

220 Withy Road (Lots 2, 3 and 14)

Geotechnical Completion Report

Prepared for: Pukeko Estates (2021) Ltd

Project 51008 - REV.1 - 11/02/2025

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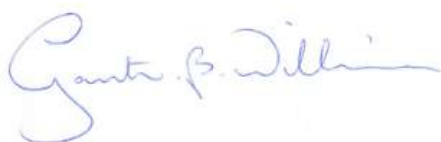
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Our opinions and recommendations are based on our comprehension of the current regulatory standards and must not be considered legal opinions. For legal advice, please consult your solicitor. This opinion is not intended to be advice that is covered by the Financial Advisors Act 2010.

The recommendations and opinions contained in this report are based on our visual reconnaissance of the site, information from geological maps and upon data from the field investigation as well as the results of in situ testing of soil. Inferences are made about the nature and continuity of subsoils away from and beyond the exploratory holes which cannot be guaranteed. The descriptions detailed on the exploratory hole logs are based on the field descriptions of the soils encountered.

This report includes Appendices. These appendices should be read in conjunction with the main part of the report and this report should not be considered complete without them.

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1.0 INTRODUCTION

Engineering Design Consultants Ltd (EDC) was commissioned by Ross Overington on behalf of Pukeko Estates (2021) Ltd on 16/12/2022 to provide a geotechnical completion report for 220 Wither Road (Lots 2, 3 and 14) (Lot 23 DP 580197), referred to below as 'the site'.

The feasibility report was conducted and completed on 18/03/2024.

The majority of the land is already subdivided; our focus is mainly on Lots 2, 3 and 14 for new residential lots (referred to below as 'the site') with access roads.

The proposed subdivision plan, provided by Ross Overington, is included within Appendix B.

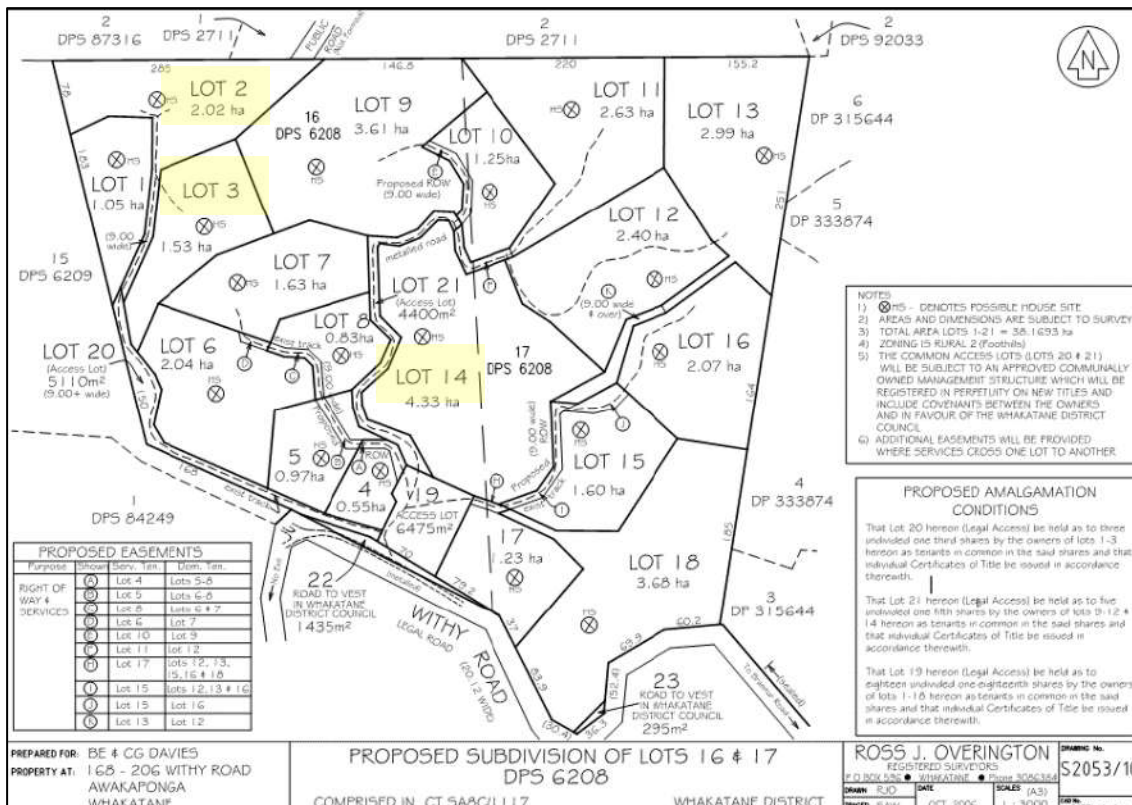


Figure 1: Subdivision Plan provided by Ross Overington

1.1 Legal Description & Topography

The site is located North of 220 Wither Road, with the original (i.e. prior to subdivision) legal description of Lot 23 DP 580197 with an overall area of 23Ha. The site is characterised by steeply sloping terrain around its perimeters, with the slopes descending towards the centre of the site.



Figure 2: Site Location (Courtesy of BOPRC Maps)

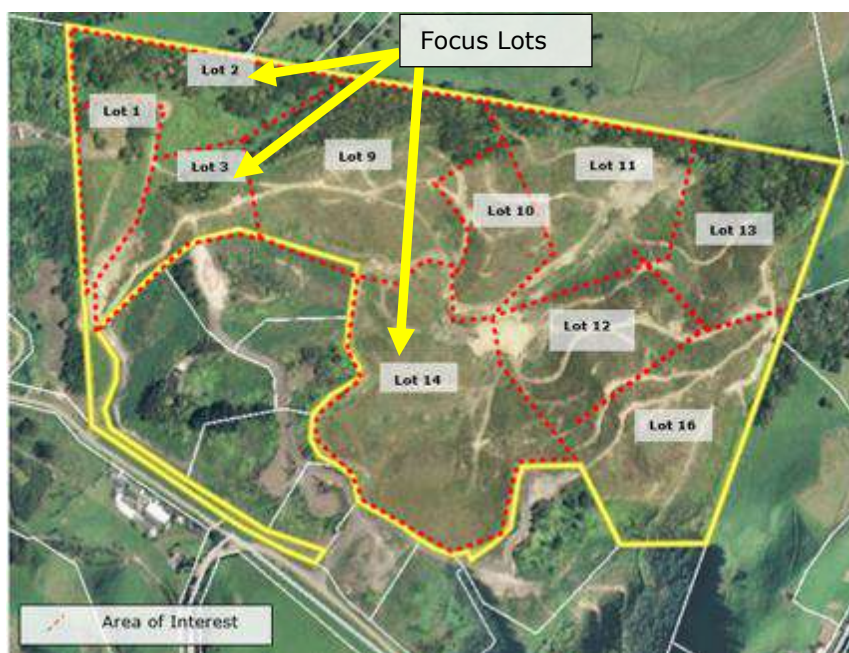


Figure 3: Indicated Subject Lots 2, 3 and 14

1.2 Site Geology

According to the GNS Geological Unit QMap, available on the New Zealand Geotechnical Database (Earthquake Commission / Ministry of Business, Innovation & Employment, 2016), the site is underlain by Late Pleistocene (0.135 - 0.329 Ma) igneous rocks of the Matahina Formation, comprising 'Pink- to purplish-grey, unwelded and soft to welded columnar jointed, locally eutaxitic, rhyolite ignimbrite; minor fall deposits' (Q8ma).

2.0 DEVELOPMENT OVERVIEW

This report is related to the formation of three new residential lots.

Some earthworks were undertaken, comprising clearing the forest / shrub and establishing an access road toward the proposed lots, as well as creating level building platforms for residential development within each lot.

The proposed new Lots are listed below:

Created Parcels	Area
Lot 2	2.74Ha
Lot 3	1.32Ha
Lot 14	2.12Ha

Table 1: Table of Lots

3.0 EARTHWORKS DETAILS

The earthworks consisted of the replacement of unsuitable (organic and clay content) material on the building sites, included the removal of unsuitable and suitable material over an approximately 400m² area for an average depth of approximately 1.0m to create a flat platform and then placing with suitable (fine granular pumice) material in approximately 0.15m thick layers

The following earthworks equipment was on-site during the construction period:

- 1x 14-tonne digger
- 1x 22 tonne three axil truck for compaction

The bulk filling was conducted in a controlled manner, including moisture control by visual assessment before compacting with a three-axil truck in layers of 150mm thickness.

4.0 PREVIOUS GEOTECHNICAL INVESTIGATIONS AND REPORTING

4.1 Original Geotechnical Reporting (2004)

Manktelow Consulting Engineers (MCE) Limited has previously prepared a 'Geotechnical Investigation Report' (Ref 111.1, issued 30/11/2004) for the proposed subdivision of 168-206 Wither Road, Whakatane.

A 4m hand auger borehole (with associated shear vane testing) was undertaken on each of the proposed 18 Lots; however, EDC notes that these logs have not been included within the reporting. When EDC attempted to locate the original logs, we were informed they were unavailable due to the time between the initial testing and the date of issue for our own reporting. We therefore rely on the MCE description of the testing, which indicates the following soil profile across the overall site:

...layers of volcanic tuff and lapilli deposits comprising pumiceous sands, sandy silts and silty sands. Densities of material varied with depth, but generally increased with depth. Typically the upper 1.5 to 2.0m depth was loose with allowable bearing pressures of only 50kPa. Undrained shear strengths varied also with values greater than 120kPa measured below the 2m depth.

Groundwater was not identified above the maximum depth of the intrusive investigation (4.0m), although groundwater emergence was identified at 'an area down-slope of the ridge to the North of Lot 2...'

Preliminary assessment of slope profiles was undertaken as part of the 2004 MCE reporting. However, MCE points out that the final nature and location of the building platforms was unknown at the time of their report issue, and therefore indicative slope profiles were used for a preliminary assessment of the slope stability across the property. Their results indicate that building sites above slopes more than 30° will require a building setback from the edge of the slope. Relevant Cross Sections from the MCE reporting include B, C, E, F and G.

With regards to earthworks, the MCE report recommends cut batters of 1 Vertical to 3 Horizontal (1V:3H, or 18°), with erosion control such as Geojute or Enkamat, in combination with hydroseeding. The report states that unless slope stability assessment is undertaken, existing or proposed cuts below any new dwelling site must be formally retained with a Professionally Engineer designed retaining wall.

4.2 Peer Review (2005)

Terrane Consultants (Terrane) peer-reviewed the 2004 MCE report on 1 August 2005 and raised the following issues:

- Building platform investigations: Terrane confirmed that a more detailed specialist geotechnical review and investigation will be required for each lot and identified further investigation and design should be carried out to demonstrate the viability of the steeper, more marginal building platforms and more clearly define geotechnical constraints on the subdivisional development.

- Earthworks and building platform extents: the extents of the existing building platforms (benched into the slope) differ from those indicated within the MCE reporting; Terrane recommended clarity regarding interim vs final levels. Reconnaissance level topographic survey was recommended to indicate the presence of a viable building platform on Lots 1, 2, 6, 8, 9, 12 and 16.
- Earthworks: Terrane suggested that geotechnical information relevant to subgrade conditions are available from surface exposures on certain building sites and recommended that this is incorporated into the geotechnical report.
- Setback distances: Terrane generally considers the MCE setbacks to be reasonable but note that they may need to be increased if pre-existing filling or landslip deposits are present on the slope. Terrane noted that this may 'impinge on the viability of some of the smaller building platforms'.
- Accessways: Terrane noted that access tracks to the building platforms appeared to be at maximum grade and recommend verification for each lot that downcutting to the required level for the building site is compatible with the access way alignment.
- Wastewater disposal: Terrane recommended that due to the steepness of some slopes and the potential for a decrease in stability due to seepage, nominal locations for effluent disposal fields should be defined for each lot. They queried if the increase in wastewater flows due to borewater supply (instead of roof tanks) had been considered by MCE, and if, due to the steepness of the slopes, the on-site effluent disposal should be classified as a discretionary activity (requiring a resource consent) or a permitted activity.
- Seismic Hazards: Terrane requested comment regarding site-specific seismic hazards to the proposed subdivision due to the proximity to active faults (e.g. risk of topographic amplification of seismic shaking, risk of ground rupture, etc).
- Stormwater disposal: Terrane queried if the disposal of stormwater runoff from sealed areas (20m from houses) included recommendations for scour protection measures or a safeguard against concentrated discharge and the potential for slope instability / erosion. They also noted that overland flowpaths for storm events (greater than the capacity of the pipe system) should be specified, and commented that specific design will be required for the individual lots and shared accessways.

Terrane also raised the following lot specific queries relevant to the subject-Lots of this report:

4.2.1 Lot 2

The original location given in the application documentation had several geotechnical issues (distance from the landslip to the north; setbacks from the base of the 6m+ high cut batter; stormwater overland flowpath). The current proposal for a building platform on the spur ridge to the east appears significantly better. The ridge is not particularly wide, so Terrane suggested there was a need for clarity as to the location and the amount of downcutting proposed.

4.2.2 Lot 3

No specific issues raised.

4.2.3 Lot 14

No specific issues raised

4.3 MCE Response to Peer Review (2005)

In response to the Terrane Peer Review, MCE undertook an additional ten window sampler investigations and an additional 75 hand augers, shear vane and Scala Penetrometer tests across the proposed subdivision (MCE report Ref. 111.2, dated 31 October 2005). EDC notes that whilst borehole logs for the window sampler investigations are included within the 2005 MCE reporting, logs from the hand augers, shear vane tests and Scala Penetrometer tests are not available. EDC has requested these logs, however, due to the time between the investigation and present day, they are not available.

The 2005 MCE lot-specific conclusions related to Subject Lots 2, 3 and 14 are as follows:

4.3.1 Lot 2

- The identified building platform was relocated to approximately 700m² of relatively level ground within a relic log skid area; MCE notes that no recent (at the time) earthworks were undertaken in this location.
- Silt and sand deposits were identified from machine-drilled boreholes to a depth of 10m below ground level. Fill was identified within the northern slopes of Lot 2; however, no further information regarding a description of the fill is available (as the hand auger logs are not included within the reporting and were not able to be obtained at the time of our own report issue).
- Slope stability analyses based on additional on-site testing indicate a 6m setback is required from all slope crests.
- A steep (near-vertical) cut face approximately 4m high was noted to have been formed by earthworks approximately 30 years prior to MCE's investigation (c. 1975; approximately 50 years prior to the issue of this GCR) in order to establish the South-western portion of the former log skid area / proposed building platform. MCE notes: "...despite localised deterioration the slope has remained globally stable during the thirty years since inception".
- To reduce the risk of falling debris affecting a building on this platform, MCE recommended the following:
 - A building offset of 6m from the base of the slope;
 - A specifically designed debris arresting wall (at least 1.8m high) between any build and the base of the cut face;

- Erosion control measures for the exposed face (environment matting such as Geojute or Enkamat geotextile, to be combined with hydro-seeding).

