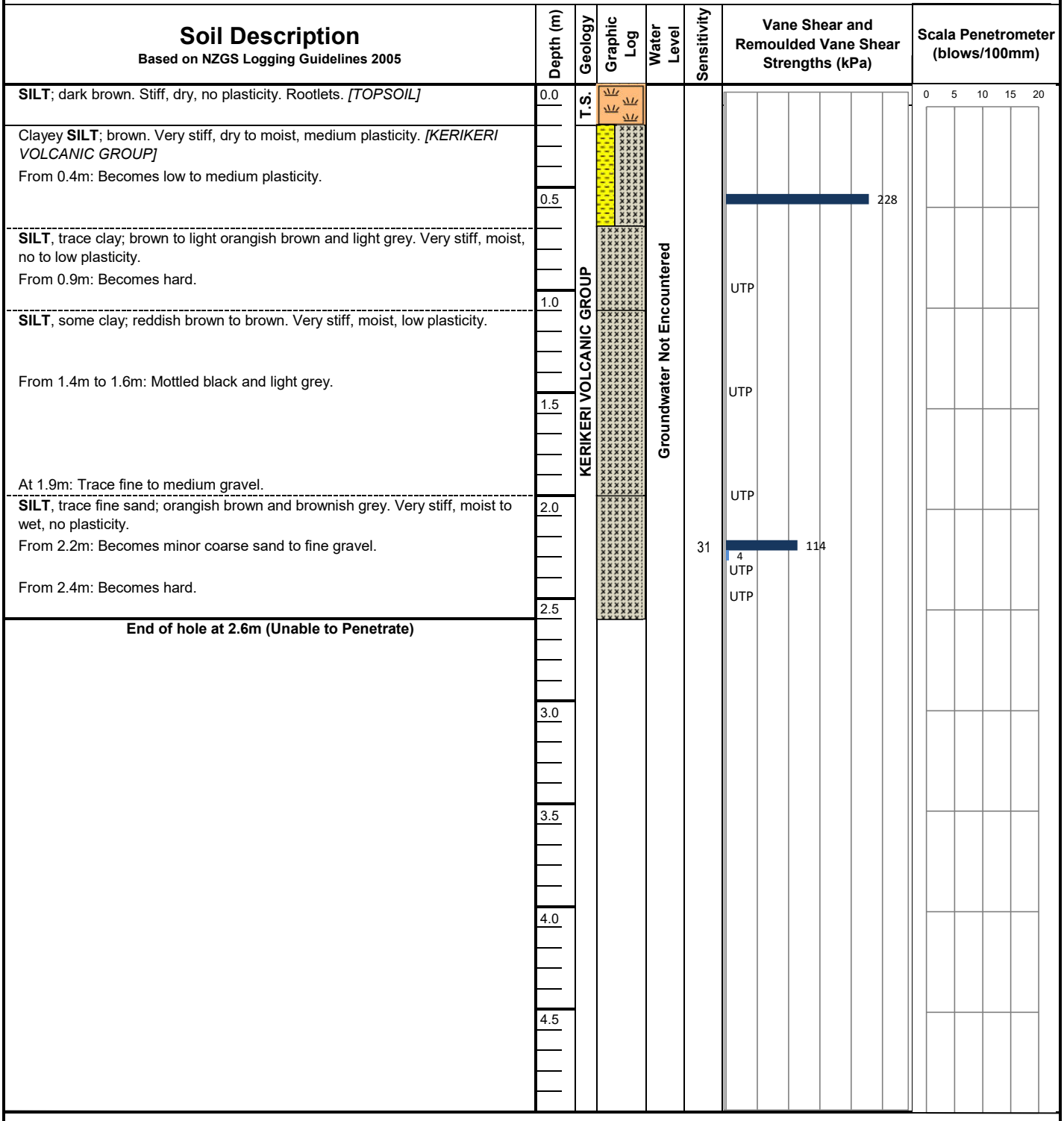
At 1.9m: Trace fine to medium gravel.

SILT, trace fine sand; orangish brown and brownish grey. Very stiff, moist to wet, no plasticity.

From 2.2m: Becomes minor coarse sand to fine gravel.

From 2.4m: Becomes hard.

End of hole at 2.6m (Unable to Penetrate)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR1698
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH02

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	PS
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

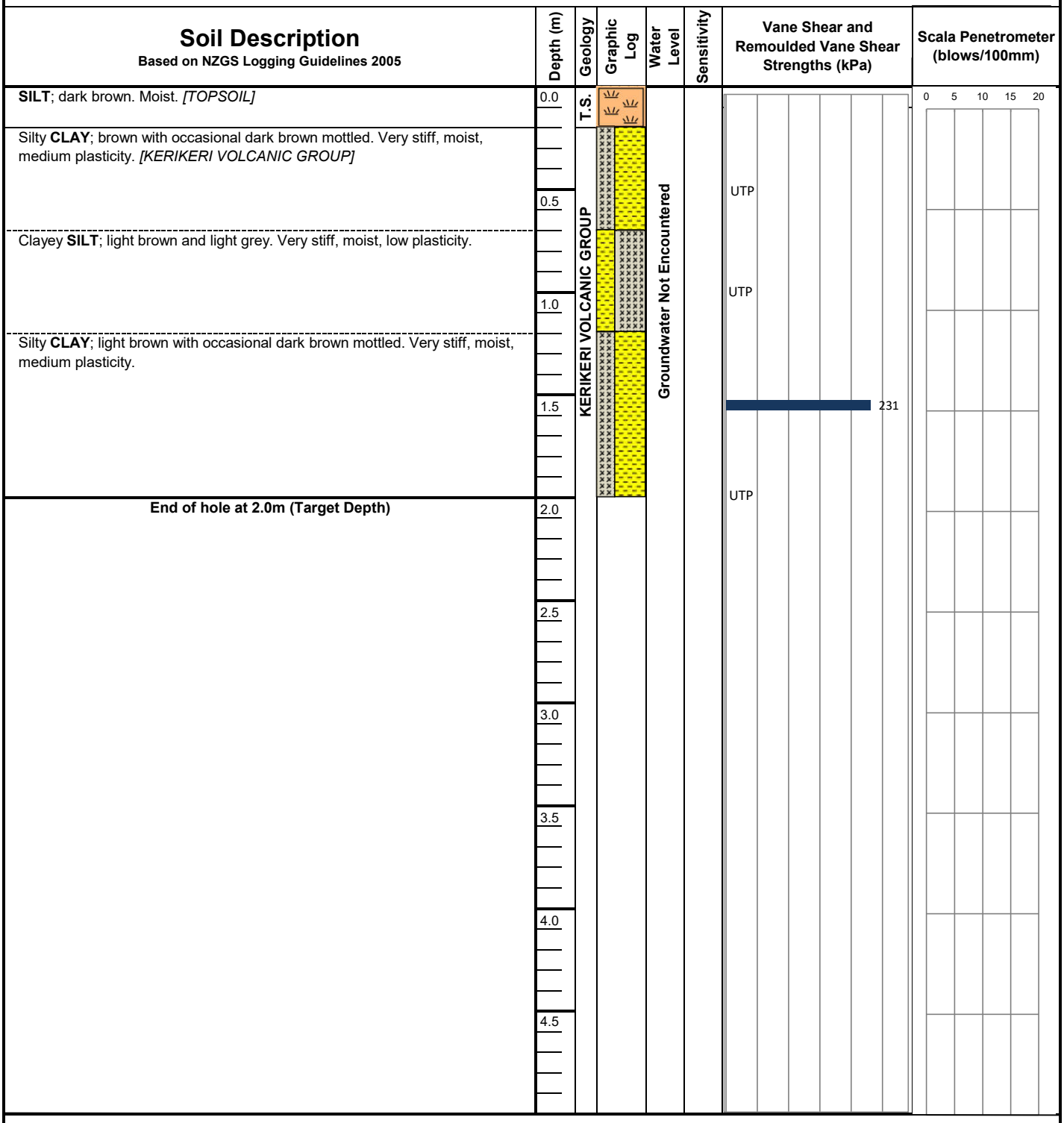
SILT; dark brown. Moist. *[TOPSOIL]*

Silty **CLAY**; brown with occasional dark brown mottled. Very stiff, moist, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

Clayey **SILT**; light brown and light grey. Very stiff, moist, low plasticity.

Silty **CLAY**; light brown with occasional dark brown mottled. Very stiff, moist, medium plasticity.

End of hole at 2.0m (Target Depth)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR440
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH03

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	PS
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

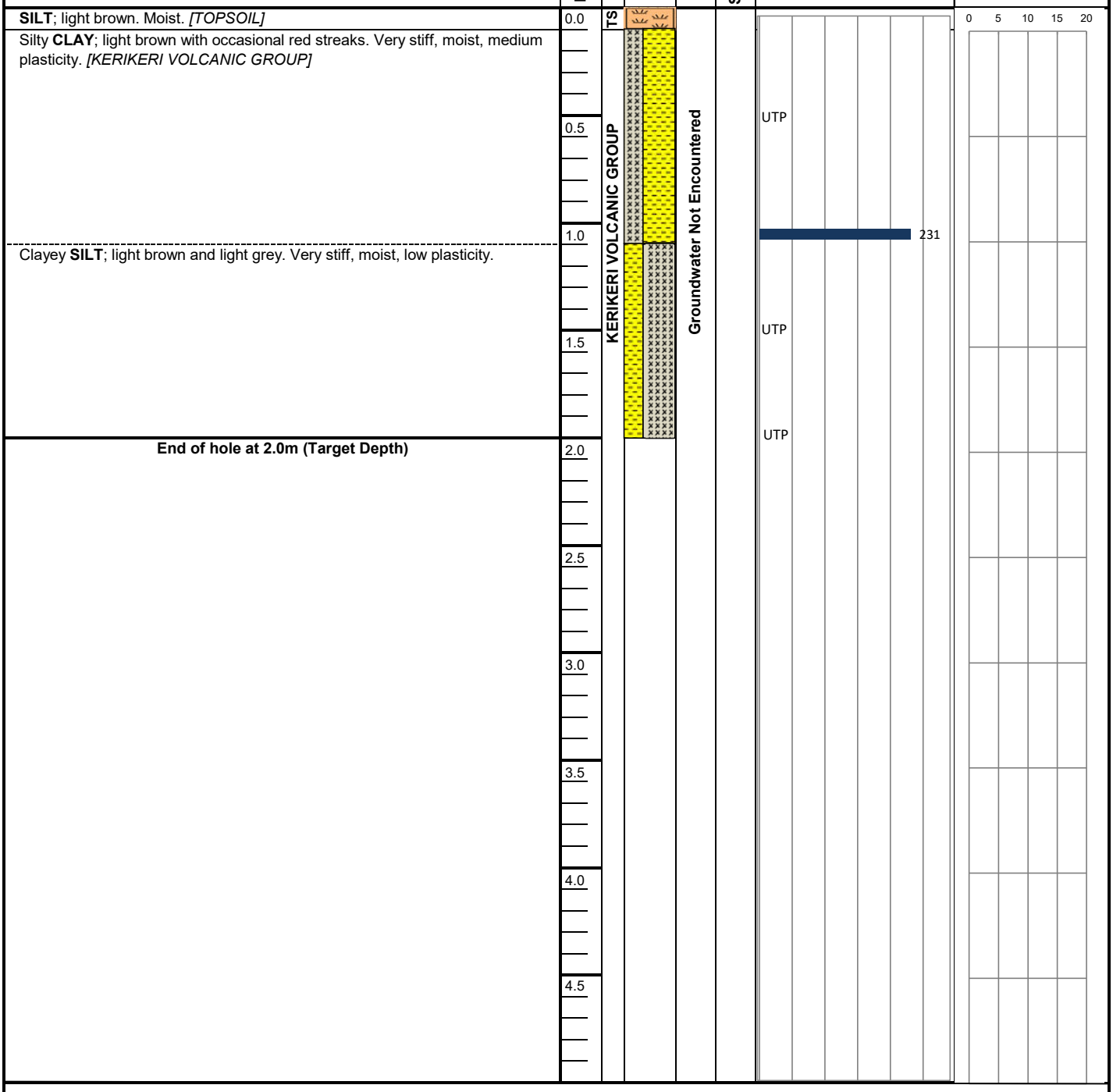
Based on NZGS Logging Guidelines 2005

SILT; light brown. Moist. *[TOPSOIL]*

Silty **CLAY**; light brown with occasional red streaks. Very stiff, moist, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

Clayey **SILT**; light brown and light grey. Very stiff, moist, low plasticity.