4.3.2 Lot 3

- The proposed house site was to be located on the crest of the ridgeline. The ground slopes down from the ridgeline to the north at around 26°. Ground levels slope gently back toward the south from the ridgeline.
- The gently sloping nature of the ground suggests no slope influences will restrict the location of any building on the lot. However, based on MCE's review of the adjacent Lot 7, it is recommended that a minimum setback of 4m be observed from the top edge of the northern slopes.
- No excavation had been undertaken at the house site at the time of MCE's site visit.
- Soil testing suggested that the site did not meet the NZS 3604:1999 definition of 'good ground' at that time.

4.3.3 Lot 14

- The building platform was to be located on an eastward trending spur located approximately 10m above the valley floor.
- Gentle slopes typified the building platform; however, ground slopes up to 30° to 35° occur over short lengths below the building site. Excavation of at least 4m was recommended to establish an adequately sized building platform.
- Soil testing suggested that the site did not meet the NZS 3604:1999 definition of 'good ground' at that time. MCE recommend that Specific Engineering Design (SED) will be required for the new dwelling at this site, and foundation adjacent to slopes (or possibly the entire dwelling, depending on specific soil investigation) will require underpinning to provide protection against slope creep or movement.

4.4 Geotechnical Feasibility Report for Subdivision (2023)

EDC then completed a geotechnical feasibility report for Lots 1, 2, 3, 9, 10, 11 and 14 of the proposed subdivision (51008 - Rev.0, June 2023). That report indicated that suitable building platforms are present on the proposed Lots 2, 3 & 14, and states that "a larger building platform can be formed on each lot though that could require specific geotechnical investigation and analysis, specifically of the slope stability".

According to the 2023 EDC Feasibility report, engineer-designed waffle slab foundations or timber pile foundations (in general accordance with NZS 3604 with B1/SA1 modifications) or screw piles are likely appropriate to ground conditions. The report notes that foundation design will be subject to a building consent stage geotechnical assessment.

5.0 INTRUSIVE INVESTIGATION

5.1 General

We understand that backfilling of approximately 400m² was undertaken on Lot 2, and roughly 150m² was undertaken on Lot 3. EDC was not present to supervise the earthworks during the “cut & fill” operation. Accordingly, our investigation and comments are based on a post-construction investigation.

5.2 Lot Investigation Testing

As part of our completion report testing, the following testing was undertaken at each identified proposed building platform, as well as near the location of a proposed new shed at Lot 2:

- Five hand augered exploratory holes (HA's 01 - 05) on Lot 2 with two additional Scala Penetrometers (SC's 01 - 02);
- Four hand augered exploratory holes (HA's 01 - 04) on Lot 3;
- Four hand augered exploratory holes (HA's 01 - 04) on Lot 14.

The testing for each lot is indicated within Figures 4 (Lot 2), 5 (Lot 3) and 6 (Lot 14) below:

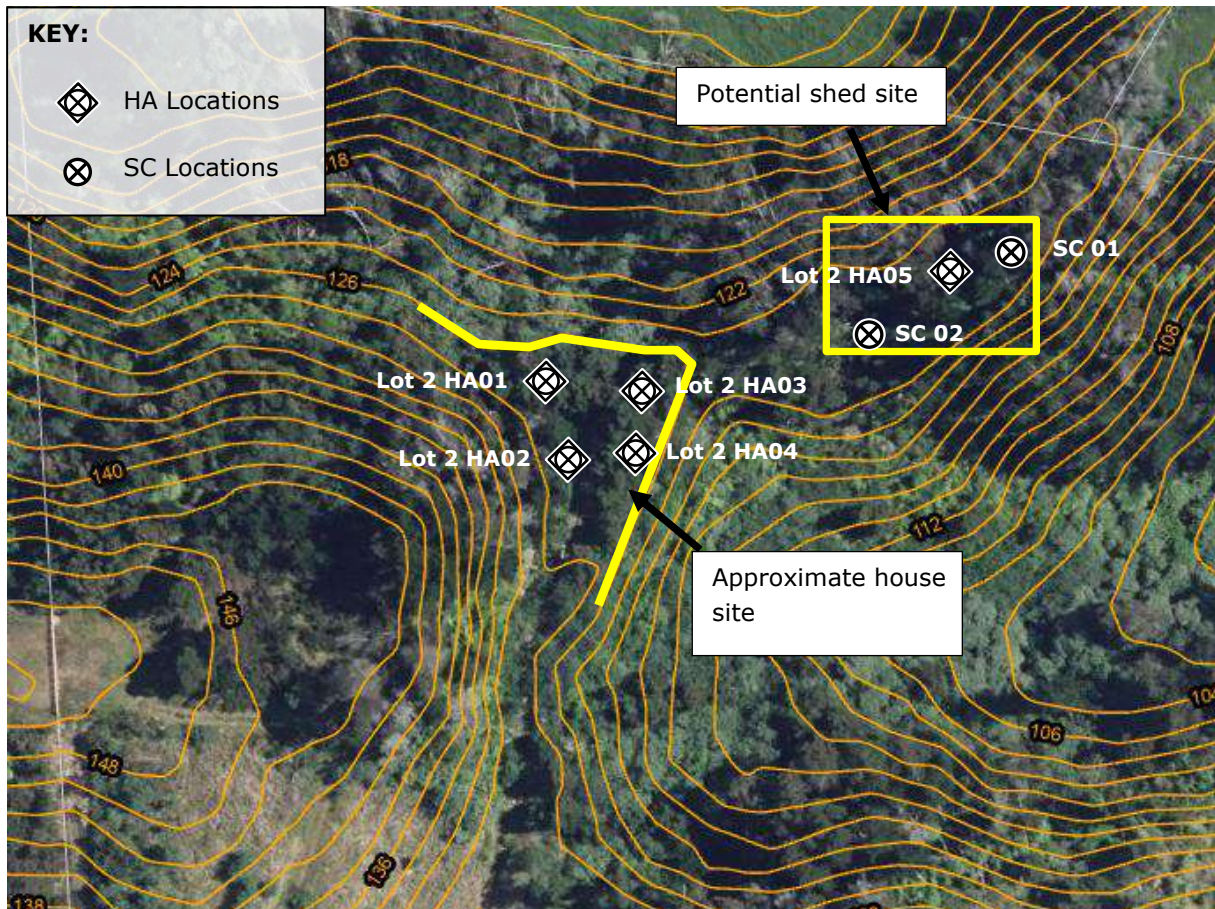


Figure 4: Intrusive Investigation Approximate Locations for Lot 2

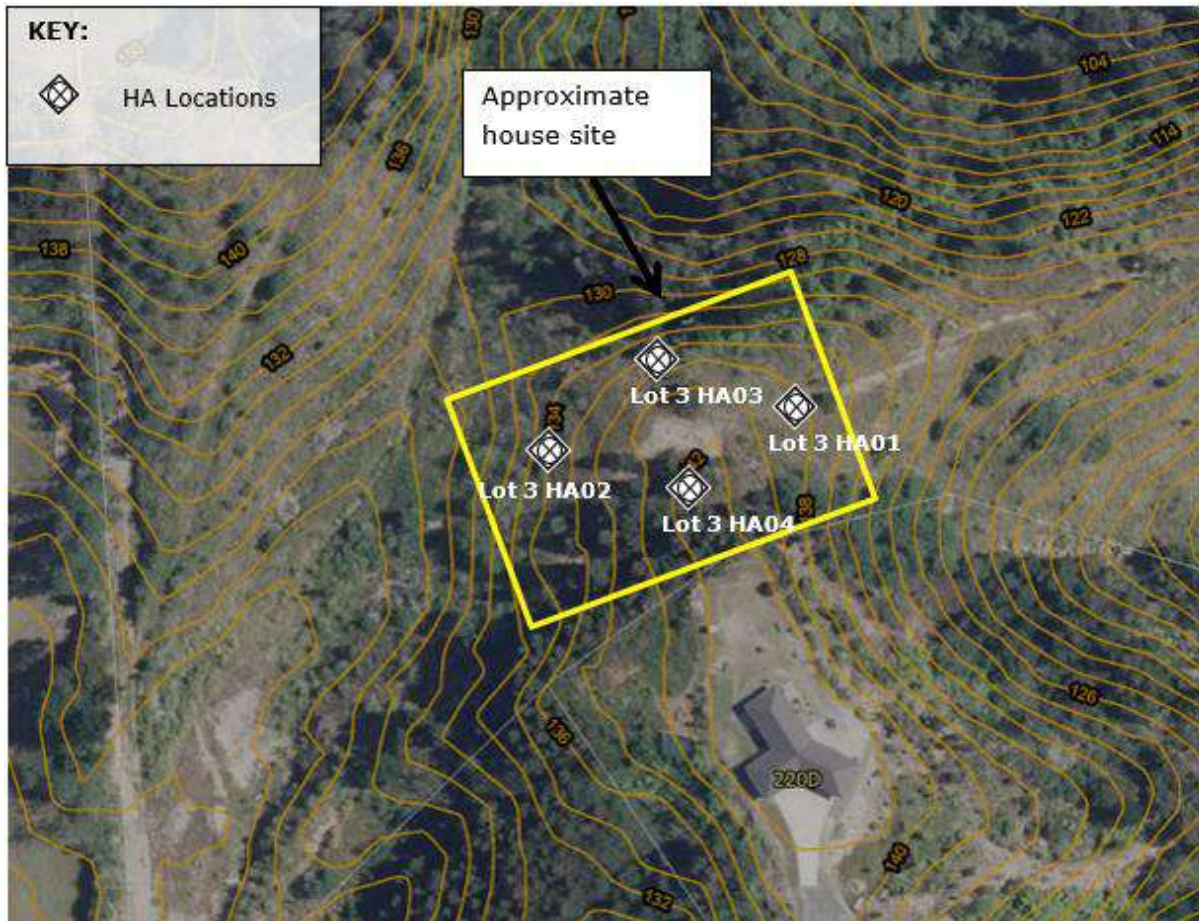


Figure 5: Intrusive Investigation Approximate Locations for Lot 3

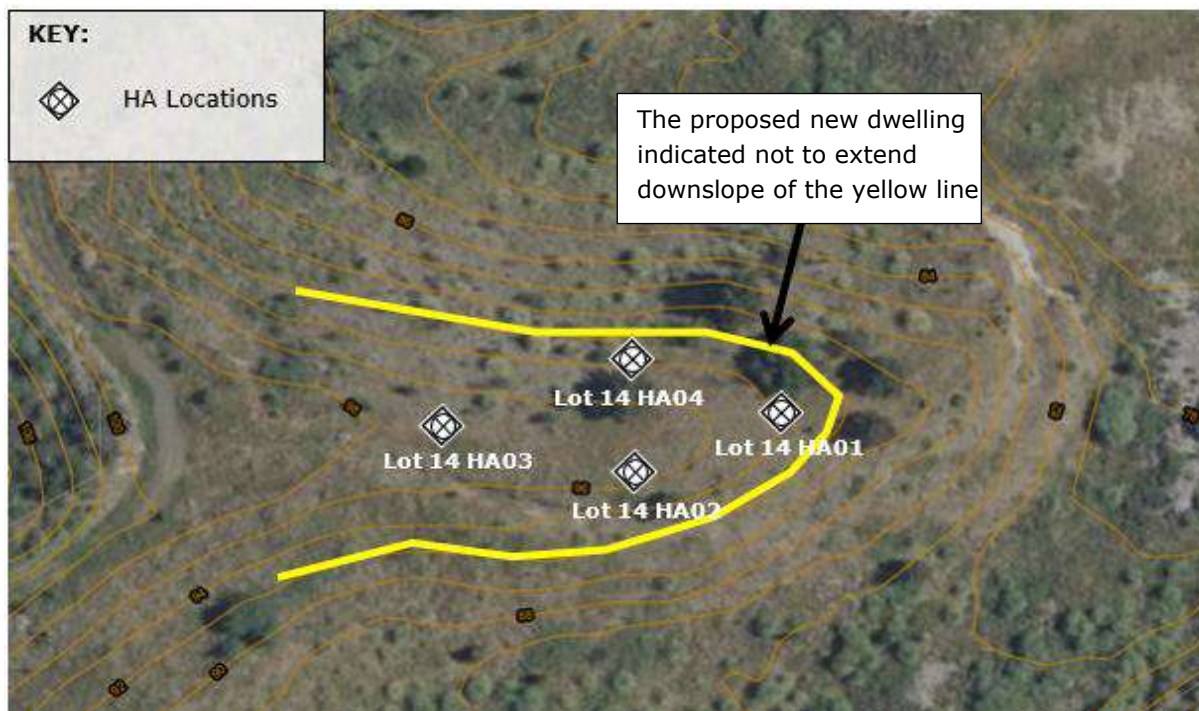


Figure 6: Intrusive Investigation Approximate Locations for Lot 14 (This photo was taken prior to any earthworks)

5.3 Intrusive Investigation Results

5.3.1 Lot 2

Table 2, below, indicates the following approximate soil section across Lot 2, and the Ground Condition Summary for Lot 2 is indicated within Table 3:

Test Ref.	Depth Reached – Reason for Termination
Lot 2 HA01	3.0m – Target Depth Achieved – Extended to 4.9m begl with Scala penetrometer tests
Lot 2 HA02	2.9m – Poor Sample Return
Lot 2 HA03	3.0m – Target Depth Achieved – Extended to 4.9m begl with Scala penetrometer tests
Lot 2 HA04	3.0m – Target Depth Achieved – Extended to 3.9m begl with Scala penetrometer tests
Lot 2 HA05	3.0m – Target Depth Achieved – Extended to 3.9m begl with Scala penetrometer tests

Table 2: Shallow Hand Testing Summary for Lot 2

General Depth Range (m)	Generalised Ground Description	Density/ Consistency
Surface to 0.2m	Topsoil – Dark brown, trace organics, fine to medium sand	Very loose
0.2m to 3.0m	Sand – Fine to medium, pumiceous with occasional lenses of sandy silt / silty sand	Medium dense to dense

Table 3: Ground Condition Summary for Lot 2

5.3.2 Lot 3

Table 4, below, indicates the following approximate soil section across Lot 3, and the Ground Condition Summary for Lot 3 is indicated within Table 5:

Test Ref.	Depth Reached – Reason for Termination
Lot 3 HA01	3.0m – Target Depth Achieved – Extended to 4.9m begl with Scala penetrometer tests
Lot 3 HA02	3.0m – Target Depth Achieved – Extended to 4.9m begl with Scala penetrometer tests
Lot 3 HA03	3.0m – Target Depth Achieved – Extended to 4.9m begl with Scala penetrometer tests
Lot 3 HA04	3.0m – Target Depth Achieved – Extended to 4.9m begl with Scala penetrometer tests

Table 4: Shallow Hand Testing Summary for Lot 3

General Depth Range (m)	Generalised Ground Description	Density/ Consistency
Surface to 0.2m	Topsoil – Dark brown, trace organics, fine to medium sand	Very loose
0.2m to 3.0m	Sand – Fine to medium, pumiceous	Medium dense to dense

Table 5: Ground Condition Summary for Lot 3

5.3.1 Lot 14

Table 6, below, indicates the following approximate soil section across Lot 14, and the Ground Condition Summary for Lot 14 is indicated within Table 7:

Test Ref.	Depth Reached – Reason for Termination
Lot 14 HA01	3.0m – Target Depth Achieved
Lot 14 HA02	2.0m – Too dense to auger – Extended to 2.45m begl with Scala penetrometer tests
Lot 14 HA03	1.8m – Unable to penetrate – Extended to 2.35m begl with Scala penetrometer tests
Lot 14 HA04	2.8m – unable to Penetrate – Extended to 3.3m begl with Scala penetrometer tests

Table 6: Shallow Hand Testing Summary for Lot 14

General Depth Range (m)	Generalised Ground Description	Density/ Consistency
Surface to 0.2m	Topsoil – Dark brown, trace organics, fine to medium sand	Very loose
0.2m to 1.8/3.0m	Sand – Fine to medium, pumiceous	Medium dense to dense

Table 7: Ground Condition Summary for Lot 14

5.3.2 Indicative Bearing Capacity

The Scala Penetrometer results from the pre-construction geotechnical testing for Lots 2, 3 and 14 have been assessed using the correlation described within the MBIE Guidance Document (3.4.1), and the results indicate that a geotechnical ultimate bearing capacity (UBC) of 300kPa can generally be achieved in the natural, inorganic sand from 200mm begl for all the Lots. However, the Scala Penetrometer results for the potential shed site for Lot 2 only achieved a geotechnical UBC of 200kPa.

We note that the Scala Penetrometer testing may underestimate the true UBC of the pumice sand due to the crushing of the sand particles, (Okana 2003) and that the actual UBC of the sand may be higher.

5.4 Proposed Additional Works

It is recommended that a site-specific geotechnical investigation is undertaken on each proposed lot once development plans are known in order to enable building consent and support foundation design.

5.5 Seismic Hazard

The BoPRC 'Liquefaction Vulnerability Assessment for Bay of Plenty Regional' indicates the site is within an area of 'Undetermined' liquefaction.

In accordance with the 'Planning and engineering guidance for potentially liquefaction-prone land' (MBIE/MfE, 2017), we have undertaken a risk-based liquefaction risk assessment.

Based on the desk-based information, shallow intrusive investigation, and area wide Liquefaction assessment, we make the following assessment of the site using Table 3.7 of the MBIE/MfE Guidance:

- The site falls within the 'Rural-residential setting' category;
- Ground damage is expected to be 'none to minor' under SLS conditions (25-year return period earthquake);
- Ground damage is expected to be 'minor to none' under ULS conditions (500-year return period earthquake);
- It is acknowledged in the MBIE Guidance that there are acceptable levels of residual uncertainty in this assessment.

In this case the liquefaction vulnerability category is considered to be 'Very low' - "There is a probability of more than 99 percent, that liquefaction-induced ground damage will be: Minor to none for a 500-year shaking.

Based on this and the MBIE Foundation Technical Category criteria we recommend a TC1 foundation system (Ministry of Business, Innovation and Employment, 2015).

5.6 Slope stability – General

Based on our site visits, exploratory holes and the topographic plans provided, EDC has undertaken slope stability assessments of the slopes surrounding the proposed building platforms, based on data from the soils investigation undertaken as part of this ground completion report.

The Model Inputs are indicated on the relevant Analyses Outputs, included within Appendix E of this report, and are summarised in the Lot-Specific comments within Section 5 below. The Lot Specific comments indicate a Building Restriction Line ('BRL', defined as the slope crest, downslope of which no development should occur), and Building Restriction Line ('BLL', defined as the edge of a zone which is the closest that a building should be located towards a slope or significant feature without additional slope stabilisation measures).

Should construction be intended within the 'setback zone' between the BLL and BRL, our assessments indicate stabilisation measures (i.e. in-ground retaining wall) will be required.

5.6.1 Analysis Scenarios

Static/normal, Worst credible groundwater and Ultimate Limit State (ULS) seismic scenarios have been analysed for the relevant slopes adjacent to indicated building platforms for each Lot. The ULS scenario analyses are undertaken for the purpose of assessing future ground performance under 'design' earthquake loadings.

Peak Ground Accelerations (PGA) for the purpose of pseudo-static analyses have been quantified using Table A1 from the MBIE 'Earthquake Geotechnical Engineering Practice'.

Undrained parameters have been used in the seismic assessments, which assumes that soils are not free draining. Since liquefaction is not anticipated, residual soil strengths have not been used.

It should be noted that the pseudo static analyses have used horizontal PGA's that are likely to be conservative since the calculation method assumes the PGA as a constant earthquake force acting only in a direction that promotes slope instability. As such reduction coefficients can be used, which reduce the horizontal PGA model input. However, the correct derivation of a pseudo static coefficient is highly complex and not considered warranted for this assessment.

A Factor of Safety (FOS) ≥ 1.5 for static, ≥ 1.3 for Worst credible groundwater and ≥ 1.0 for seismic slope stability analysis is required for a slope to be considered suitable for development. Where failure planes with lower FOS's exist, the soils between the failure plane and surface are potentially at risk of failure.

The following table provides a generalised interpretation of the Factor of Safety (FoS) against instability:

Factor of Safety	Likelihood of Instability	Comments
1.5 and greater	Very Unlikely	A stable slope. In most cases, such a slope will survive moderately severe ground shaking during an earthquake and will accommodate construction on its surface without affecting the state of stability.
1.25 to 1.5	Unlikely	No signs of instability. Surface building loads reduce factors of safety. At the lower end of this category, slopes are sensitive to groundwater rise and earthquake loads. About 50% of slopes in this category are expected to survive moderately severe earthquake loading, the remainder would yield, deform or fail under earthquake loading.
1.1 to 1.25	Likely	Signs of general stability with some indications of instability by tension and creep. Normal small variations in soil strength characteristics have a big effect on the state of stability. This category is sensitive to changing groundwater conditions, external loading and earthquake loading as they all reduce safety and promote instability. Moderately severe shaking is expected to produce an unstable condition. Imposed building loads reduce the state of stability.
1.0 to 1.1	Very Likely	Generally failure or near failure by landslipping. Small changes in ground and water conditions could precipitate ground rupture. Slopes have no tolerance to earthquake loads. Moderately severe shaking would produce instability. Signs of creep movements are likely to be evident.
Less than 1.0	Almost certain	Slope is theoretically unstable and likely to fail. Slopes have no tolerance to earthquake loadings. Signs of creep movements are likely to be evident.

Table 8: Slope Stability Factor of Safety Interpretation

We have included lot specific comments in Section 6 below.

6.0 INDIVIDUAL LOT COMMENTS

Assessment of the individual lots are included within the following sections, and a Lot-Specific summary table is included within Appendix G of this Geotechnical Completion Report.

6.1 Lot 2

Figures 7 to 11 show some photographs of the proposed building platforms for the new dwelling and shed at Lot 2 (taken during our site walkover).

Platform - From EDC's understanding, Lot 2 was an existing platform that had some improvement undertaken over time, including a cut face to the South-west of the building platform that is approximately 4.0m high (cut in the 1970's).

EDC was also informed that the Southern end of the platform was cut by approximately 1.0m as part of recent earthworks, and all the organic material (stumps and roots) was removed from the proposed platform. The resulting cavities were then backfilled and compacted with suitable material obtained from the adjoining ridge North-east of the site. The new material was placed in layers approximately 0.15m thick and levelled by a 13-tonne digger, and compacted with a laden 3 axel truck with a gross weight of approximately 22 tonnes. Layers were progressively checked by a Scala Penetrometer testing to achieve a minimum of 7 blows per 100mm.

Bearing Capacity: > 300kPa UBC (150kPa Dependable) for the proposed house site; however, the potential shed site only has a geotechnical UBC of 200kPa (100kPa Dependable).

Cut Surfaces: It was our observation that the cut surface will generally provide suitable foundation conditions for the erection of standard domestic dwellings complying with the provisions of NZS 3604:1990. The design geotechnical UBC should be limited to 300kPa for limit state design for the proposed new dwelling; a design geotechnical UBC of 200kPa may be used for the proposed new shed.

Recommended foundation depths are a minimum of 400mm below cleared ground level (i.e. with topsoil removed) for traditional pads and strip footings (i.e. spread footings).

Settlement: Unlikely to exceed typically accepted levels for residential development

Surrounding Slopes: The site's surface is gently sloping, with descending slopes to the North and East of the proposed new dwelling location. The slope to the North is roughly 16m high and dips at about 28° North, while the slope to the East is roughly 9m high and dips at about 42° to the East.

The dwelling platform is distinct, with an approximately 4m high slope located to the West of the platform that dips at 42° to the East towards the platform. It is noted that this face has been present for over 50 years and shows no obvious sign of instability.

A narrow access road North-east of Lot 2 leads down to a potential shed site, roughly 3m - 4m lower in elevation than the proposed house site, with a roughly 20m x 30m wide platform covered in grass. An approximately 2.5m high slope is located North of the platform, dipping at 20° onto the shed site. That slope is grassed and appears to be stable.

Slope Stability Assessment: Our Slope Stability Assessment for Lot 2 indicates the BLL (red) and BRL (purple) as per Figure 12, below. No setback was identified for the Northern slope; however, a setback of 6.0m was identified between the BLL and BRL along the Eastern slope.

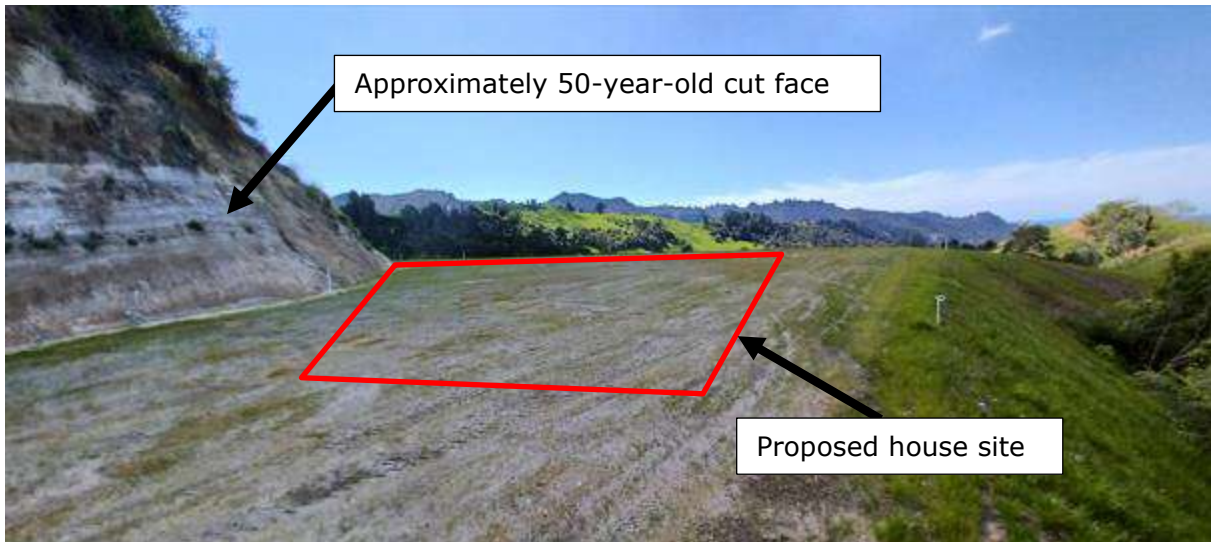


Figure 7: View of the proposed house site.

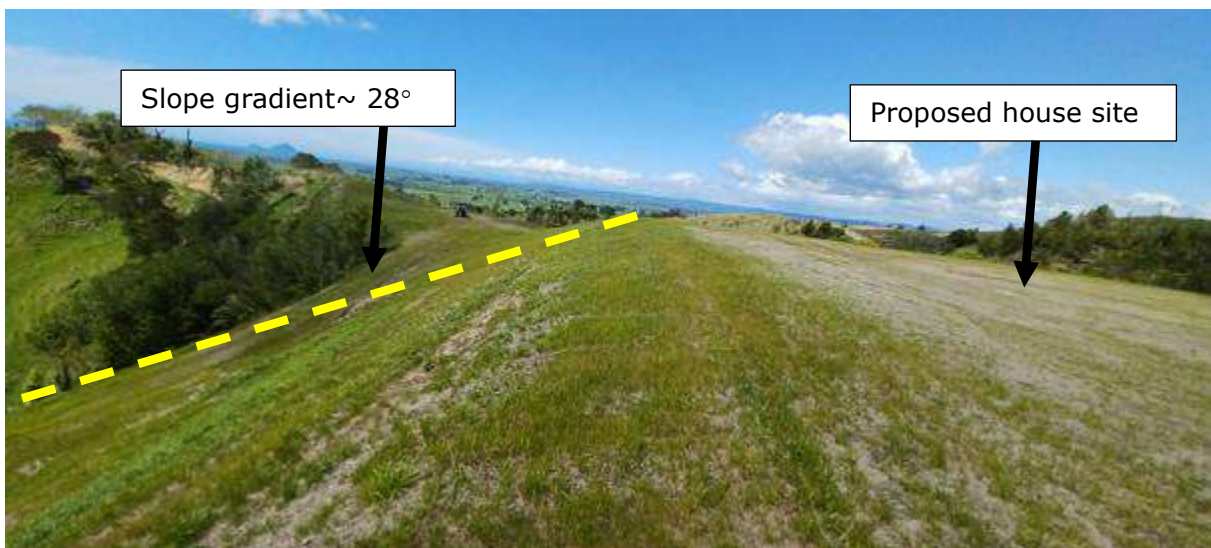


Figure 8: View of the slope to the North of the proposed house site.