End of hole at 2.0m (Target Depth)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR440
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH04

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

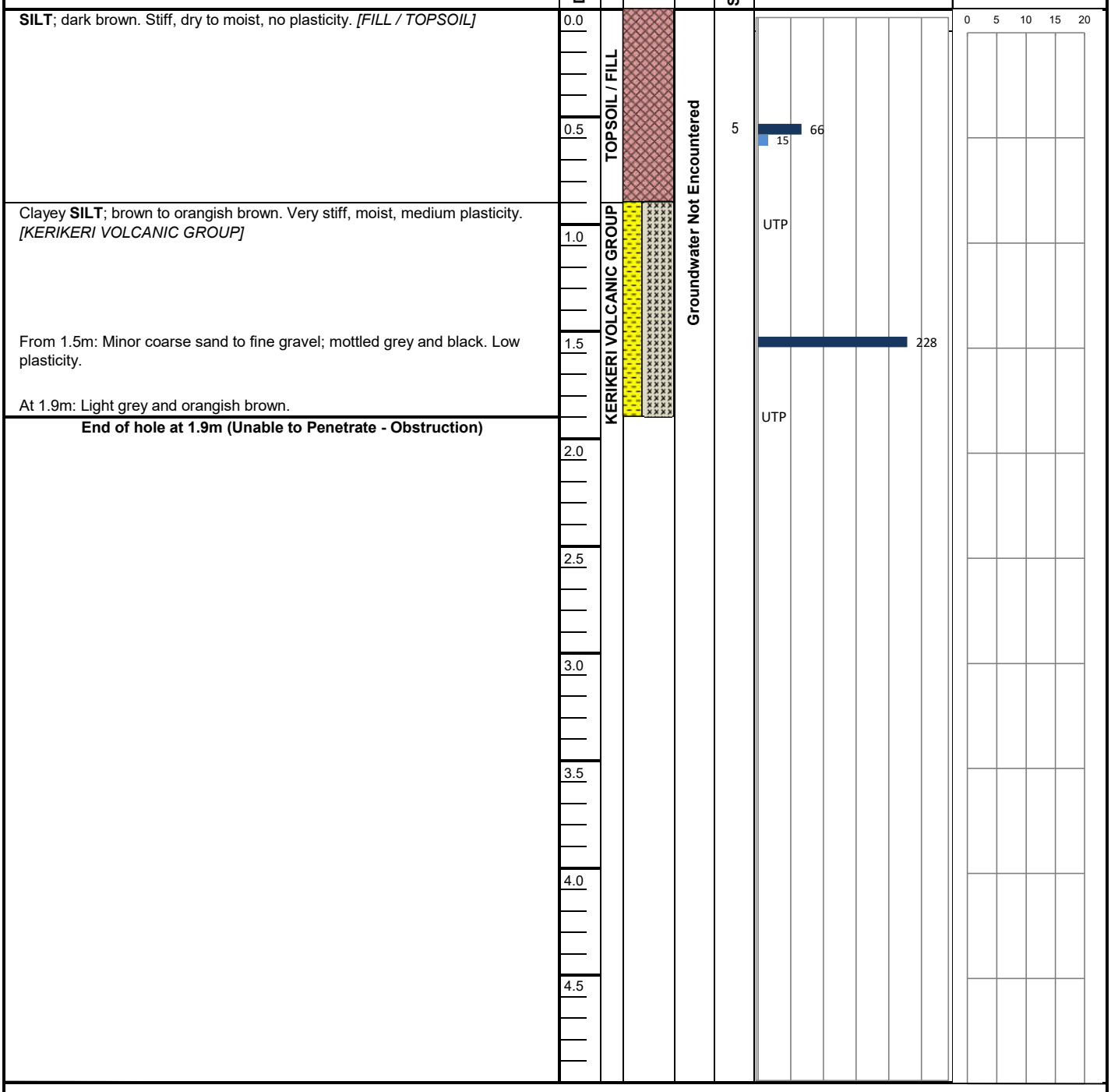
SILT; dark brown. Stiff, dry to moist, no plasticity. *[FILL / TOPSOIL]*

Clayey **SILT**; brown to orangish brown. Very stiff, moist, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

From 1.5m: Minor coarse sand to fine gravel; mottled grey and black. Low plasticity.

At 1.9m: Light grey and orangish brown.

End of hole at 1.9m (Unable to Penetrate - Obstruction)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR1698
Groundwater not encountered.

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6 Fairway Drive
Kerikeri, 0230
New Zealand

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Fax 09 407 8378
www.haighworkman.co.nz
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Borehole Log - BH05

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	PS
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

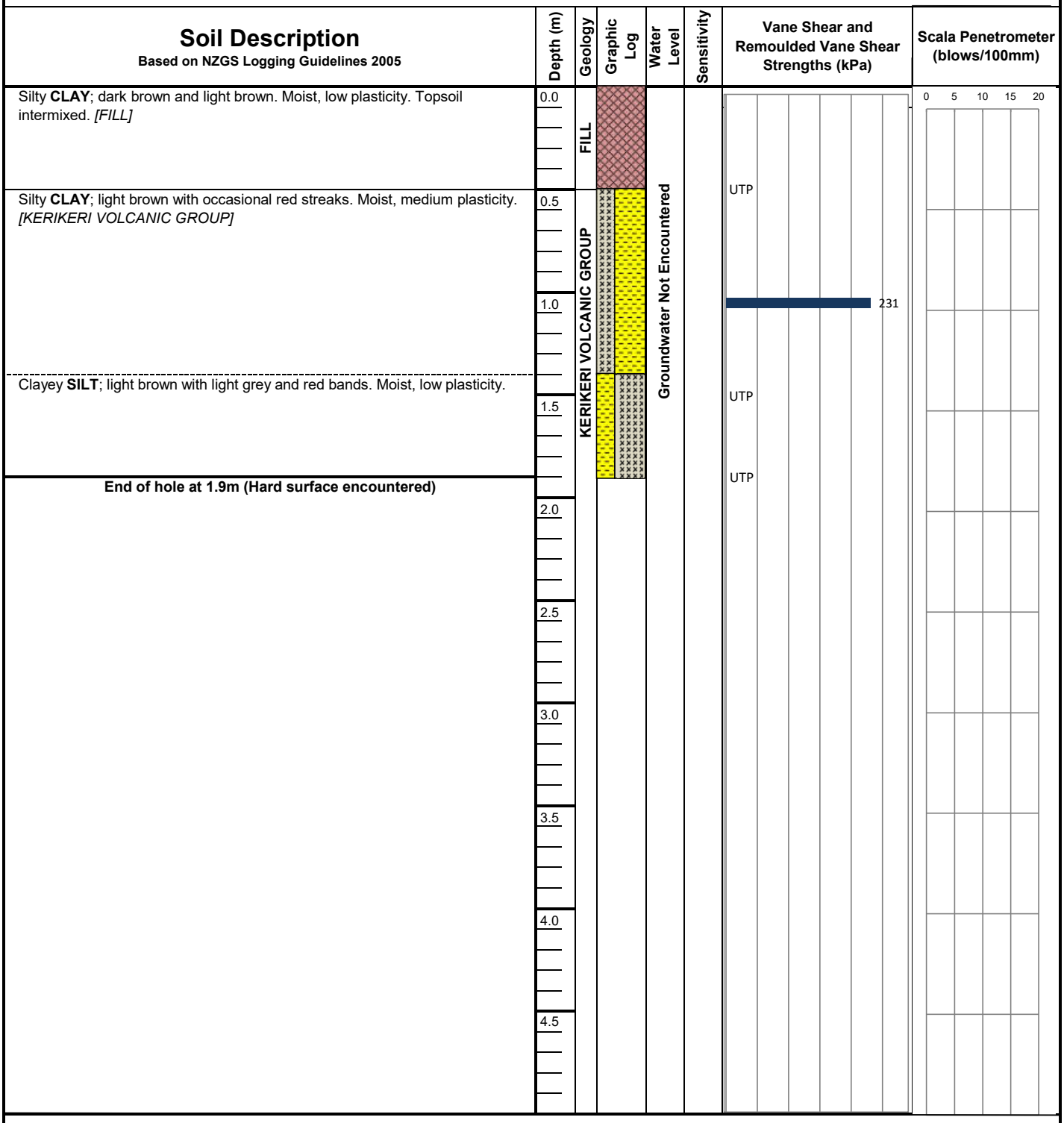
Based on NZGS Logging Guidelines 2005

Silty **CLAY**; dark brown and light brown. Moist, low plasticity. Topsoil intermixed. *[FILL]*

Silty **CLAY**; light brown with occasional red streaks. Moist, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

Clayey **SILT**; light brown with light grey and red bands. Moist, low plasticity.

End of hole at 1.9m (Hard surface encountered)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR440
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH06

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description
Based on NZGS Logging Guidelines 2005

SILT, minor clay; dark brown, mottled light greyish brown and orange. Very stiff, dry to moist, no to low plasticity. *[FILL]*

SILT, trace clay; dark brown, trace mottled brown. Stiff, moist, no plasticity. *[BURIED TOPSOIL]*

Clayey **SILT**, trace medium to coarse sand; brown to orangish brown, mottled grey and brownish orange. Very stiff, moist, low to medium plasticity. *[KERIKERI VOLCANIC GROUP]*

From 1.2m: Some coarse sand to fine gravel. Low plasticity.

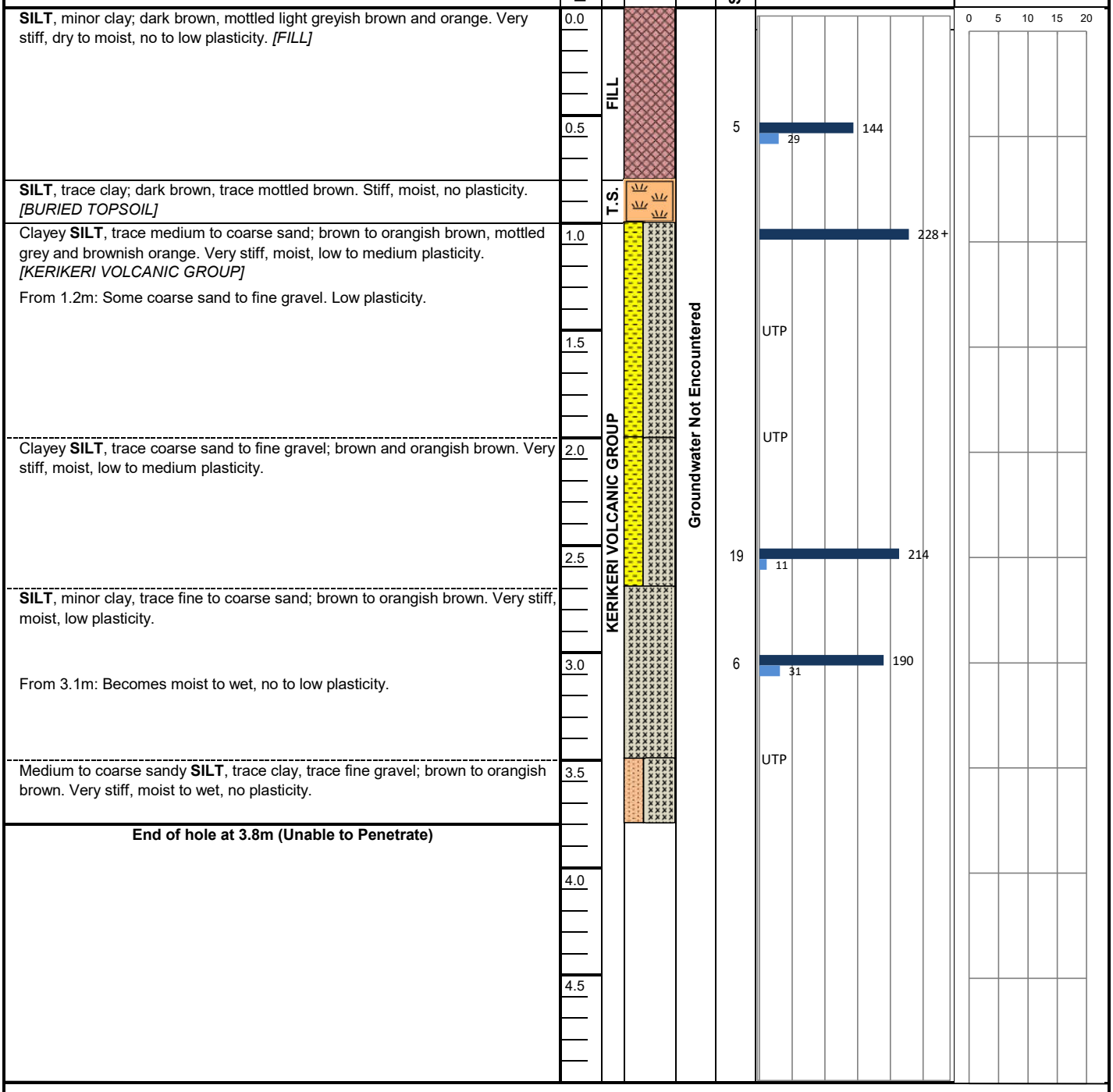
Clayey **SILT**, trace coarse sand to fine gravel; brown and orangish brown. Very stiff, moist, low to medium plasticity.

SILT, minor clay, trace fine to coarse sand; brown to orangish brown. Very stiff, moist, low plasticity.

From 3.1m: Becomes moist to wet, no to low plasticity.

Medium to coarse sandy **SILT**, trace clay, trace fine gravel; brown to orangish brown. Very stiff, moist to wet, no plasticity.

End of hole at 3.8m (Unable to Penetrate)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR1698
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
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Borehole Log - BH07

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	PS
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty **CLAY**; light brown. Dry, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

From 0.8m: Becomes red.

Clayey **SILT**; light brown with light grey and black mottled. Moist, low plasticity. Silt clasts present.

From 1.6m: Becomes light brown with black mottles.

At 3.1m: Difficult to auger.

From 3.5m: Becomes light brown with red and light grey streaks, and black mottles.

End of hole at 4.8m (Target Depth Achieved)

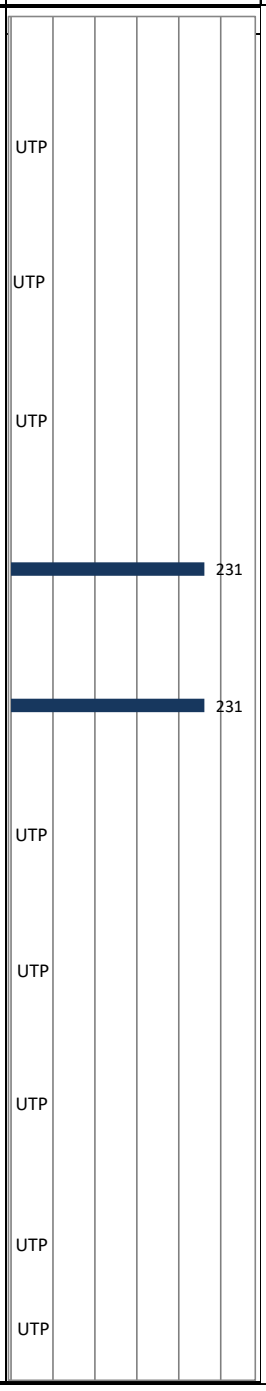
Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

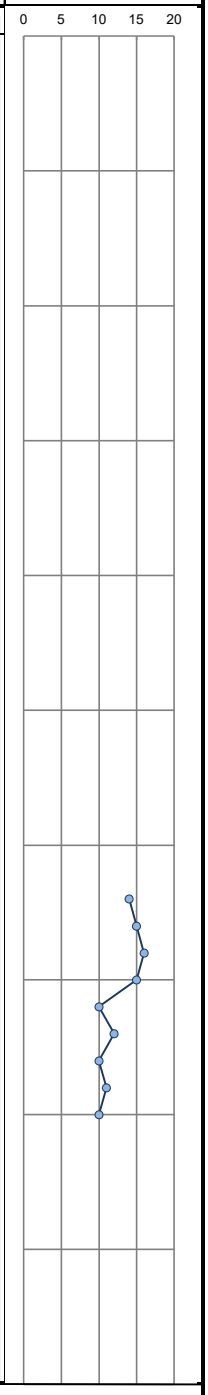
Geology: KERIKERI VOLCANIC GROUP

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity





LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR3947
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
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Borehole Log - BH08 (Atempt. 2)

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

SILT; dark brown. Stiff, dry to moist, no plasticity. *[TOPSOIL]*

Clayey **SILT**, trace coarse sand to fine gravel; brown, mottled brownish orange and light grey. Very stiff, moist, low to medium plasticity. *[KERIKERI VOLCANIC GROUP]*

From 0.8m: Some coarse sand to fine gravel. Low plasticity.

From 1.2m: Minor fine gravel; orangish brown.

Fine gravelly **SILT**, minor clay; orangish brown, mottled white. Very stiff, moist, no plasticity.

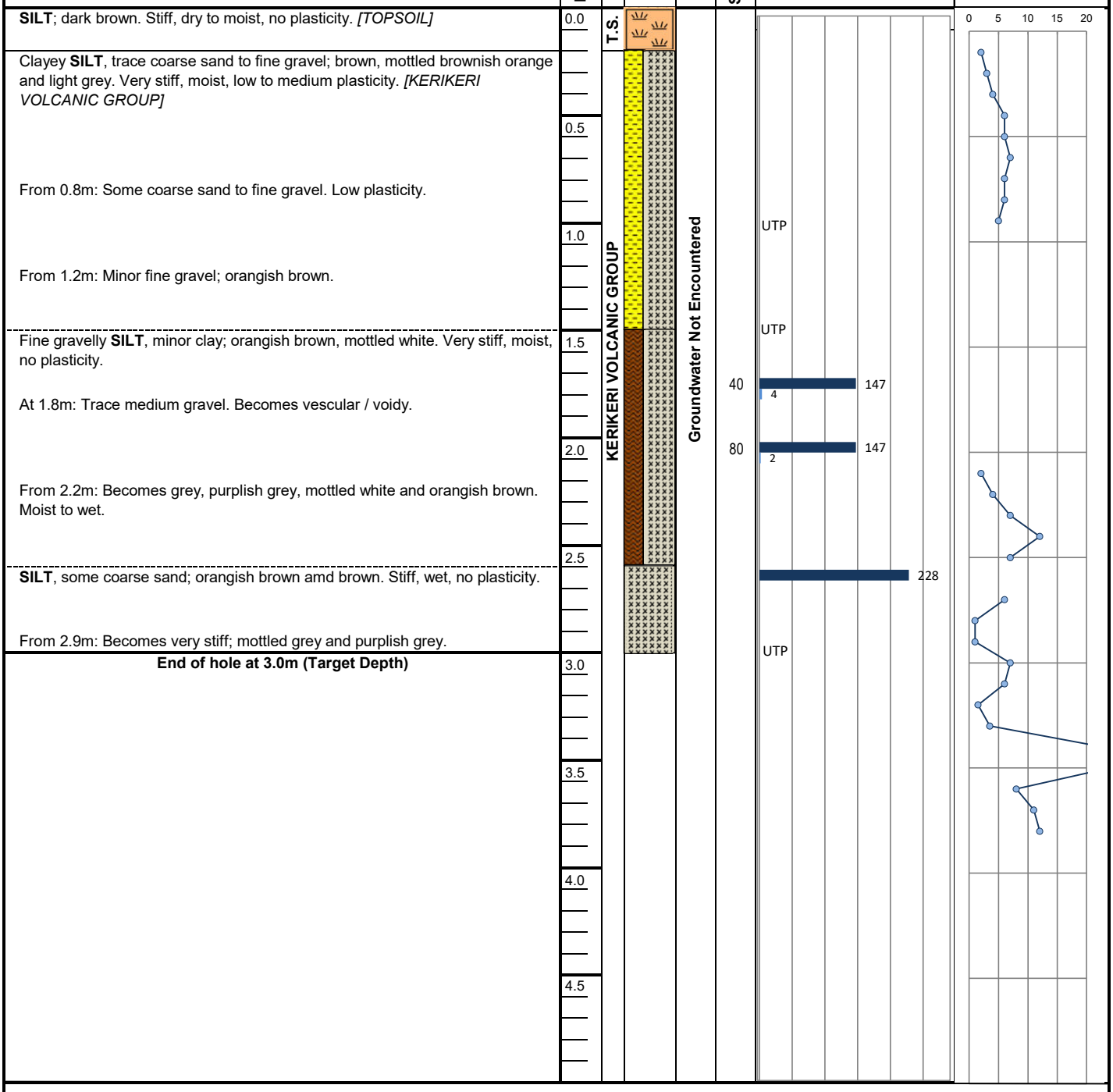
At 1.8m: Trace medium gravel. Becomes vescular / voidy.

From 2.2m: Becomes grey, purplish grey, mottled white and orangish brown. Moist to wet.

SILT, some coarse sand; orangish brown amd brown. Stiff, wet, no plasticity.

From 2.9m: Becomes very stiff; mottled grey and purplish grey.