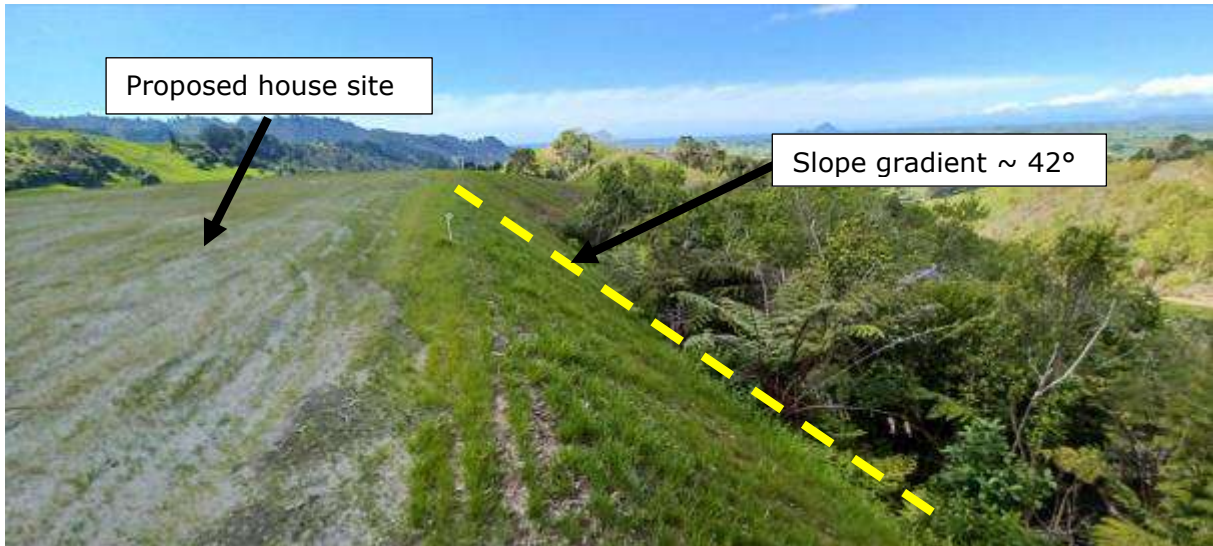


Figure 9: View of the slope to the East of the proposed house site



Figure 10: View of the potential shed site, looking North



Figure 11: View of the potential shed site, looking South

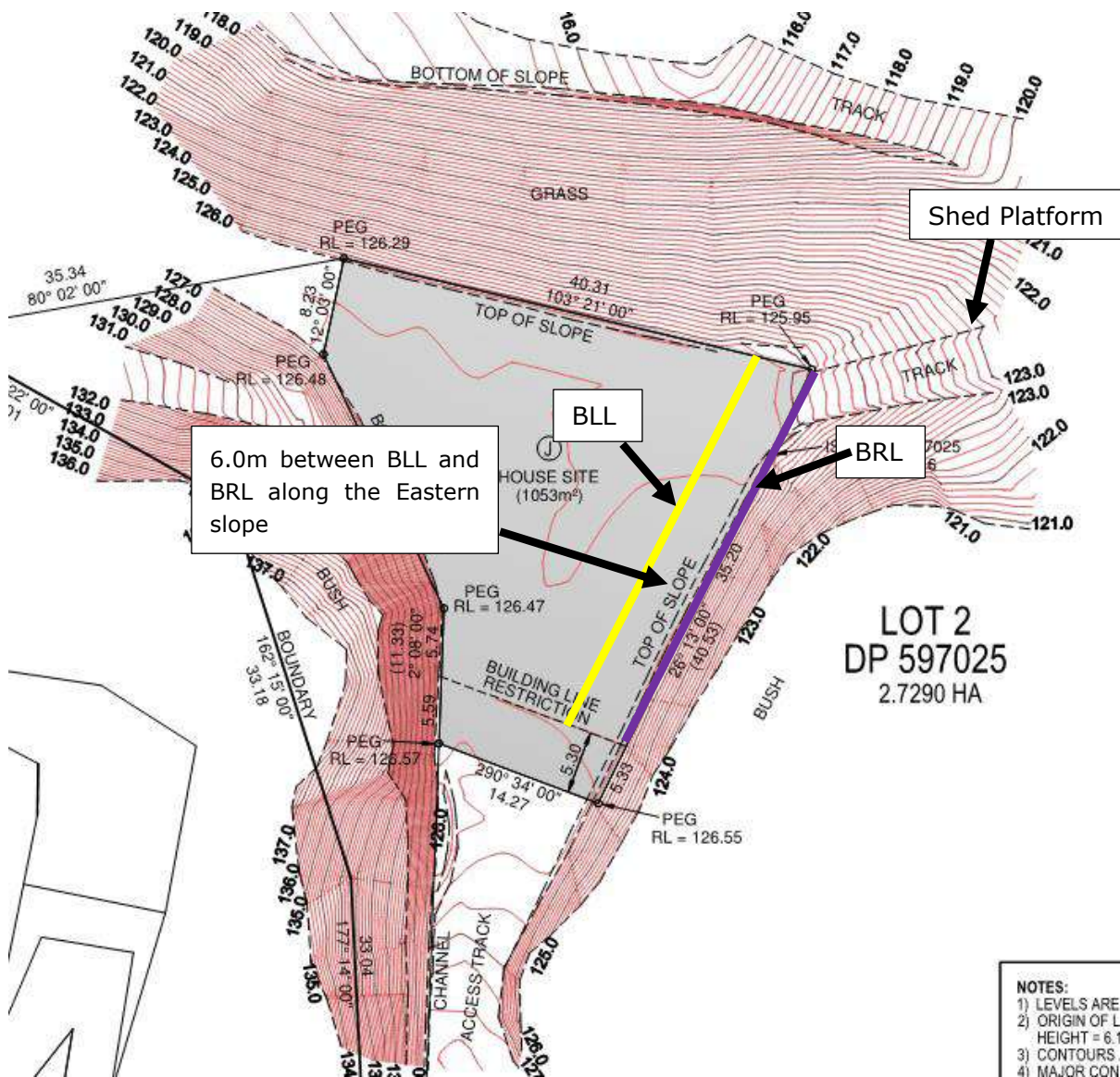


Figure 12: Approximate Building Setbacks for Lot 2

6.2 Lot 3

Figures 13 to 16 show some photographs of the proposed building platform at Lot 3 (taken during our site walkover).

Platform - From EDC’s understanding, Lot 3 was cut lower by approximately 5.5m at the Southern end of the proposed house site, forming a roughly 3.5m high slope with a near vertical 2.0m high free face at the toe of the slope. After the completion of the earthworks, a proposed house site of approximately 40m x 30m had been formed. The surface of the proposed house site is generally flat and covered in grass.

EDC was also informed that approximately 150m² from the central portion of the platform was cut by approximately 1.0m as part of recent earthworks, and all the organic material (stumps and roots) was removed from the proposed platform. The resulting cavities were then backfilled and compacted with suitable material obtained from the adjoining ridge

North-east of the site. The new material was placed in layers approximately 0.15m thick and levelled by a 13-tonne digger, and compacted with a laden 3 axle truck with a gross weight of approximately 22 tonnes. Layers were progressively checked by a Scala Penetrometer testing to achieve a minimum of 7 blows per 100mm.

Bearing Capacity: > 300kPa UBC (150kPa Dependable) for the proposed house site.

Cut Surfaces: The cut surface will generally provide suitable foundation conditions for the erection of standard domestic dwellings complying with the provisions of NZS 3604:1990. The design geotechnical UBC should be limited to 300kPa for limit state design for the proposed new dwelling.

Recommended foundation depths are a minimum of 400mm below cleared ground level (i.e. with topsoil removed) for traditional pads and strip footings (i.e. spread footings).

Settlement: Unlikely to exceed typically accepted levels for residential development

Surrounding Slopes: The proposed house site is bounded by moderately steep slopes to the North, East and West. The slopes are generally $\pm 10.0\text{m}$ high and dip at roughly 25° . The slopes to the East and West are covered in grass and appear stable, as no instability was noticed. The upper section of the slope to the North is covered in grass; however, the lower section of the slope is densely vegetated with trees and grass.

Slope Stability Assessment: Our Slope Stability Assessment for Lot 3 indicates the BLL (red) and BRL (purple) as per Figure 17, below. A setback of 6.0m was identified between the BLL and BRL along the Northern and Western slopes, and a setback of 6.0m was identified between the BLL and BRL along the Eastern slope.