End of hole at 3.0m (Target Depth)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil. First attempt failed with refusal at 0.7mbgl. Attempt 2 aprox. 1.5m from attempt 1.
Hand Held Shear Vane S/N: DR1698
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH09

Hole Location: Refer to Site Plan

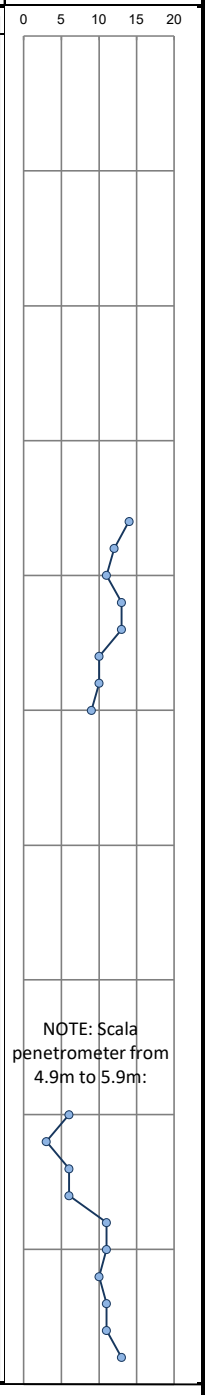
JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Depth (m)	Soil Description	Geology	Graphic Log	Water Level	Sensitivity	Vane Shear and Remoulded Vane Shear Strengths (kPa)	Scala Penetrometer (blows/100mm)
0.0	**SILT**; dark brown. Stiff, dry, no plasticity. *[TOPSOIL]*	T.S.					
0.15	0.15m: **SILT**, some clay, some coarse sand to fine gravel; brown to orangish brown, mottled light brownish grey and orange. Very stiff, moist, low plasticity. *[KERIKERI VOLCANIC GROUP]*	KERIKERI VOLCANIC GROUP		Groundwater Not Encountered		UTP	
0.5							
	SILT, trace clay, trace fine gravel; brownish orange and light greyish brown. Very stiff, moist, no to low plasticity.				11	228 / 20	
1.0	From 1.1m: Becomes mottled light grey.						
					8	162 / 20	
1.5	From 1.6m: Becomes some coarse sand to fine gravel.						
	SILT, trace fine to medium sand; grey and purplish brown, mottled black, flecked white. Hard, moist, no plasticity. Unable to penetrate without scala penetrometer testing.						
2.0							
2.5	2.55m: Silty **CLAY**; brown and greyish brown, mottled grey and black. Stiff, moist to wet, medium to high plasticity.				1	74 / 53	
					2	74 / 48	
3.0					2	74 / 37	
					2	63 / 33	
	Clayey **SILT**; brownish purple, mottled grey, brownish grey, flecked orange. Firm to stiff, moist to wet, medium plasticity.				3	44 / 17	
3.5	From 3.7m: Becomes stiff to very stiff.				6	114 / 18	
4.0					4	85 / 22	
	SILT, trace clay, trace fine to medium sand; brownish orange, mottled brownish grey. Very stiff, moist, no plasticity.						
4.5	From 4.6m: Becomes trace mottled black.				31	228 / 7	
						228	
	End of hole at 4.9m (Target Depth)						



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR1698
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

HAIGH WORKMAN LTD
Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH10

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	05/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	PS
Date Completed:	05/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty **CLAY**; light brown with dark brown mottles. Moist, medium plasticity.
[KERIKERI VOLCANIC GROUP]

Clayey **SILT**; light brown and light grey. Moist, low plasticity.
At 0.9m: Difficult to auger.

From 1.3m: Becomes light brown with light grey streaks and black mottles.

From 3.1m: Becomes dark red with light brown streaks and occasional black mottles.

End of hole at 4.1m (Unable to penetrate)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: KERIKERI VOLCANIC GROUP

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity

Vane Shear and Remoulded Vane Shear Strengths (kPa)

UTP

UTP

NOTE: Vane shear strength not undertaken - scala penetrometer testing

UTP

231

NOTE: Vane shear strength not undertaken - scala penetrometer testing

UTP

Scala Penetrometer (blows/100mm)

0 5 10 15 20 25

LEGEND

TOPSOIL CLAY SILT SAND GRAVEL FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR440
Groundwater not encountered.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

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Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH11

Hole Location: Refer to Site Plan

JOB No. 25 023

CLIENT:	Ian & Vicki Smith	**SITE:**	55 Kingfisher Drive, Kerikeri (Lot 2 DP 311542 & Lot 4 DP 317854)		
Date Started:	25/02/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	25/02/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

SILT; dark brown. Stiff, dry, no plasticity. *[TOPSOIL]*

Clayey **SILT**; brown. Very stiff, dry, medium plasticity. *[KERIKERI VOLCANIC GROUP]*

From 0.4m: Becomes dry to moist.

SILT, some clay, trace coarse sand to fine gravel; brown and orangish brown, mottled light grey, trace mottled black. Very stiff, moist, low plasticity.

SILT, some clay, trace coarse sand to fine gravel; brown and orangish brown, mottled light grey and mottled black. Stiff, moist to wet, low plasticity.

From 2.9m: Becomes brownish orange, mottled grey and orange.

SILT, minor clay, minor medium sand to fine gravel; brownish orange, mottled black. Very stiff, wet, no to low plasticity.

From 3.3m: Becomes wet to saturated.

Medium to coarse sandy **SILT**, some fine gravel, trace clay; orangish brown and brownish orange, mottled black. Very stiff to hard, wet, no to low plasticity.

End of hole at 4.0m (Target Depth)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: TS; KERIKERI VOLCANIC GROUP

Water Level: Groundwater seepage encountered at 3.3mbgl to 3.5mbgl

Sensitivity: 7, 17

Vane Shear and Remoulded Vane Shear Strengths (kPa): 228, 228, 206, 29, 92, 6, 228

Scala Penetrometer (blows/100mm): 0 5 10 15 20

NOTE: Scala bouncing at 4.17m (21blows = 70mm, bouncing)

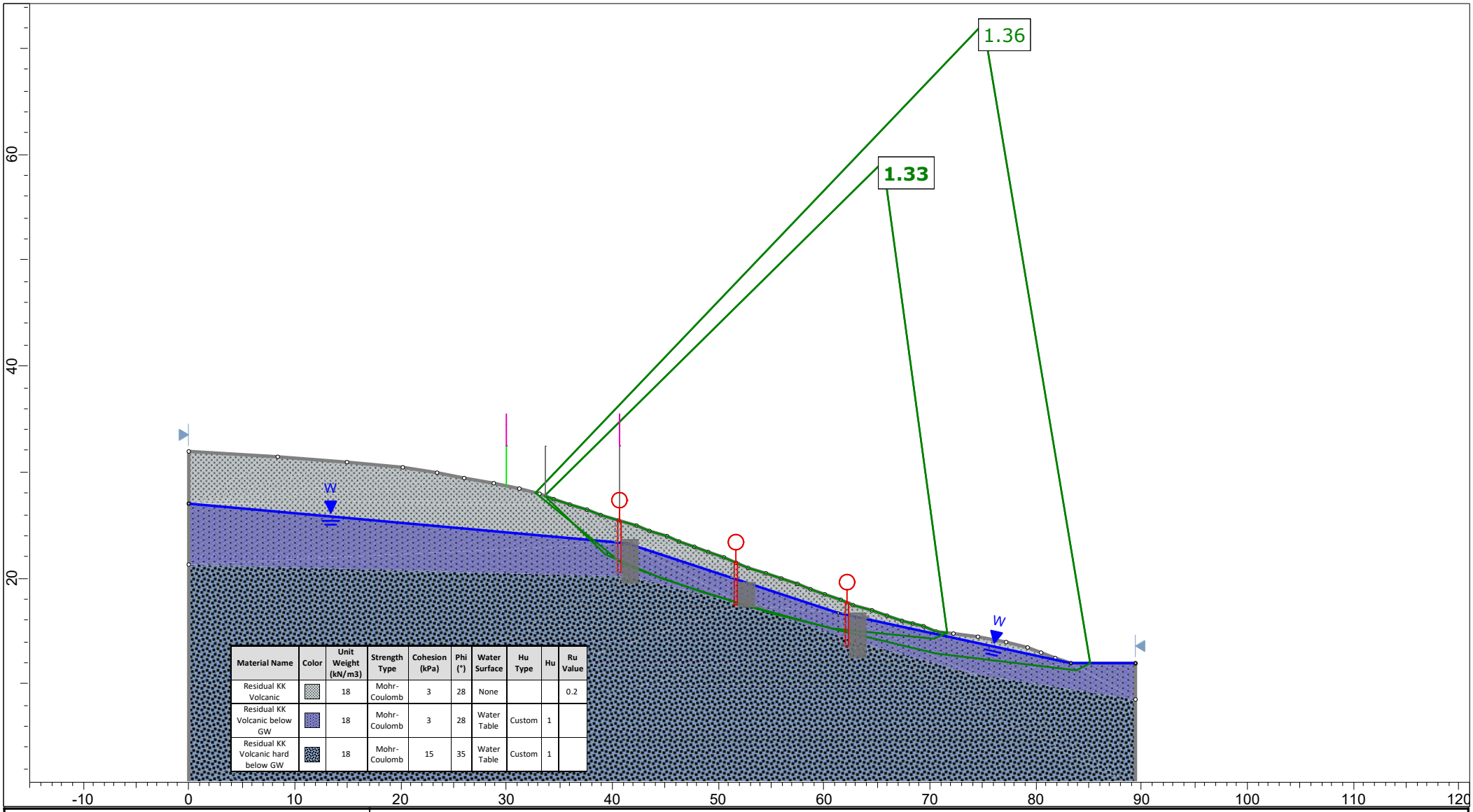
LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: DR1698
Groundwater not encountered however seepage was encountered at 3.3mbgl to 3.5mbgl.

Appendix D – Slope Stability Outputs



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value
Residual KK Volcanic		18	Mohr-Coulomb	3	28	None			0.2
Residual KK Volcanic below GW		18	Mohr-Coulomb	3	28	Water Table	Custom	1	
Residual KK Volcanic hard below GW		18	Mohr-Coulomb	15	35	Water Table	Custom	1	

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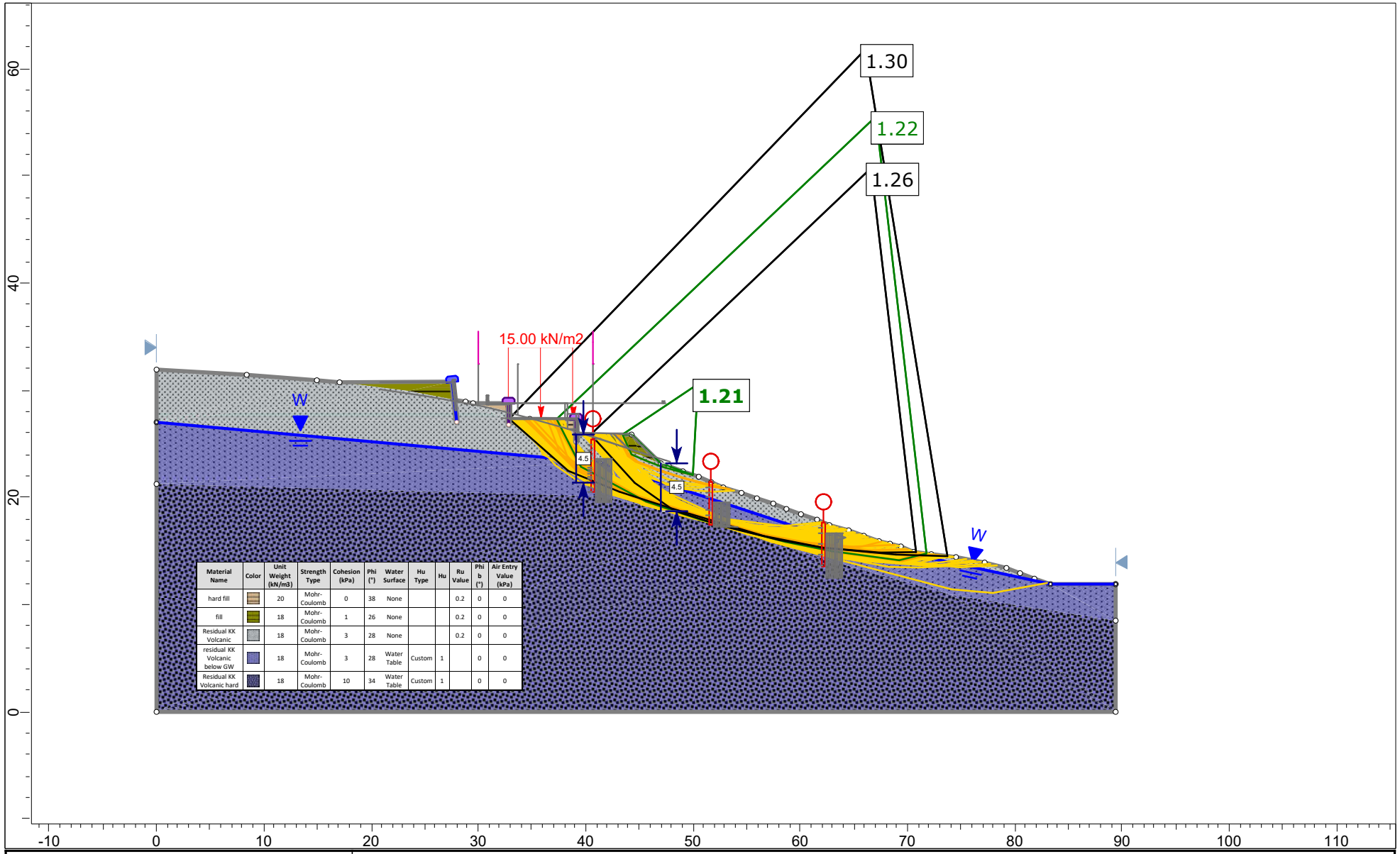
SLIDEINTERPRET 9.028

Project	25 023 stability analysis		
Group	Cross Section A-A'	*Scenario*	A-A' elevated pre development
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 8:18:13 AM	*File Name*	A-A' elevated pre development



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value	Phi b (°)	Air Entry Value (kPa)
hard fill		20	Mohr-Coulomb	0	38	None			0.2	0	0
fill		18	Mohr-Coulomb	1	26	None			0.2	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	None			0.2	0	0
residual KK Volcanic below GW		18	Mohr-Coulomb	3	28	Water Table	Custom	1		0	0
Residual KK Volcanic hard		18	Mohr-Coulomb	10	34	Water Table	Custom	1		0	0

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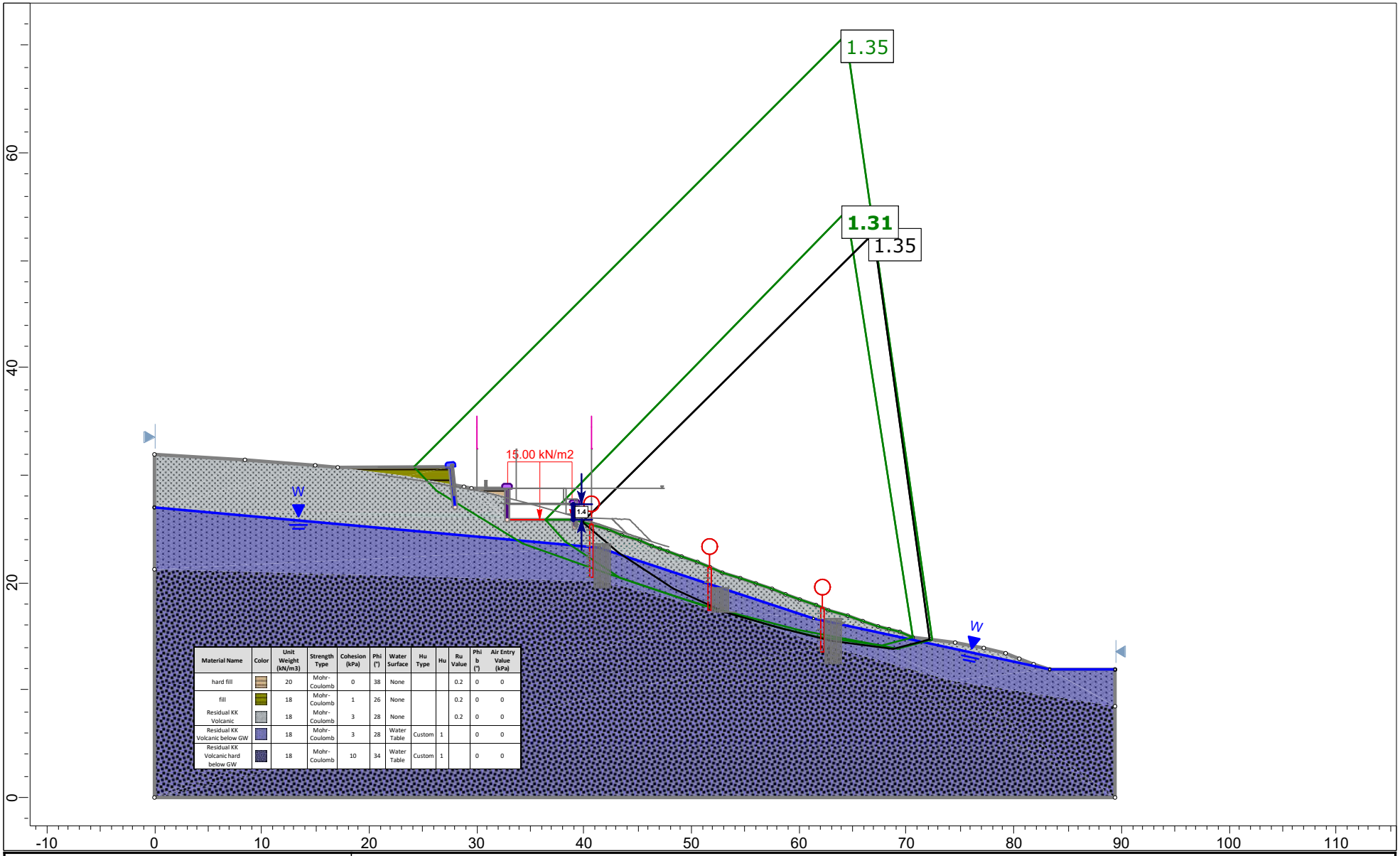
SLIDEINTERPRET 9.028

Project	25 023 stability analysis		
Group	Cross Section A-A'	*Scenario*	A-A' elevated GW post dev
Drawn By	CN	*Scale*	1:500
Date	13/03/2025 9:56:59 AM	*File Name*	A-A' elevated GW post dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value	Phi b (°)	Air Entry Value (kPa)
hard fill		20	Mohr-Coulomb	0	38	None			0.2	0	0
fill		18	Mohr-Coulomb	1	26	None			0.2	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	None			0.2	0	0
Residual KK Volcanic below GW		18	Mohr-Coulomb	3	28	Water Table	Custom	1		0	0
Residual KK Volcanic hard below GW		18	Mohr-Coulomb	10	34	Water Table	Custom	1		0	0

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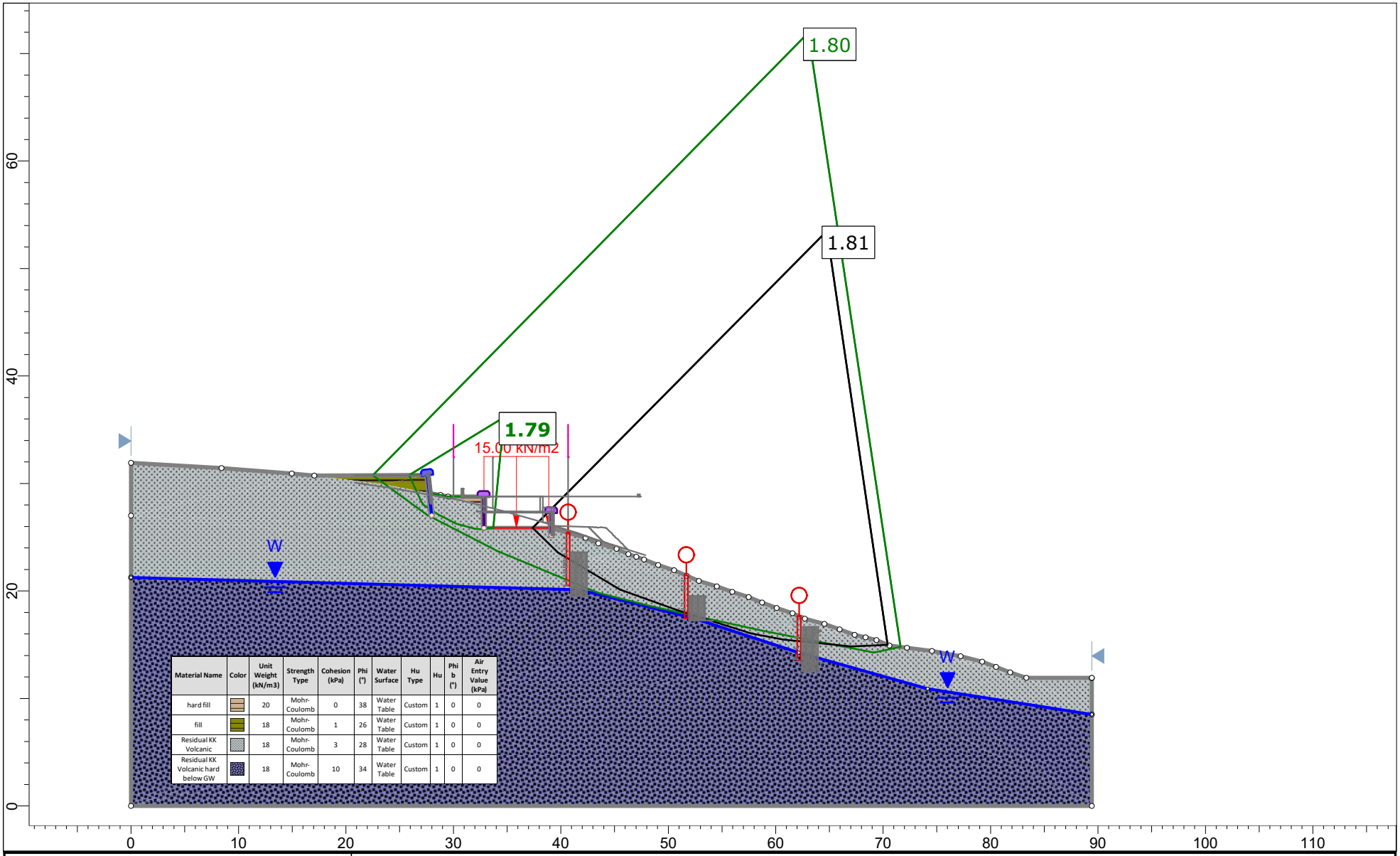
SLIDEINTERPRET 9.028