Figure 13: View of the proposed house site for Lot 3, looking East

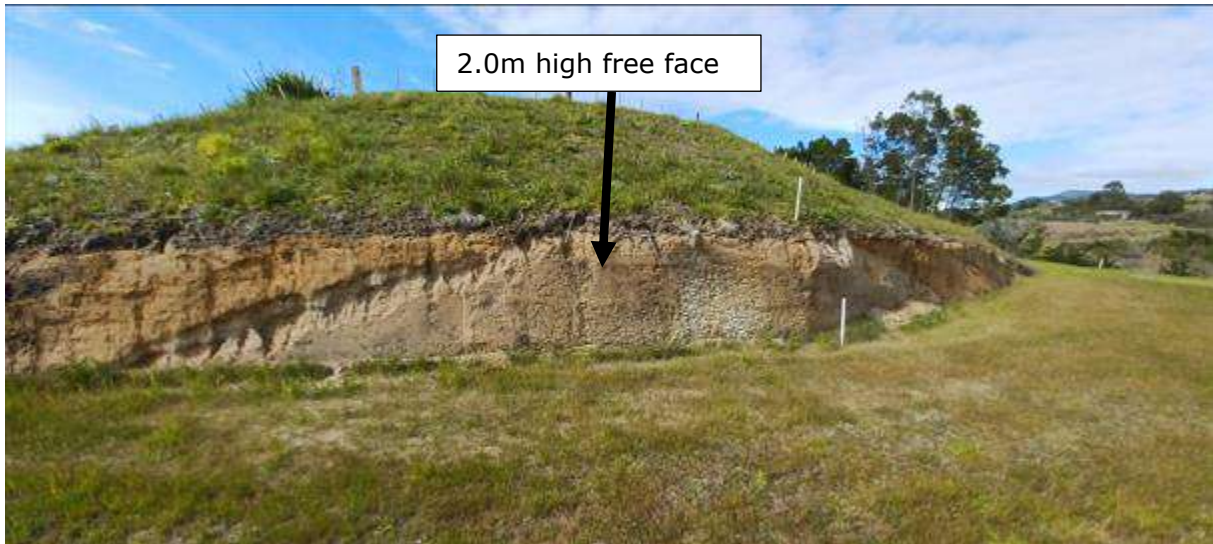


Figure 14: View of the 2.0m free face to the South, Lot 3

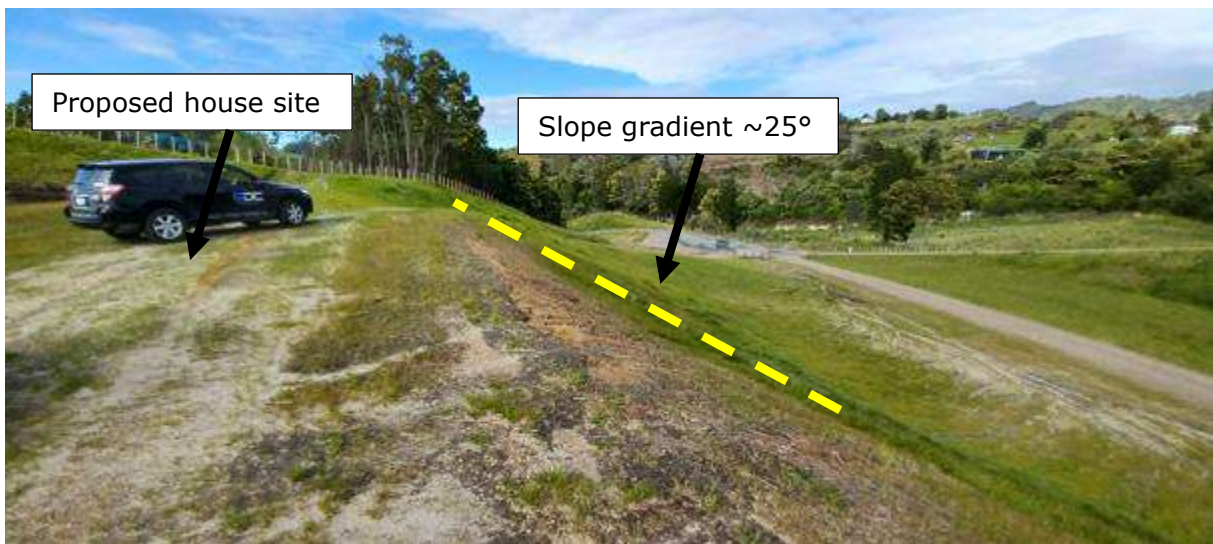


Figure 15: View of the slope to the West of Lot 3 proposed house site

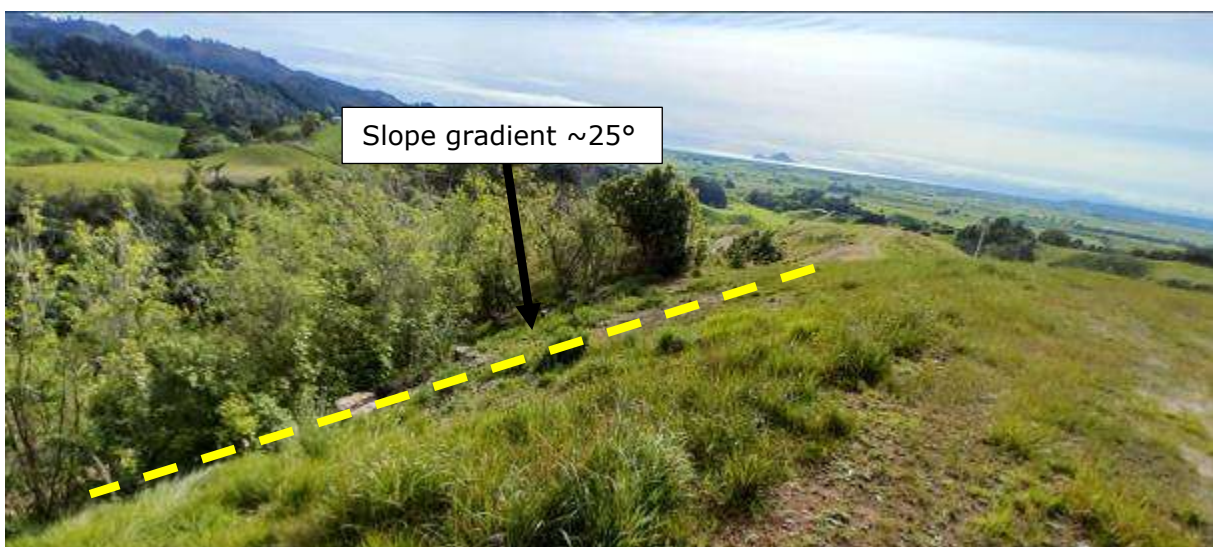


Figure 16: View of the slope to the North of Lot 3 propose house site

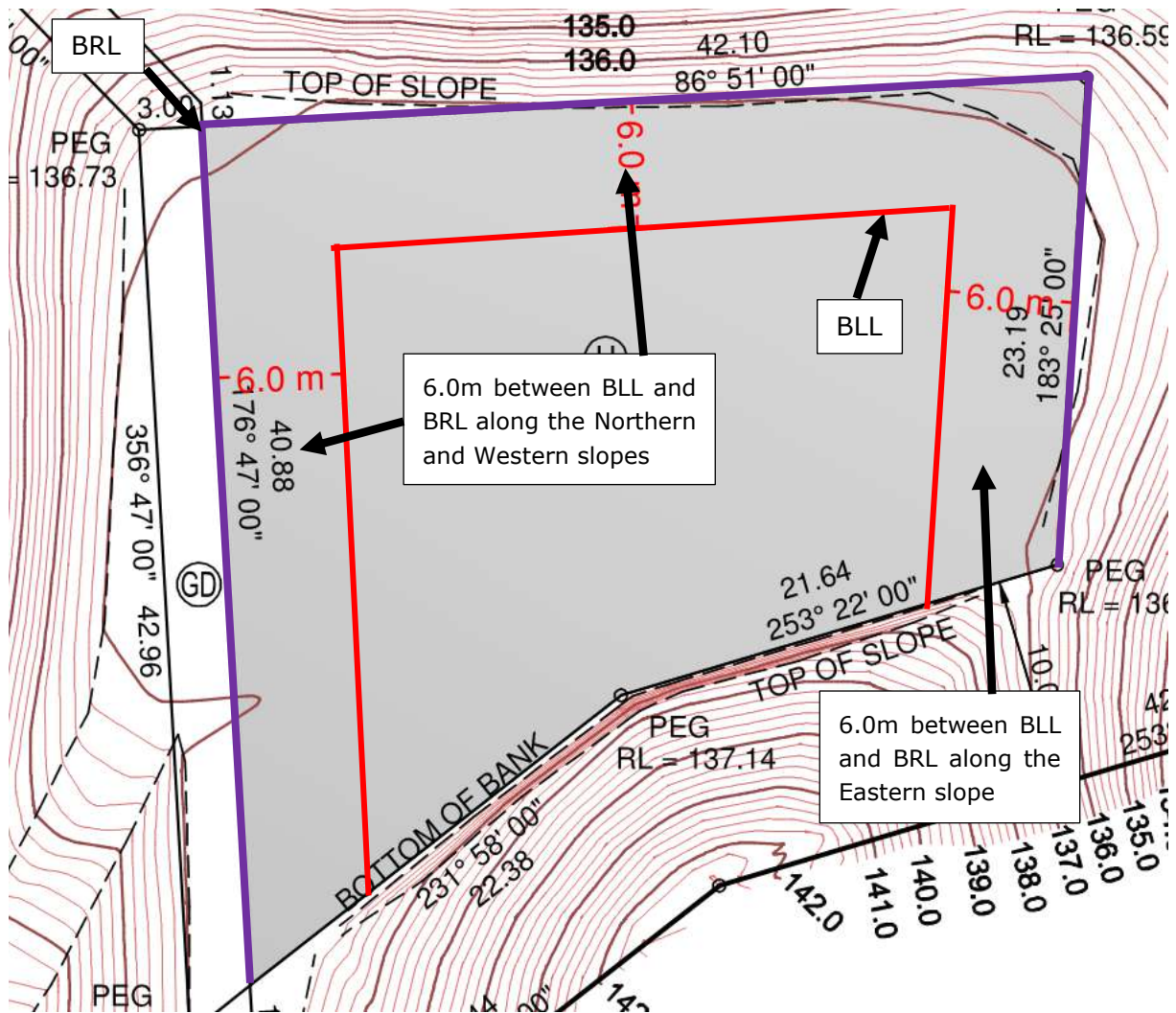


Figure 17: Approximate Building Setbacks for Lot 3

6.3 Lot 14

Figures 18 to 20 show some photographs of the proposed building platform at Lot 3 (taken during our site walkover).

Platform - From EDC's understanding, the proposed house site of Lot 14 was cut lower by approximately 6.8m, which was the highest point on the West of the site. After the completion of the earthworks, a proposed house site of approximately 50m x 40m had been established. The surface of the proposed house site is generally flat and covered in grass.

Bearing Capacity: > 300kPa UBC (150kPa Dependable) for the proposed house site.

Cut Surfaces: The cut surface will generally provide suitable foundation conditions for the erection of standard domestic dwellings complying with the provisions of NZS 3604:1990. The design geotechnical UBC should be limited to 300kPa for limit state design for the proposed new dwelling.

Recommended foundation depths are a minimum of 400mm below cleared ground level (i.e. with topsoil removed) for traditional pads and strip footings (i.e. spread footings).

Settlement: Unlikely to exceed typically accepted levels for residential development

Surrounding Slopes: The surface is generally flat, with descending slopes leading north east and south of the building platform. The slopes are roughly 5m to 13m high and approximately dip at 25° to 30°. To the West of the proposed house site is a 9.0m high slope that dips at roughly 30° (towards the building platform). That slope is grassed and no instability was observed.

Slope Stability Assessment: Our Slope Stability Assessment for Lot 14 indicates the BLL (red) and BRL (purple) as per Figure 21, below. A setback of 6.0m was identified between the BLL and BRL.



Figure 18: View of the proposed house site, looking East.



Figure 19: View of the (approximately) 9m high slope, located West of the building platform.



Figure 20: View of the driveway located North-west of the building platform.

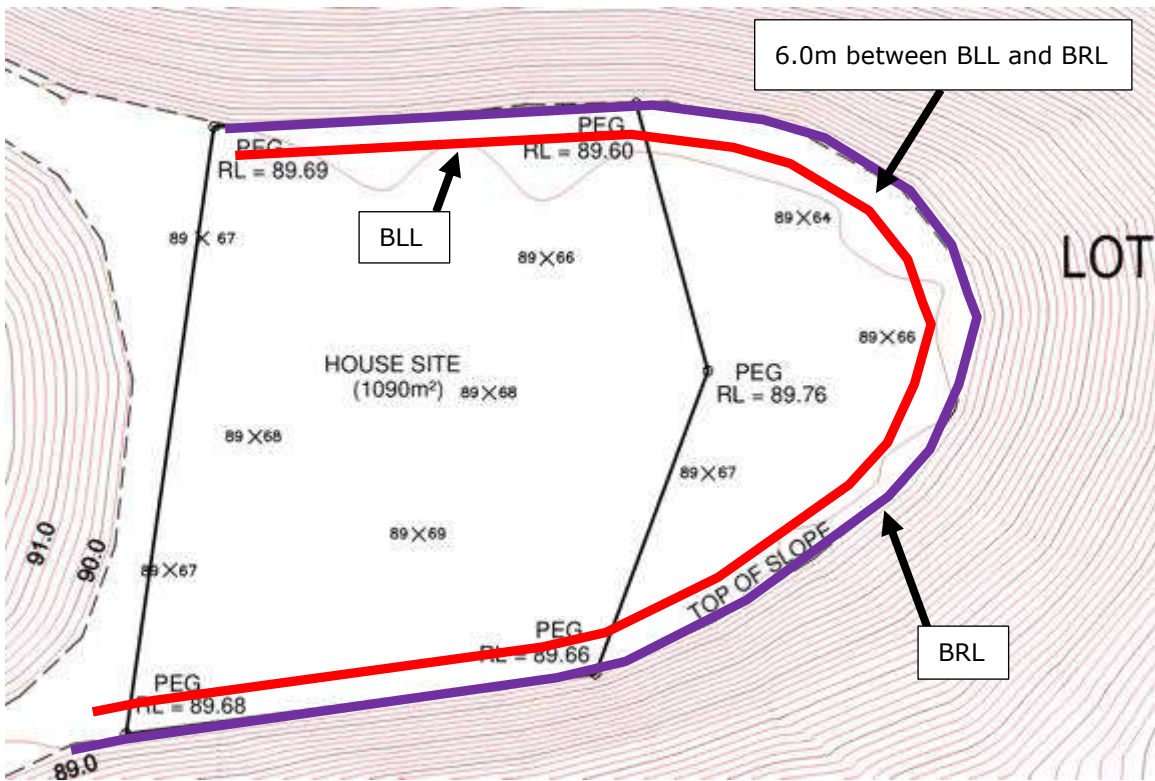


Figure 21: Approximate Building Setbacks for Lot 14 (Not to scale)

7.0 CONCLUSIONS

EDC has been informed by the surveyor for the site that the grade of the shared accessways is less than 1:6. The maximum grade of the access road specifically serving Lots 1, 2, and 3 is a short section at 1:7, while the access road serving Lot 14 has a maximum grade of 1:11. Individual driveways have a maximum grade of approximately 1:5, which is acceptable.

On the basis of the test results and our observation of the construction procedures, we conclude that the earthworks as reported here, are acceptable and have been undertaken in accordance with the requirements of the New Zealand Standards mentioned above.

It is our professional opinion that the excavated and natural areas of these lots have an adequate dependable bearing capacity for the construction of standard residential buildings complying with NZS 3604:2011, provided the new structures do not extend between the identified BLL's and BRL's (as per Figures 12, 17 and 21). Should construction extend within the zones between the BLL's and BRL's, further slope stabilisation measures will be required, and additional geotechnical testing will be necessary.

We do not expect the sites to be at risk of liquefaction if subjected to a 'design' level earthquake.

This certification does not remove the necessity for the normal inspection and design of foundations as would be made under normal circumstances in accordance with the relevant New Zealand Codes.

The following recommendations are made:

1. If building within the BLL's, then foundations designed in accordance with NZS3604 will be adequate. If however, foundation loads exceed those specified in NZS3604 or construction extends into the zone between the BRL and the BLL, then specific design will be required and will include further geotechnical investigation.
2. If building foundation pressures exceed the values given above, the foundation system should be re-appraised relative to the specific sub-surface conditions at the particular building location;
3. Conventional shallow pad and strip footings for all proposed buildings should be founded at a minimum depth of 400mm below prepared platform levels;
4. At the time of construction, the Building Platform surfaces must be checked for non-engineered fill or soft spots. Any such spots should be removed and replaced with engineered fill. Subsequently, the slab (including any sub-base) can then be constructed on-grade.

The professional opinion expressed in this report is furnished to Whakatane District Council and for their purposes only, on the express condition that it is not to be relied upon by any other person and on the understanding that where heavy unusual constructions are proposed, then the buildings sites of concern will be specifically appraised by a Chartered Professional Engineer.

APPENDIX A

STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

Development: Lots 2, 3 and 14

Developer: Pukeko Estates

Location: 220 Wither Road, Manawahe

I **Gareth Brendon Williams**

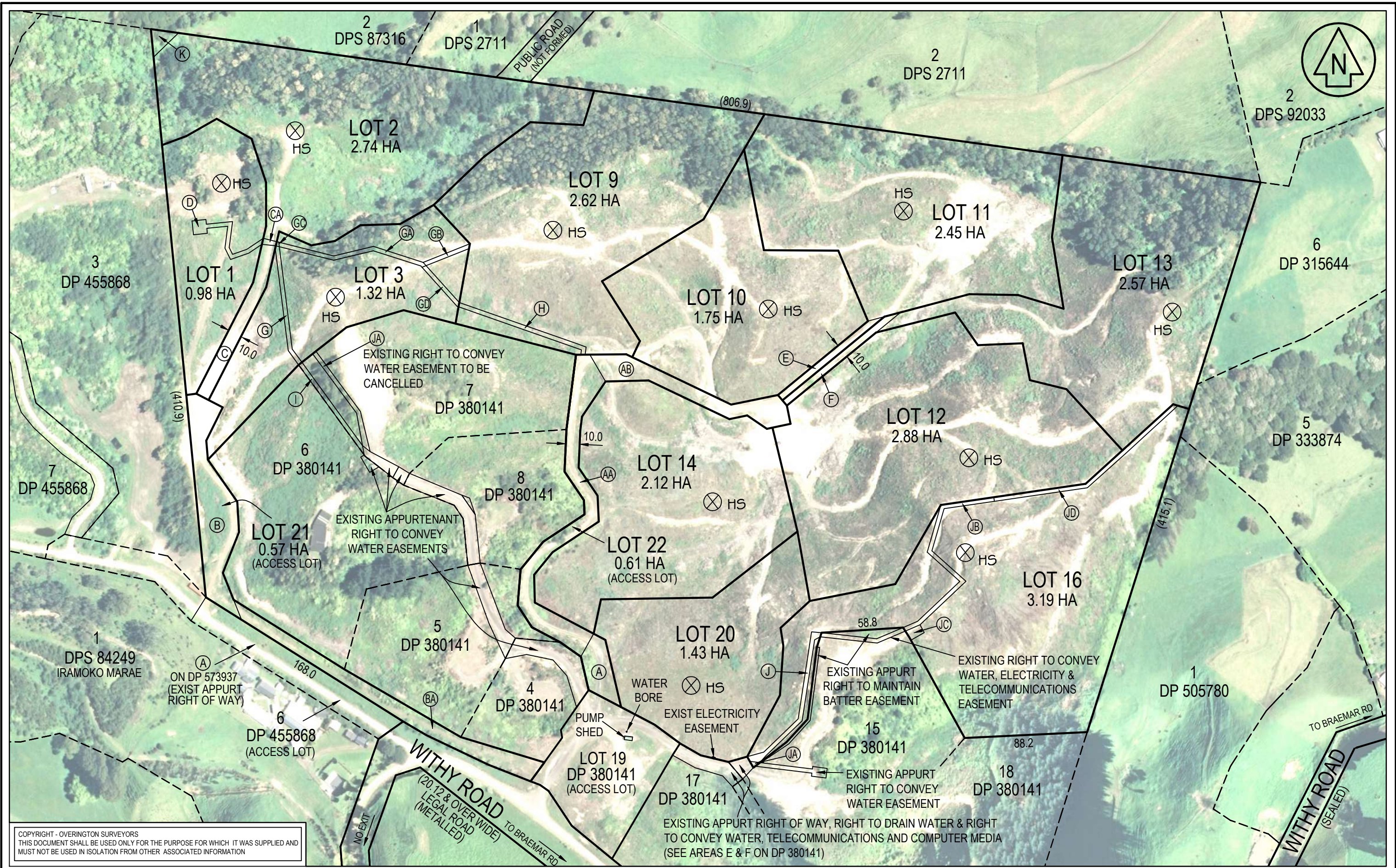
of Engineering Design Consultants Ltd

PO Box 855 Whakatane 3120 hereby confirm:

1. I am a geotechnical professional as defined in clause 1.2.2 of NZS 4402:2010 and was retained by the developer as the geotechnical professional on the above Development.
2. Manktelow Consulting Engineers Ltd undertook a Geotechnical Investigation in 2004 and the conclusions and recommendations of that document have been re-evaluated in the preparation of this report. The results of all tests and/or re-evaluations carried out are as described in my geotechnical completion report dated 10/12/2024.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
 - a. The natural cut ground shown on the attached plan (ref 51008), has a geotechnical Ultimate Bearing Capacity of 300kPa;
 - b. Subject to 3a of this opinion, the original ground is suitable for the erection of buildings designed in accordance with NZS3604 provided that:
 - i. Site specific confirmation is undertaken at time of foundation construction;
 - ii. In addition specific slope stability analysis must be undertaken if any building is proposed between the Building Limitation and the Building Restriction Lines;
 - c. The original ground not affected by filling and the filled ground is unlikely to be subject to erosion, subsidence or slippage in accordance with the provisions of section 106 of the Resource Management Act 1991 provided that:
4. This professional opinion is furnished to the TA and the developer for their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any building.

APPENDIX B

SUBDIVISION SCHEME PLAN



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PREPARED FOR:
 PUKEKO ESTATES (2021) LIMITED
 220 WITHER ROAD
 AWAKAPONGA
 WHAKATANE

PROPOSED LOTS 1 - 3, 9 - 14, 16, & 20 - 22 BEING SUBDIVISION OF LOT 100 DP 380141

COMPRISED IN RT 321308

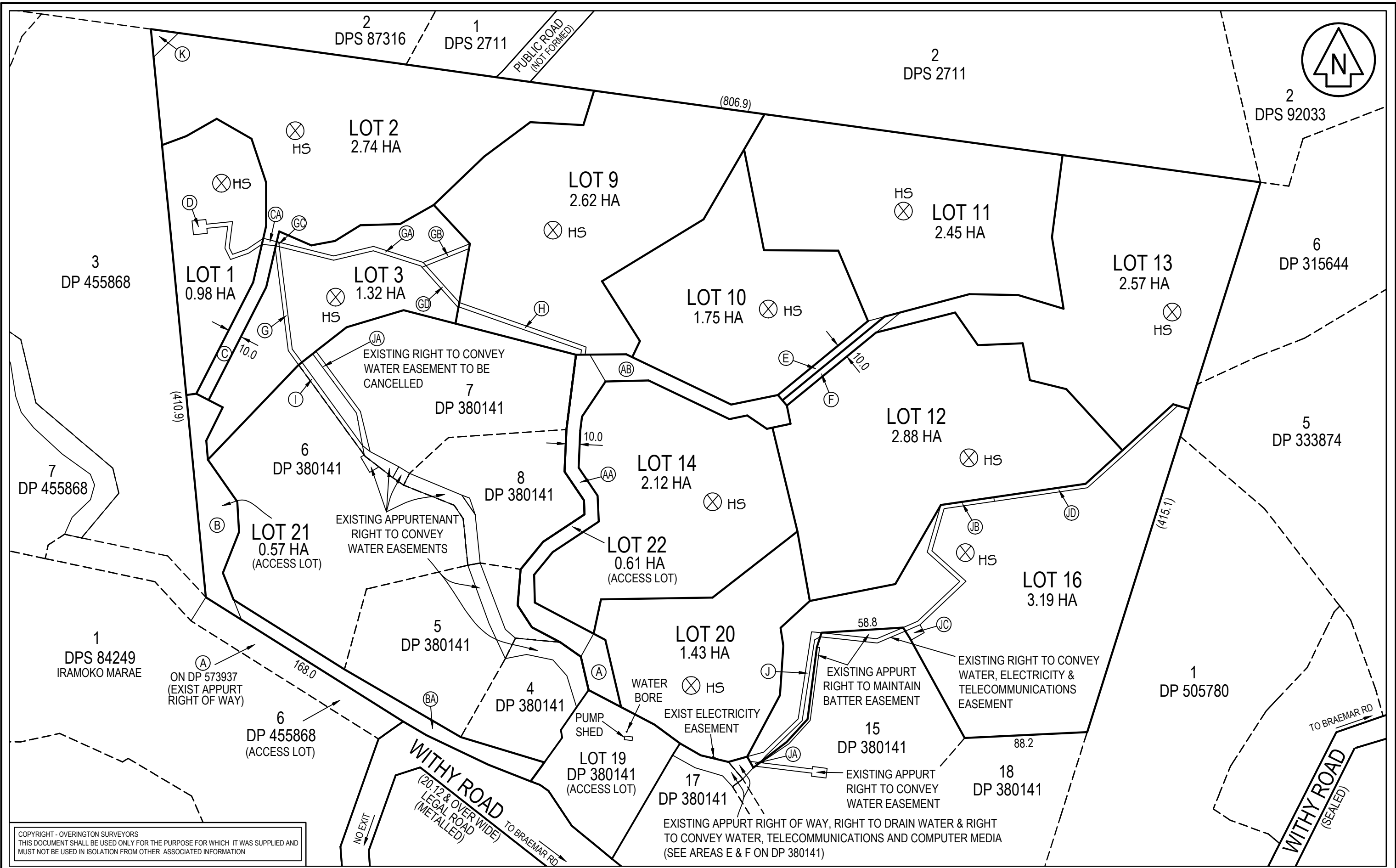
WHAKATANE DISTRICT

DATE	APRIL 2022	
SCALES	1 : 2500 (A3)	
No.	Date	Revision

OVERINGTON SURVEYORS
 Phone: 0274 904203 Email: ross.overington@overington.co.nz

DESIGNED	RJO	SURVEYED
DRAWN	BAO & CGO	

DRAWING No.
4106/1
 Sheet 1 of 3
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DESIGNED	RJO	SURVEYED
DRAWN	BAO & CGO	

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PROPOSED EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	BENEFITED LAND
RIGHT OF WAY & RIGHT TO DRAIN WATER, RIGHTS TO CONVEY WATER, ELECTRICITY & TELECOMMUNICATIONS	(A) (AA) (AB)	LOT 22	LOTS 9 - 14
	(B)	LOT 21	LOTS 1 - 3
	(E)	LOT 11	LOT 13
	(F)	LOT 13	LOT 11
RIGHT OF WAY	(A)	LOT 22	LOT 20
	(A) (AA)	LOT 22	LOT 7 DP 380141
RIGHT TO CONVEY WATER	(C) (CA)	LOT 2	LOTS 1, 3, 9 - 11 & 14
	(D)	LOT 1	LOTS 2, 3, 9 - 11 & 14
	(G) (GC)	LOT 3	LOTS 1, 2, 9 - 11 & 14
	(I)	LOT 7 DP 380141	LOTS 1 - 3, 9 - 11 & 14
	(GA)	LOT 3	LOTS 9 - 11 & 14
	(GD)	LOT 3	LOTS 10, 11 & 14
	(GB)	LOT 3	LOT 9
	(JC)	LOT 16	LOTS 12 & 13
RIGHT TO CONVEY ELECTRICITY & TELECOMMUNICATIONS	(C) (CA)	LOT 2	LOTS 1 & 3
	(GC) (GA)	LOT 3	LOTS 1 & 2
	(GD)	LOT 3	LOTS 1, 2 & 9
	(GB)	LOT 3	LOT 9
RIGHT TO CONVEY WATER, ELECTRICITY & TELECOMMUNICATIONS	(H)	LOT 9	LOTS 1 - 3
	(J) (JA) (JB)	LOT 16	LOTS 12 & 13
	(JD)	LOT 16	LOT 13

PROPOSED AMALGAMATION CONDITIONS

STAGE ONE

THAT LOT 19 DP 380141 (LEGAL ACCESS) BE HELD AS TO ONE UNDIVIDED FIVE NINETY-NINTH SHARE BY THE OWNER OF LOT 20 HEREON AND AS TO ONE UNDIVIDED FIFTY NINETY-NINTH SHARE BY THE OWNER OF LOT 23 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

STAGE TWO

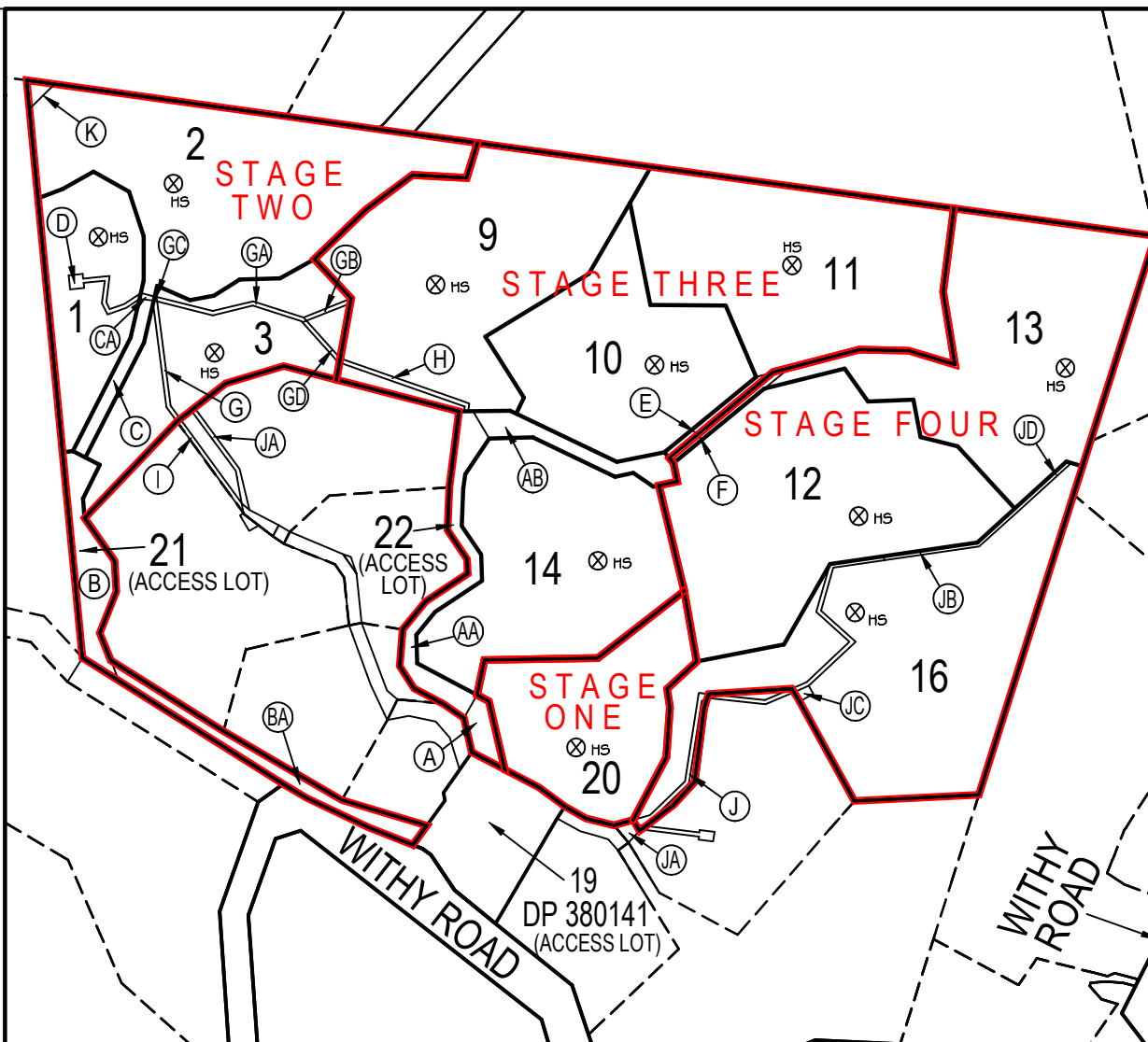
- i) THAT LOT 19 DP 380141 (LEGAL ACCESS) BE HELD AS TO THREE UNDIVIDED FIVE NINETY-NINTH SHARES BY THE OWNERS OF LOTS 1, 2 & 3 HEREON AND AS TO ONE UNDIVIDED THIRTY FIVE NINETY-NINTH SHARE BY THE OWNER OF LOT 24 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.
- ii) THAT LOT 21 HEREON (LEGAL ACCESS) BE HELD AS TO THREE UNDIVIDED ONE THIRD SHARES BY THE OWNERS OF LOTS 1, 2 & 3 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

STAGE THREE

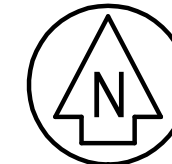
- i) THAT LOT 19 DP 380141 (LEGAL ACCESS) BE HELD AS TO FOUR UNDIVIDED FIVE NINETY-NINTH SHARES BY THE OWNERS OF LOTS 9, 10, 11 & 14 HEREON AND AS TO ONE FIFTEEN NINETY-NINTH SHARE BY THE OWNER OF LOT 25 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.
- ii) THAT LOT 22 HEREON (LEGAL ACCESS) BE HELD AS TO FOUR UNDIVIDED ONE SIXTH SHARES BY THE OWNERS OF LOTS 9, 10, 11 & 14 HEREON AND AS TO ONE UNDIVIDED ONE THIRD SHARE BY THE OWNER OF LOT 25 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

STAGE FOUR

- i) THAT LOT 19 DP 380141 (LEGAL ACCESS) BE HELD AS TO THREE UNDIVIDED FIVE NINETY-NINTH SHARES BY THE OWNERS OF LOTS 12, 13 & 16 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.
- ii) THAT LOT 22 HEREON (LEGAL ACCESS) BE HELD AS TO TWO UNDIVIDED ONE SIXTH SHARES BY THE OWNERS OF LOTS 12 & 13 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.