Project	25 023 stability analysis		
Group	Cross Section A-A'	*Scenario*	A-A' elevated GW post dev - lowered pool by 1.4m, no fill
Drawn By	CN	*Scale*	1:500
Date	13/03/2025 10:03:13 AM	*File Name*	A-A' elevated GW post dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Phi b (°)	Air Entry Value (kPa)
hard fill		20	Mohr-Coulomb	0	38	Water Table	Custom	1	0	0
fill		18	Mohr-Coulomb	1	26	Water Table	Custom	1	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	Water Table	Custom	1	0	0
Residual KK Volcanic hard below GW		18	Mohr-Coulomb	10	34	Water Table	Custom	1	0	0

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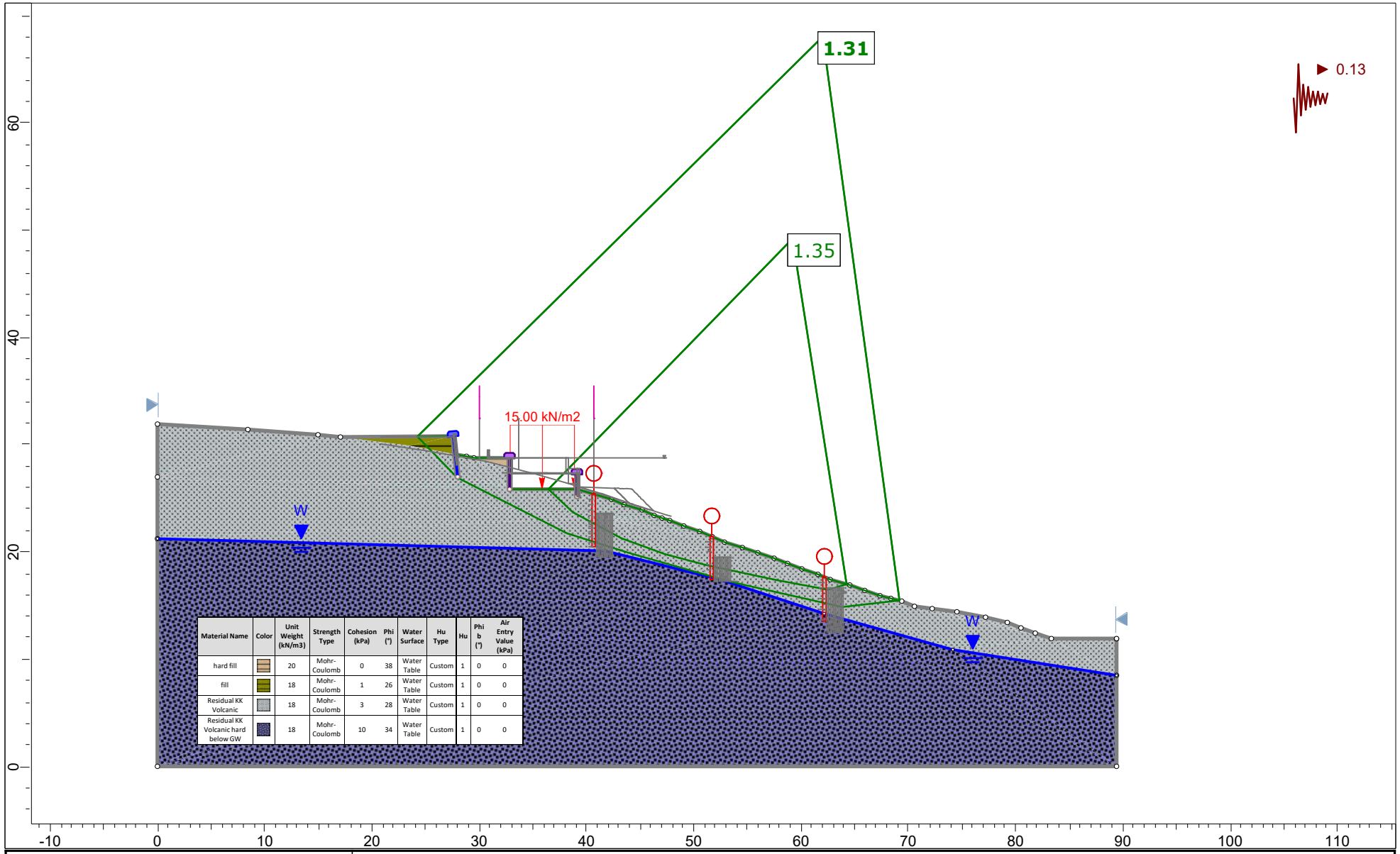
Project	25 023 stability analysis		
Group	Cross Section A-A'	*Scenario*	A-A' normal GW post dev lowered pool 1.4m
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 3:39:39 PM	*File Name*	A-A' normal GW post dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Phi b (°)	Air Entry Value (kPa)
hard fill		20	Mohr-Coulomb	0	38	Water Table	Custom	1	0	0
fill		18	Mohr-Coulomb	1	26	Water Table	Custom	1	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	Water Table	Custom	1	0	0
Residual KK Volcanic hard below GW		18	Mohr-Coulomb	10	34	Water Table	Custom	1	0	0

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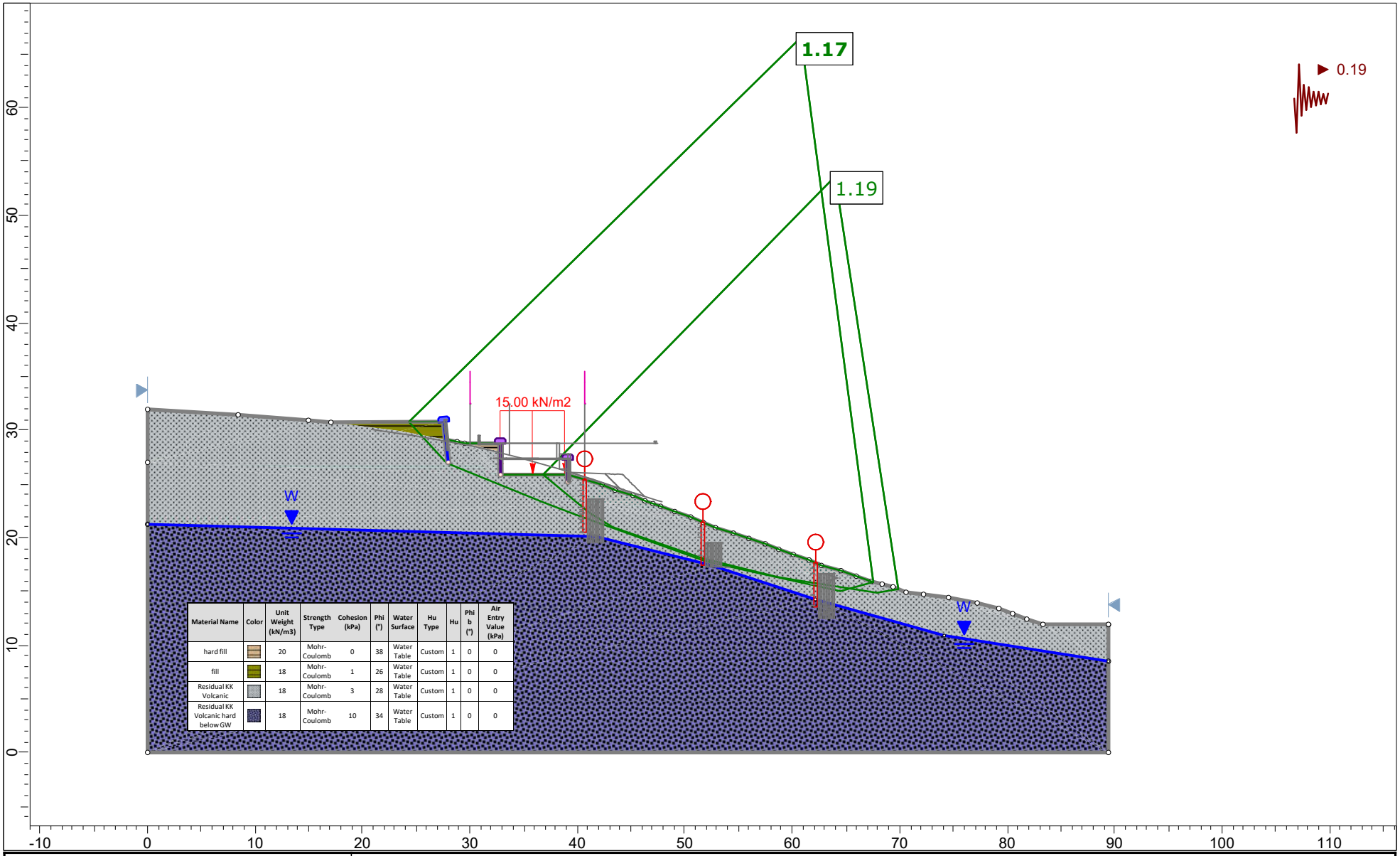
Project	25 023 stability analysis		
Group	Cross Section A-A'	*Scenario*	A-A' seismic (0.13g) post dev lowered pool 1.4m
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 3:41:46 PM	*File Name*	A-A' seismic (0.13g) post dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Phi b (°)	Air Entry Value (kPa)
hard fill		20	Mohr-Coulomb	0	38	Water Table	Custom	1	0	0
fill		18	Mohr-Coulomb	1	26	Water Table	Custom	1	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	Water Table	Custom	1	0	0
Residual KK Volcanic hard below GW		18	Mohr-Coulomb	10	34	Water Table	Custom	1	0	0