NOTES



- 1) ⊗ HS - DENOTES PROPOSED HOUSE SITE
- 2) AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY
- 3) TOTAL AREA LOT 100 DP 380141= 25.2350 ha
- 4) ZONING IS RURAL FOOTHILLS
- 5) EXISTING APPURTENANT RIGHT OF WAY, RIGHT TO DRAIN WATER, RIGHTS TO CONVEY WATER, TELECOMMUNICATIONS & COMPUTER MEDIA EASEMENTS OVER LOT 15 & 17 DP 380141 (SHOWN E & F ON DP 380141) ARE TO BE CANCELLED AS TO LOTS 1 - 3, 9 - 11, 14, & 21 - 22)
- 6) EXISTING APPURTENANT RIGHTS TO CONVEY WATER, ELECTRICITY & TELECOMMUNICATIONS EASEMENTS OVER LOT 15 DP 380141 (SHOWN A ON DP 571419) ARE TO BE CANCELLED AS TO LOTS 1 - 3, 9 - 11, 14, & 20 - 22 HEREON
- 7) EXISTING APPURTENANT RIGHTS TO MAINTAIN BATTER EASEMENT OVER LOT 15 DP 380141 (SHOWN L ON DP 380141, AND B ON DP 571419) ARE TO BE CANCELLED AS TO LOTS 1 - 3, 9 - 14 & 20 - 22 HEREON
- 8) EXISTING APPURTENANT RIGHT TO CONVEY WATER EASEMENT OVER LOT 15 DP 380141 (SHOWN C ON DP 571419) IS TO BE CANCELLED AS TO LOTS 1 - 3, 9 - 11, 14, 21 & 22 HEREON
- 9) EXISTING APPURTENANT RIGHT TO CONVEY ELECTRICITY EASEMENT OVER LOT 15 DP 380141 (SHOWN F ON DP 380141) IS TO BE CANCELLED AS TO LOTS 1 - 3, 9 - 11, 14 & 20 - 22 HEREON
- 10) EXISTING APPURTENANT RIGHT OF WAY, RIGHT TO DRAIN WATER, RIGHTS TO CONVEY TELECOMMUNICATIONS & COMPUTER MEDIA EASEMENTS OVER LOT 17 DP 380141 (SHOWN E ON DP 380141) ARE TO BE CANCELLED AS TO LOTS 1 - 3, 9 - 11, 14, & 20 - 22 HEREON
- 11) EXISTING APPURTENANT RIGHT OF WAY EASEMENTS OVER LOTS 15 & 17 DP 380141 (SHOWN E & F ON DP 380141) ARE TO BE CANCELLED AS TO LOTS 12 & 13 HEREON.
- 12) EXISTING APPURTENANT RIGHT OF WAY EASEMENT OVER LOT 6 DP 455848 (SHOWN A ON DP 573937) IS TO BE CANCELLED AS TO LOTS 9 - 14, 16, & 20 - 22 HEREON.
- 13) EXISTING RIGHT TO CONVEY WATER EASEMENT OVER LOT 7 DP 380141 (SHOWN JA HEREON) IS TO BE CANCELLED
- 14) STAGING:
STAGE ONE = LOT 20 PLUS BALANCE (= LOT 23)
STAGE TWO = LOTS 1 - 3 & 21 PLUS BALANCE (= LOT 24)
STAGE THREE = LOTS 9 - 11, 14 & 22 PLUS BALANCE (= LOT 25)
STAGE FOUR = LOTS 12, 13 & 16
- 15) ADDITIONAL EASEMENTS WILL BE PROVIDED WHERE SERVICES CROSS ONE LOT TO ANOTHER
- 16) AREAS SHOWN BA & K REFER TO A PROPOSED VEGETATION PROTECTION COVENANT

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AWAKAPONGA
WHAKATANE

**PROPOSED LOTS 1 - 3, 9 - 14, 16, & 20 - 22
BEING SUBDIVISION OF LOT 100 DP 380141**

COMPRISED IN RT 321308

WHAKATANE DISTRICT

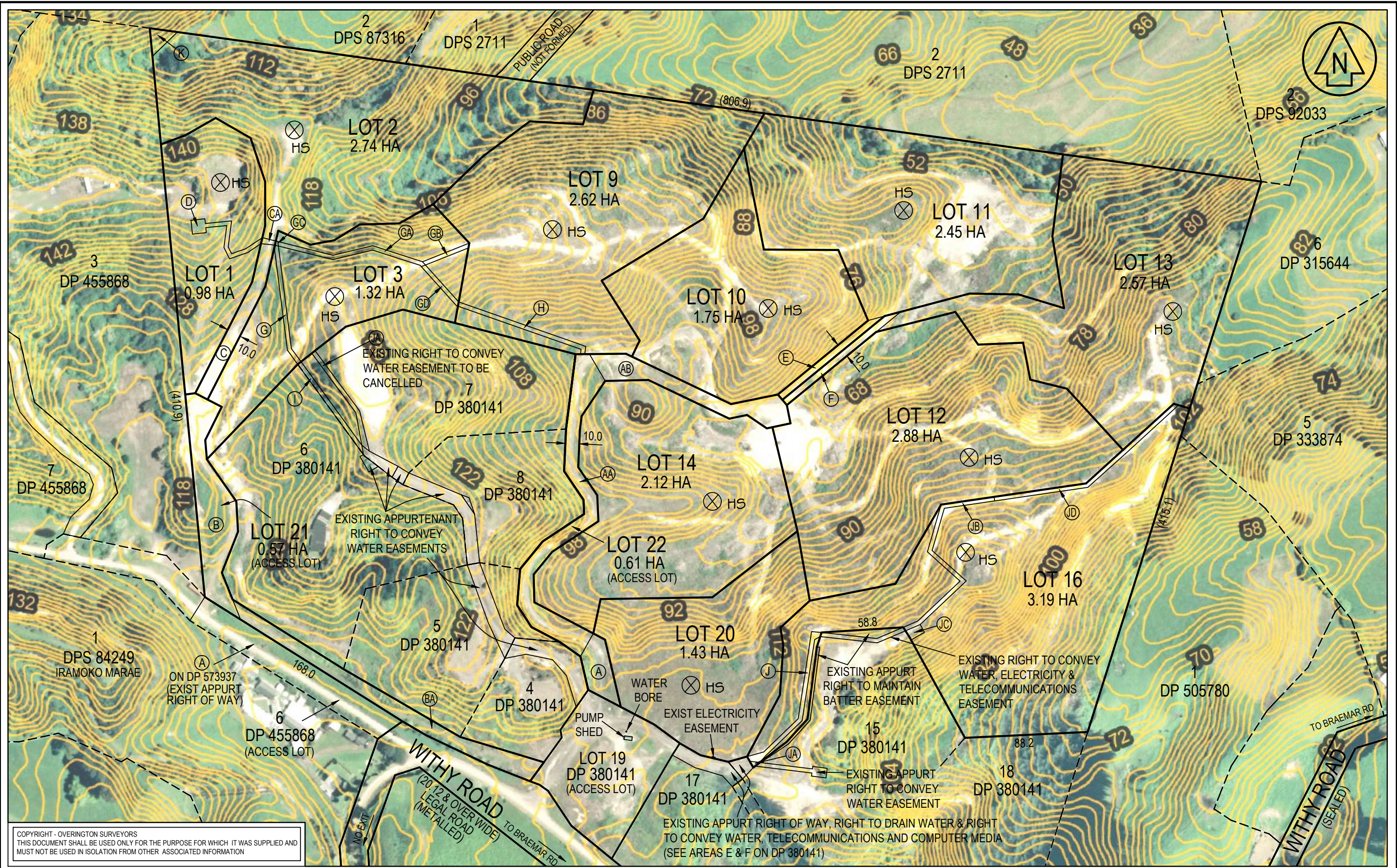
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DRAWN	BAO & CGO		& CGO

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APPENDIX C

HAND AUGER LOGS



DRILLED: 10/10/2024 FILE: 51008

HOLE REF:

Lot 2 HA01

SHEET 1 OF 1

PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

LOGGED
JB & TB

PROCESSED
JB & TB

CHECKED
EC

ADDRESS: 220 Withy Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, trace organics, fine to medium sand, moist		TS TS			
0.2	Dense, light brown, fine to medium, pumiceous SAND, moist (Hard to Auger)					
0.4						
0.6						
0.8						
1.0	trace, fine to coarse, subrounded pumiceous gravel					
1.2						
1.4	trace silt					
1.6						
1.8						
2.0						
2.2						
2.4	Very stiff, light brown, fine to medium, pumiceous sandy SILT, wet, high plasticity (Hard to Auger)					
2.6	Medium dense, light brown, fine ot medium, pumiceous SAND, trace silt, wet					
2.8						
3.0	End of Borehole (Target Depth Acieved)					
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						

EOH @ 4.90 m

NOTES:

No groundwater was encountered during hand auger drilling

ENGINEERING DESIGN CONSULTANTS LTD

CIVIL, STRUCTURAL, ENVIRONMENTAL, GEOTECHNICAL AND FIRE ENGINEERS

www.edc.co.nz team@edc.co.nz

15B Leslie Hills Drive, Riccarton Christchurch 8011 PH (03) 355 5559

1st Floor, Unit 1 100 Bush Road Albany 0632 Auckland PH (09) 451 9044

Suite 5 Level 1, ASB House 202 The Strand Whakatane 3120 PH (07) 922 0075

Produced With GEROC Core-GS



DRILLED: 10/10/2024 FILE: 51008

HOLE REF:

Lot 2 HA03

PROJECT: Geotechnical Completion Report

SHEET 1 OF 1

CLIENT: Ross Overington

LOGGED

PROCESSED

CHECKED

ADDRESS: 220 Withy Road, Awakaponga

JB & TB

JB & TB

EC

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, trace organics, fine to medium sand, moist		TS TS			
0.2	Dense, yellowish brown, fine to medium, pumiceous SAND, moist (Medium to Auger)					
0.4						
0.6						
0.8	minor, subangular, fine to coarse, pumiceous gravel (Hard to Auger)					
1.0						
1.2	trace silt					
1.4						
1.6						
1.8						
2.0	orangey brown, silt absent					
2.2						
2.4	trace silt					
2.6	minor silt					
2.8						
3.0	End of Borehole (Target Depth Achieved)					
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						

EOH @ 4.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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Suite 5 Level 1, ASB House 202 The Strand Whakatane 3120 PH (07) 922 0075

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DRILLED: 10/10/2024 FILE: 51008

HOLE REF:

Lot 2 HA04

PROJECT: Geotechnical Completion Report

SHEET 1 OF 1

CLIENT: Ross Overington

LOGGED

PROCESSED

CHECKED

ADDRESS: 220 Withy Road, Awakaponga

JB & TB

JB & TB

EC

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.2	TOPSOIL: Very loose, dark brown, trace organics, fine to medium sand, moist		TS			
0.4	Medium dense, yellowish brown, fine to medium, pumiceous SAND, moist (Hard to Auger)					
1.0	trace silt some, fine to coarse, subangular, pumiceous gravel					
2.8	becoming orangey brown					
3.0	some silt					
3.2	End of Borehole (Target Depth Achieved)					
3.8						

EOH @ 3.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

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ADDRESS: 220 Wither Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL					5 0	
0.2	TOPSOIL: Very loose, dark brown, trace organics, fine to medium sand, moist		TS TS			
0.4	Medium dense, light brown, fine to coarse, pumiceous SAND, some, pumiceous gravel (Medium to Auger)					
0.6	trace silt					
0.8	wet					
1.0	Medium dense, light brown, fine, pumiceous GRAVEL, some fine to coarse, pumiceous sand, trace silt, wet (Hard to Auger)		U U U U			
1.2	Dense, light brown, medium to coarse, pumiceous SAND, minor, gravel, moist (Hard to Auger)		U U U U			
1.4						
1.6						
1.8	some gravel					
2.0						
2.2	wet					
2.4						
2.6	Loose, yellowish brown, silty, fine to medium, pumiceous SAND, saturated (Easy to Auger)		X X X X			
2.8						
3.0	End of Borehole (Target Depth Achieved)					
3.2						
3.4						
3.6						
3.8						

EOH @ 3.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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DRILLED: 10/10/2024 FILE: 51008

HOLE REF:

Lot 3 HA01

SHEET 1 OF 1

PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

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EC

ADDRESS: 220 Withy Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, organics, fine to medium, sand, moist					
0.2	Medium dense, yellowish brown, fine to medium, pumiceous SAND, moist (Hard to Auger)					
0.4	some fine to coarse, subangular pumiceous gravel					
0.6	trace silt					
0.8						
1.0						
1.2						
1.4						
1.6						
1.8						
2.0	orangey brown, minor silt, gravels absent					
2.2						
2.4	Very stiff, light brown, SILT, wet, high plasticity					
2.6						
2.8						
3.0	End of Borehole (Target Depth Achieved)					
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						

EOH @ 4.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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CLIENT: Ross Overington

ADDRESS: 220 Withy Road, Awakaponga

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DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, organics, fine to medium, sand, moist					
0.2	Medium dense, yellowish brown, fine to medium, pumiceous SAND, trace silt, moist					
0.4	(Hard to Auger)					
0.6	some, fine to coarse, subangular pumiceous gravel					
1.2	becoming light grey					
1.4	becoming yellowish brown					
2.0	minor silt					
2.4	becoming fine to coarse, trace silt					
2.8	wet					
3.0	End of Borehole (Target Depth Achieved)					
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						

EOH @ 4.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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DRILLED: 10/10/2024 FILE: 51008

HOLE REF:

Lot 3 HA03

SHEET 1 OF 1

PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

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EC

ADDRESS: 220 Worthy Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL					5 0	
0.0	TOPSOIL: Very loose, dark brown, trace organics, fine to medium, sand, moist		TS TS TS TS			
0.2	Medium dense, light brown, fine to medium, pumiceous SAND, trace silt, moist (Medium to Auger)					
0.4	minor silt					
0.6						
0.8						
1.0						
1.2						
1.4	pumiceous gravel lenses					
1.6	some silt, wet					
1.8						
2.0	Very loose, light brown, silty, fine to medium, pumiceous SAND, saturated (Easy to Auger)		x x x x			
2.2			x x x x			
2.4			x x x x			
2.6			x x x x			
2.8			x x x x			
3.0	End of Borehole (Target Depth Achieved)					
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						

EOH @ 4.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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HOLE REF:

Lot 3 HA04

PROJECT: Geotechnical Completion Report

SHEET 1 OF 1

CLIENT: Ross Overington

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ADDRESS: 220 Withy Road, Awakaponga

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DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, organics, fine to medium, sand, moist					
0.2	Medium dense, yellowish brown, fine to medium, pumiceous SAND, trace silt, moist					
0.4	(Hard to Auger)					
0.6	some, fine to coarse, subangular pumiceous gravel,					
1.0	gravel absent					
1.8	minor silt					
2.0	wet					
2.2	light brown					
2.4	some silt					
2.6	saturated					
2.8	minor silt					
3.0	End of Borehole (Target Depth Achieved)					
3.2						
3.4						
3.6						
3.8						
4.0						
4.2						
4.4						
4.6						
4.8						

EOH @ 4.90 m

NOTES:

No groundwater was encountered during hand auger drilling

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DRILLED: 11/10/2024 FILE: 51008

HOLE REF:

Lot 14 HA02

SHEET 1 OF 1

PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

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ADDRESS: 220 Withy Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
	TOPSOIL: Medium dense, dark brown, trace organic, fine to medium, sand, moist		TS TS TS TS			
-0.2	Medium dense, light brown, fine to medium, pumiceous SAND, minor gravel (scoria), moist					
-0.4	wet					
-0.8	trace silt					
-1.6	minor silt					
-1.8	light grey					
-2.0	End of Borehole (Too Dense to Auger - Dense rock / gravel)					
-2.4						

EOH @ 2.45 m

NOTES:

No groundwater was encountered during hand auger drilling.