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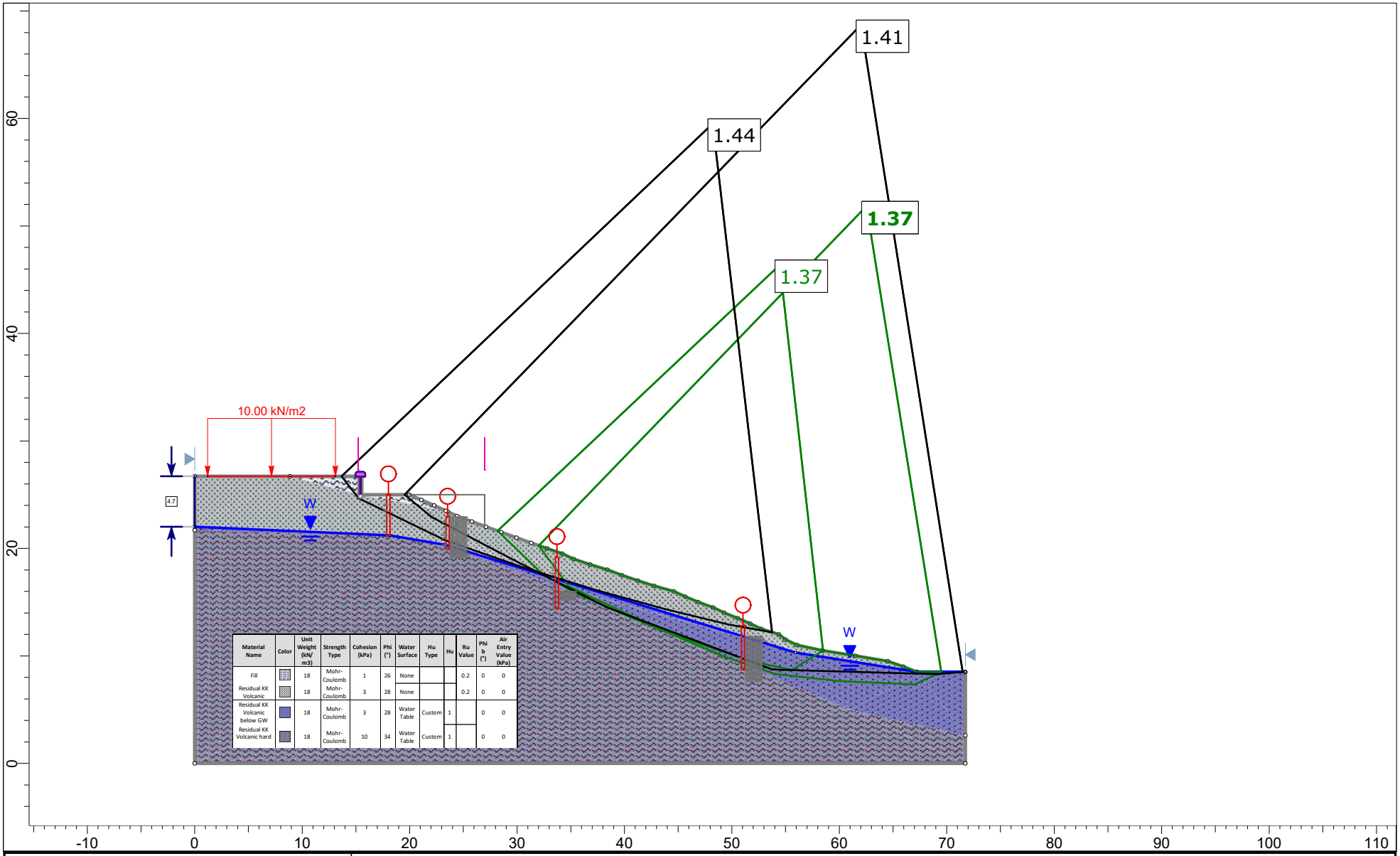
Project	25 023 stability analysis		
Group	Cross Section A-A'	*Scenario*	A-A' seismic (0.19g) post dev lowered pool 1.4m
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 3:43:49 PM	*File Name*	A-A' seismic (0.19g) post dev



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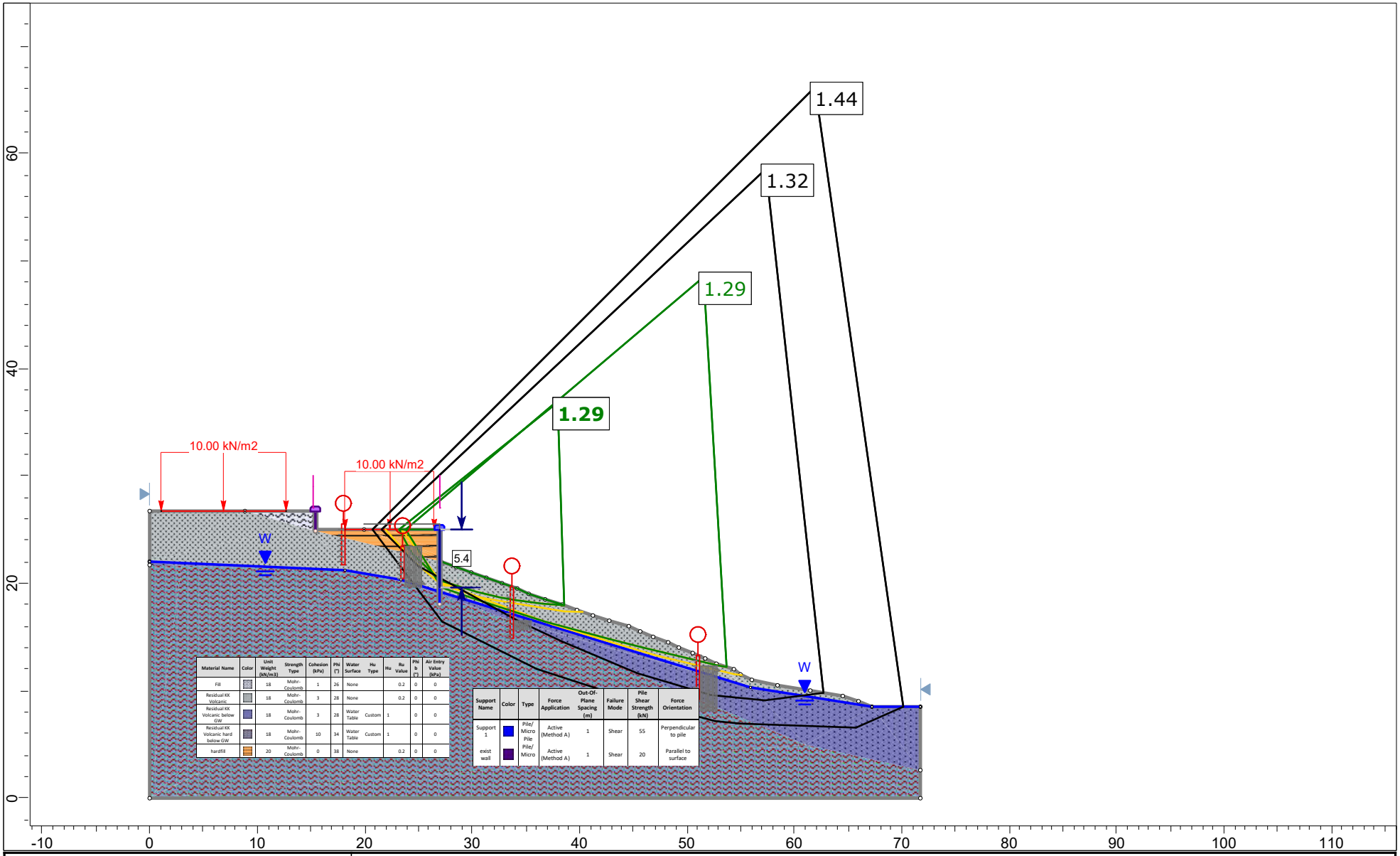
SLIDEINTERPRET 9.028

Project	25 023 stability analysis		
Group	Cross Section B-B'	*Scenario*	B-B' elevated GW pre dev outdoor kitchen
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 4:20:13 PM	*File Name*	B-B' elevated GW pre dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value	Phi b (°)	Air Entry Value (kPa)
Fill		18	Mohr-Coulomb	1	26	None			0.2	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	None			0.2	0	0
Residual KK Volcanic below GW		18	Mohr-Coulomb	3	28	Water Table	Custom	1		0	0
Residual KK Volcanic hard below GW		18	Mohr-Coulomb	10	34	Water Table	Custom	1		0	0
hardfill		20	Mohr-Coulomb	0	38	None			0.2	0	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Support 1		Pile/ Micro Pile	Active (Method A)	1	Shear	55	Perpendicular to pile
exist wall		Pile/ Micro	Active (Method A)	1	Shear	20	Parallel to surface

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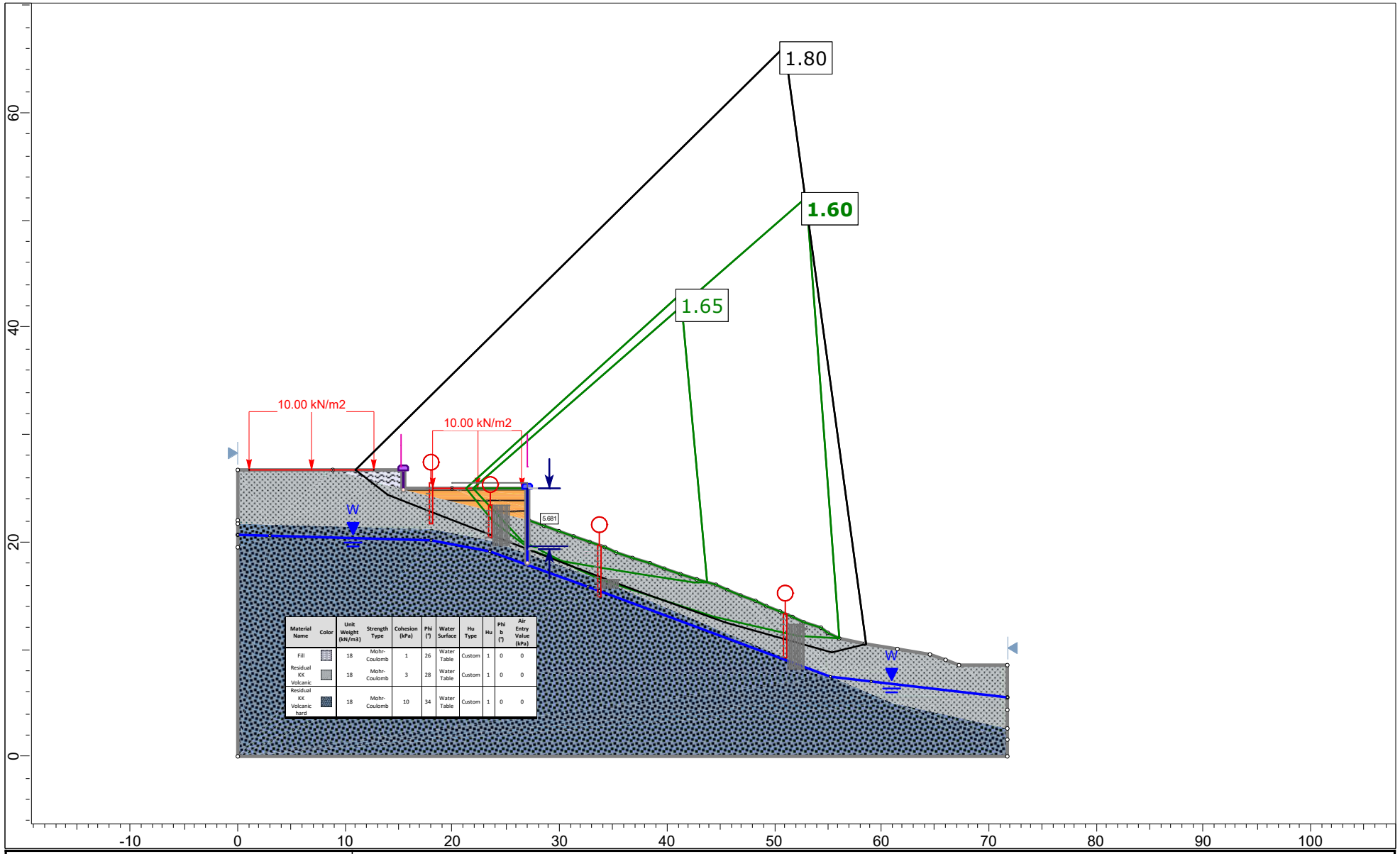
SLIDEINTERPRET 9.028

Project	25 023 stability analysis		
Group	Cross Section B-B'	*Scenario*	B-B' elevated GW post dev outdoor kitchen
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 4:15:09 PM	*File Name*	B-B' elevated GW post dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Phi b (°)	Air Entry Value (kPa)
Fill		18	Mohr-Coulomb	1	26	Water Table	Custom	1	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	Water Table	Custom	1	0	0
Residual KK Volcanic hard		18	Mohr-Coulomb	10	34	Water Table	Custom	1	0	0

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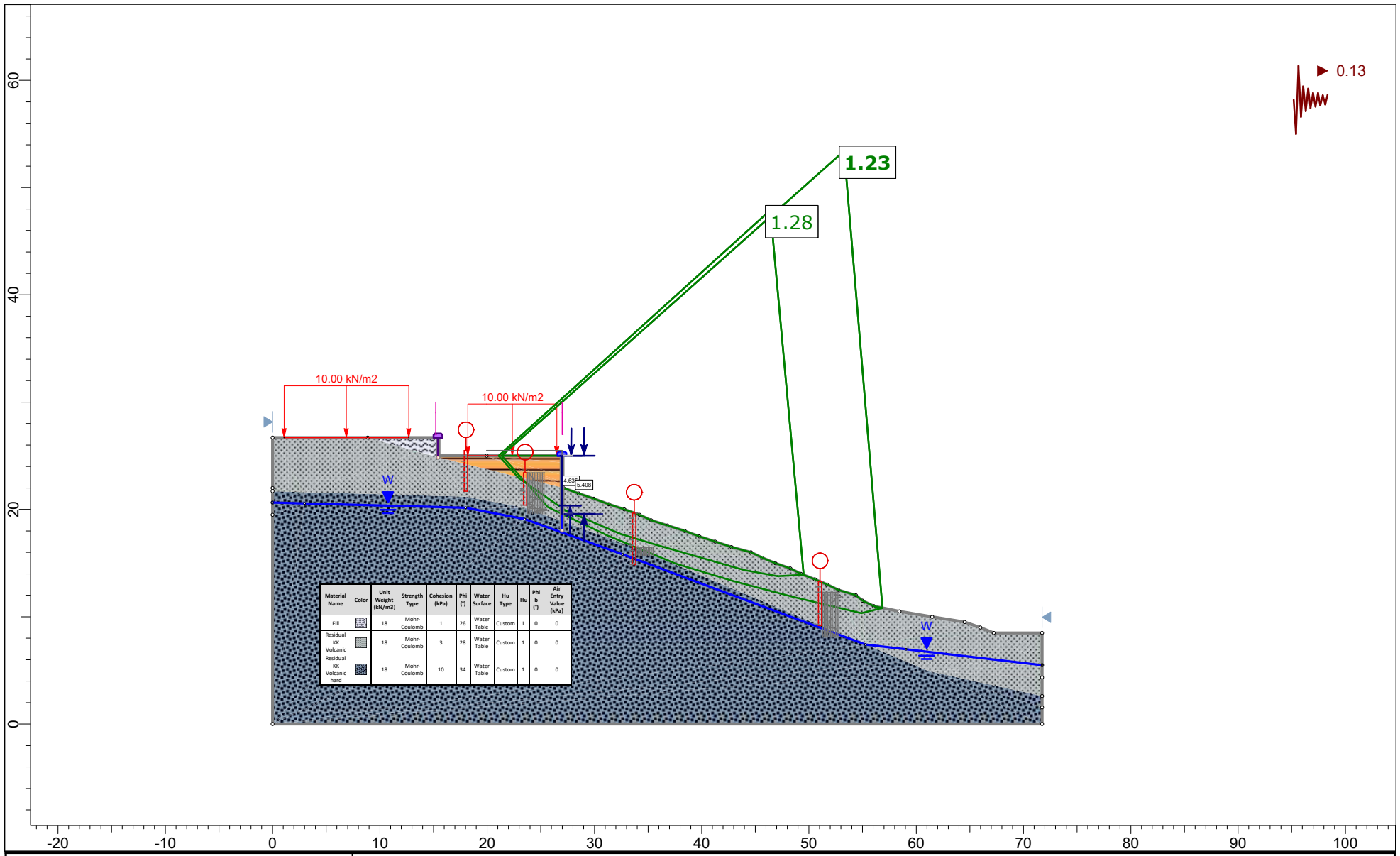
Project	25 023 stability analysis		
Group	Cross Section B-B'	*Scenario*	B-B' normal GW post dev outdoor kitchen
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 4:01:17 PM	*File Name*	B-B' normal GW post dev



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Phi b (°)	Air Entry Value (kPa)
Fill		18	Mohr-Coulomb	1	26	Water Table	Custom	1	0	0
Residual KK Volcanic		18	Mohr-Coulomb	3	28	Water Table	Custom	1	0	0
Residual KK Volcanic hard		18	Mohr-Coulomb	10	34	Water Table	Custom	1	0	0

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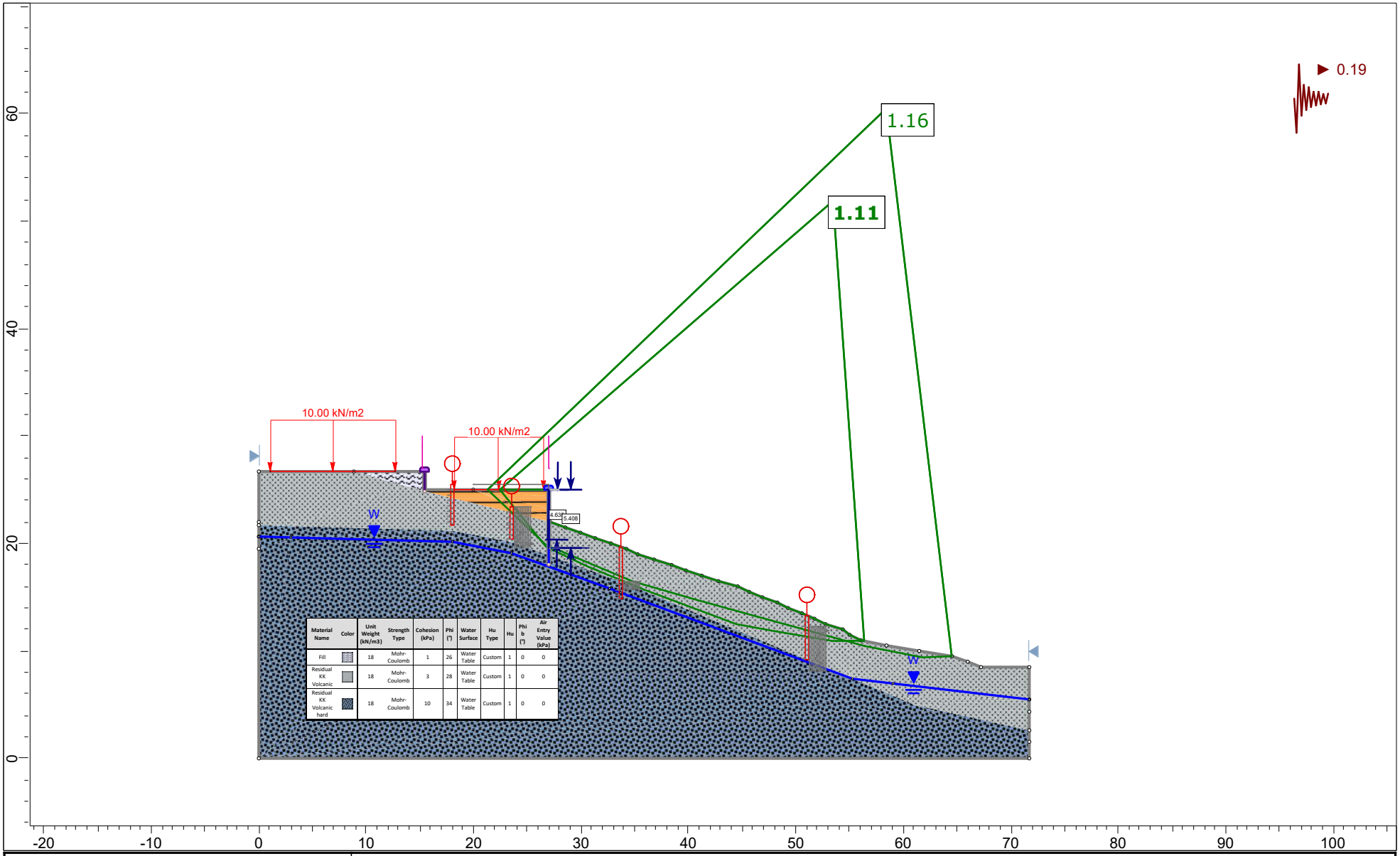
Project	25 023 stability analysis		
Group	Cross Section B-B'	*Scenario*	B-B' seismic (0.13g) post dev outdoor kitchen
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 3:55:04 PM	*File Name*	B-B' seismic (0.13g) post dev



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Civil & Structural Engineers

SLIDEINTERPRET 9.028

Project	25 023 stability analysis		
Group	Cross Section B-B'	*Scenario*	B-B' seismic (0.19g) post dev outdoor kitchen
Drawn By	CN	*Scale*	1:500
Date	12/03/2025 3:52:05 PM	*File Name*	B-B' seismic (0.19g) post dev

Appendix E – Producer Statement Advisory Note

IMPORTANT ADVISORY NOTE

PRODUCER STATEMENT – CONSTRUCTION REVIEW (PS4)

The Building Consent Authority (BCA) frequently requires Producer Statements–Construction Review (PS4) to be submitted to the BCA in order for a Code of Compliance Certificate (CCC) to be issued. A PS4 is usually required for each specialist area. The requirement for a consultant to issue a PS4 related to their area of work will appear as a condition in the Building Consent documents.

It is the consent holder's responsibility to notify Haigh Workman Limited for geotechnical construction monitoring and testing required for subsequent issue of a PS4. An initial inspection of stripped or excavated ground must take place before any fill or blinding concrete is placed. Retrospective site monitoring of completed or partially completed geotechnical work is not possible and a PS4 will not be issued without all the required observations.

In order to secure our construction monitoring services and avoid delays on site, Haigh Workman Limited require at least 24 hours' notice prior to the time the site visit is required. Construction monitoring is limited to items that have been recommended, designed and detailed by Haigh Workman Limited. We are unable to inspect non-consented or unauthorised work. Haigh Workman Limited do not carry out construction monitoring or issue PS4's for work that has been recommended, designed or detailed by other consultants without prior approval from Haigh Workman Limited. Haigh Workman Limited will not issue a PS4 where construction monitoring and/or testing have been carried out by any other consultant. The PS4 must be sought from the consultant who carried out those inspections.

The full Building Consent, with stamped plans with consent numbers (or a legible copy of the same) including all amendments, shall be made available to us during inspections. We will not commence construction monitoring until the documentation is available or provided to us prior to our site visit.

Unless stated otherwise in our terms of engagement, the fees associated with construction monitoring and the issue of PS4's are separate from any work carried out prior to commencement of construction. We are able to provide a fee estimate for this work if required. We cannot provide a fixed quote because the quantum of work required frequently depends on the construction program and the performance of others. These things are not known to us in advance of construction. Our normal terms of trade require payment of fees monthly during the inspection period and full settlement prior to release of any PS4.