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DRILLED: 11/10/2024 FILE: 51008

HOLE REF:

Lot 14 HA03

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PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

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ADDRESS: 220 Wothy Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, some organics, fine to medium, sand, moist		TS TS TS TS TS			
0.2	Medium dense, light grey, fine to medium, pumiceous SAND, minor, subangular, gravel (scoria), moist (Hard to Auger)					
0.4						
0.6						
0.8						
1.0						
1.2	some gravel (Very hard to Auger)					
1.4						
1.6	orangey brown, minor silt					
1.8	becomes light greyish yellow					
1.8	End of Borehole (Unable to Penetrate - Possible rock / gravel)					
2.0						
2.2						

EOH @ 2.35 m

NOTES:

No groundwater was encountered during hand auger drilling.

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DRILLED: 11/10/2024 FILE: 51008

HOLE REF:

Lot 14 HA04

SHEET 1 OF 1

PROJECT: Geotechnical Completion Report

CLIENT: Ross Overington

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ADDRESS: 220 Worthy Road, Awakaponga

DEPTH (m)	SOIL DESCRIPTION	Strength/density, colour, structure, minor, MAJOR, plasticity, moisture content, other comments	LEGEND	GROUND WATER	SCALA BLOWS (PER 50 mm)	SOIL SAMPLE
GL						
0.0	TOPSOIL: Very loose, dark brown, some organics, fine to medium, sand, moist					
0.2	Medium dense, yellowish grey, fine to medium, pumiceous SAND, moist (Hard to Auger)					
0.4	some, fine to coarse, gravel (scoria) trace silt					
0.6						
0.8						
1.0						
1.2						
1.4	wet					
1.6						
1.8						
2.0						
2.2	silt absent					
2.4						
2.6	sand becoming fine					
2.8	End of Borehole (Unable to Penetrate - Possible rock / gravel)					
3.0						
3.2						

EOH @ 3.30 m

NOTES:

No groundwater was encountered during hand auger drilling.

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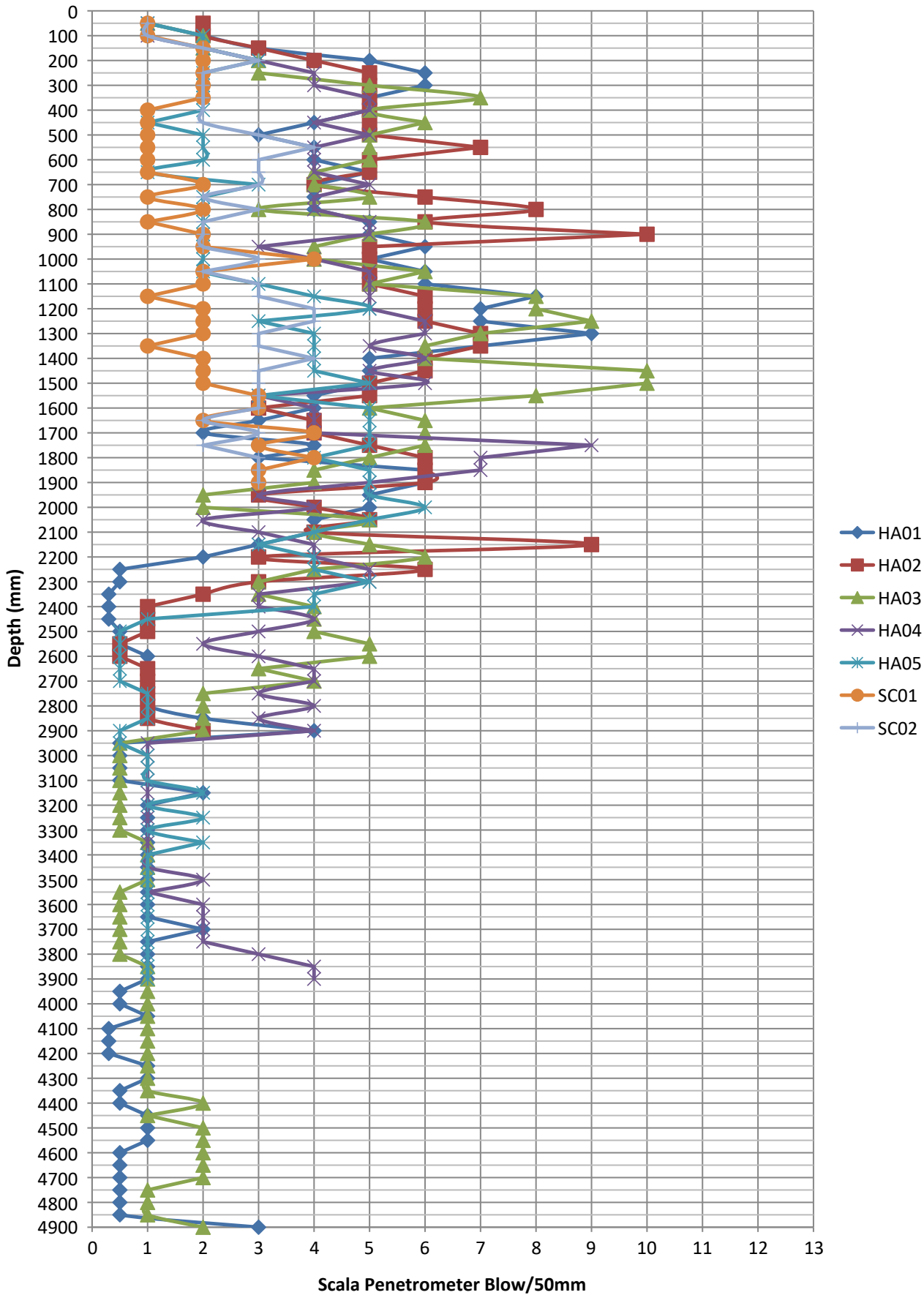
Suite 5 Level 1, ASB House 202 The Strand Whakatane 3120 PH (07) 922 0075

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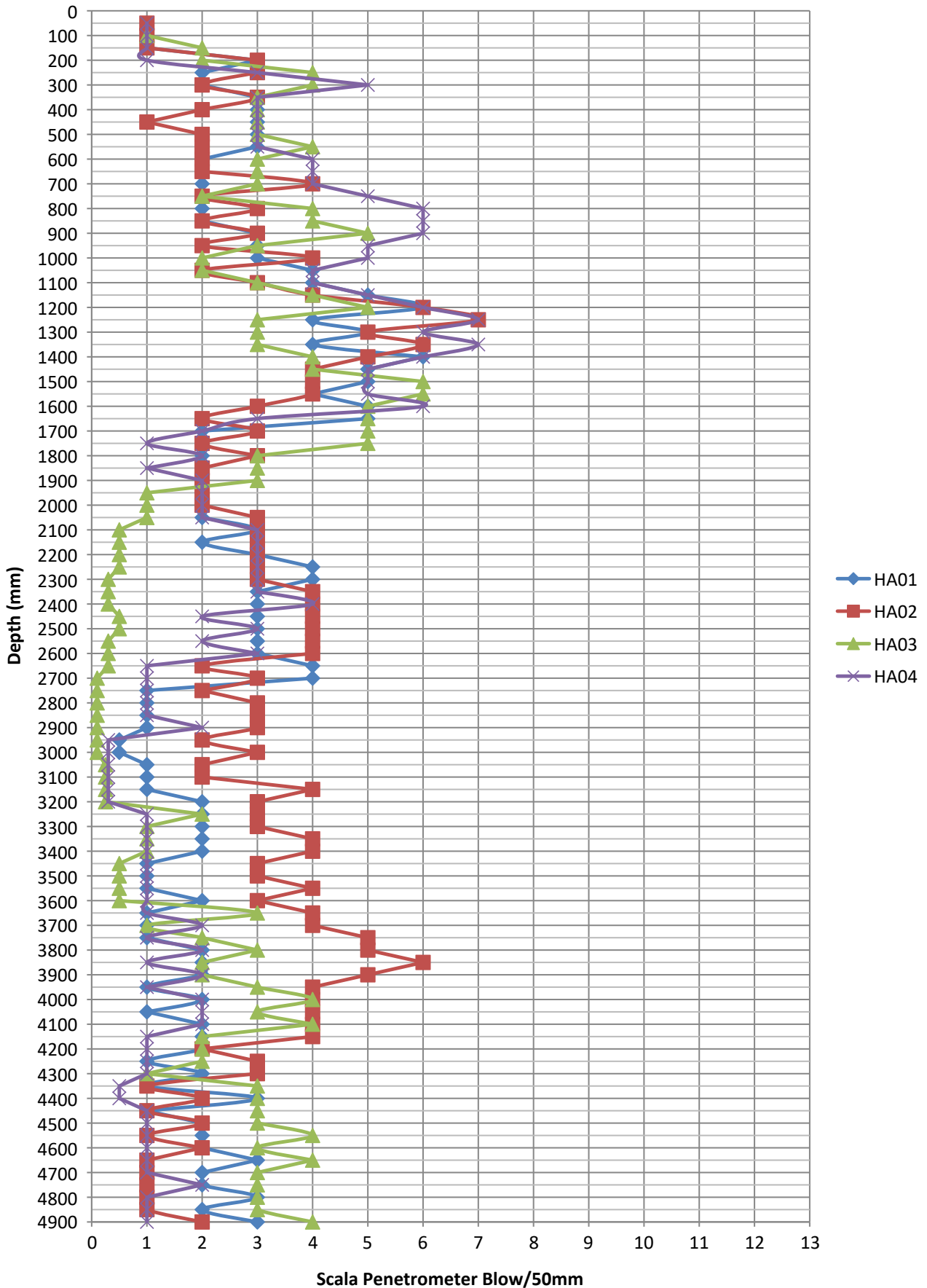
APPENDIX D

UBC BLOWCOUNT

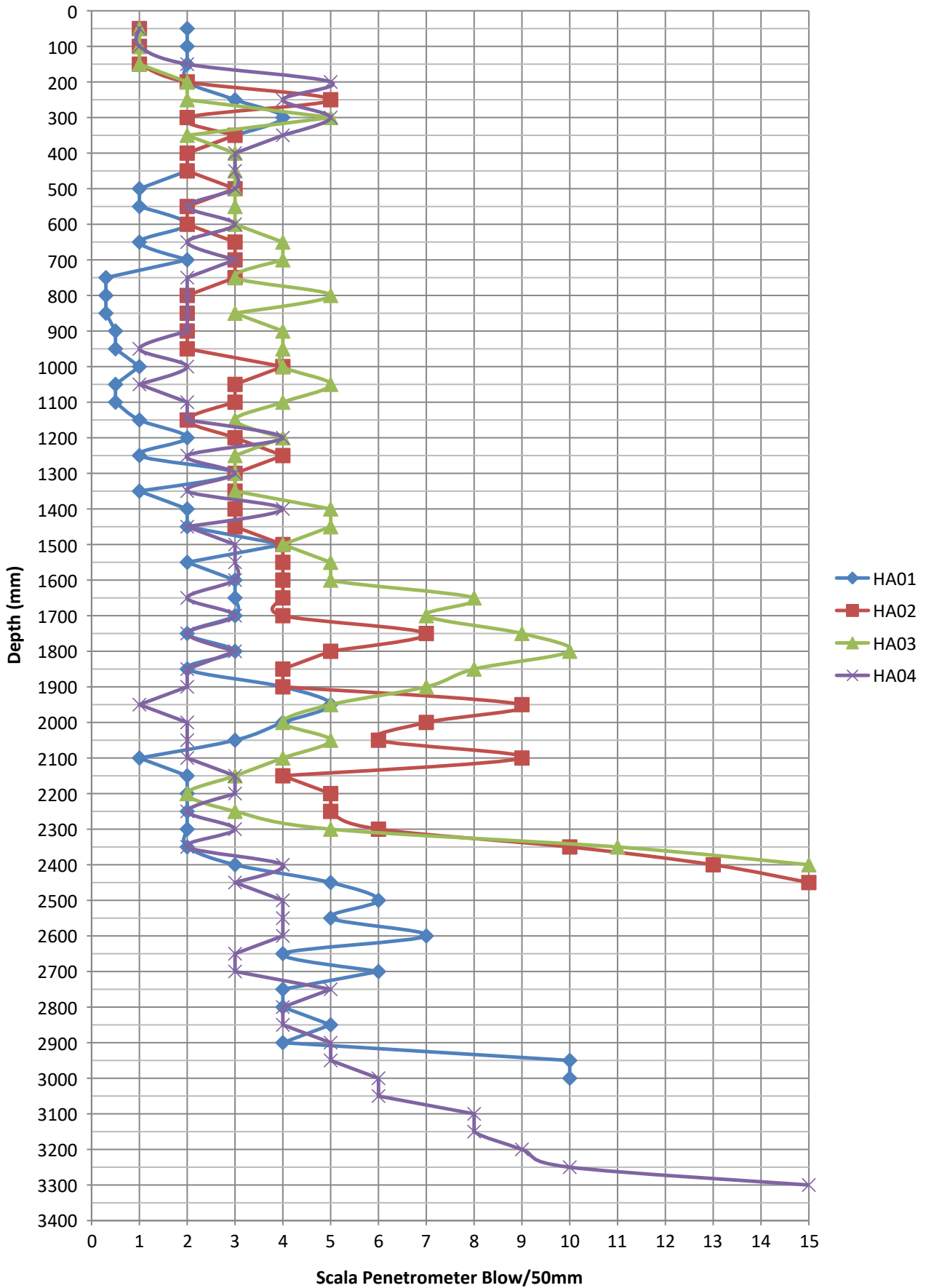
Summary of Scala Penetrometer Blowcounts vs Depth



Summary of Scala Penetrometer Blowcounts vs Depth

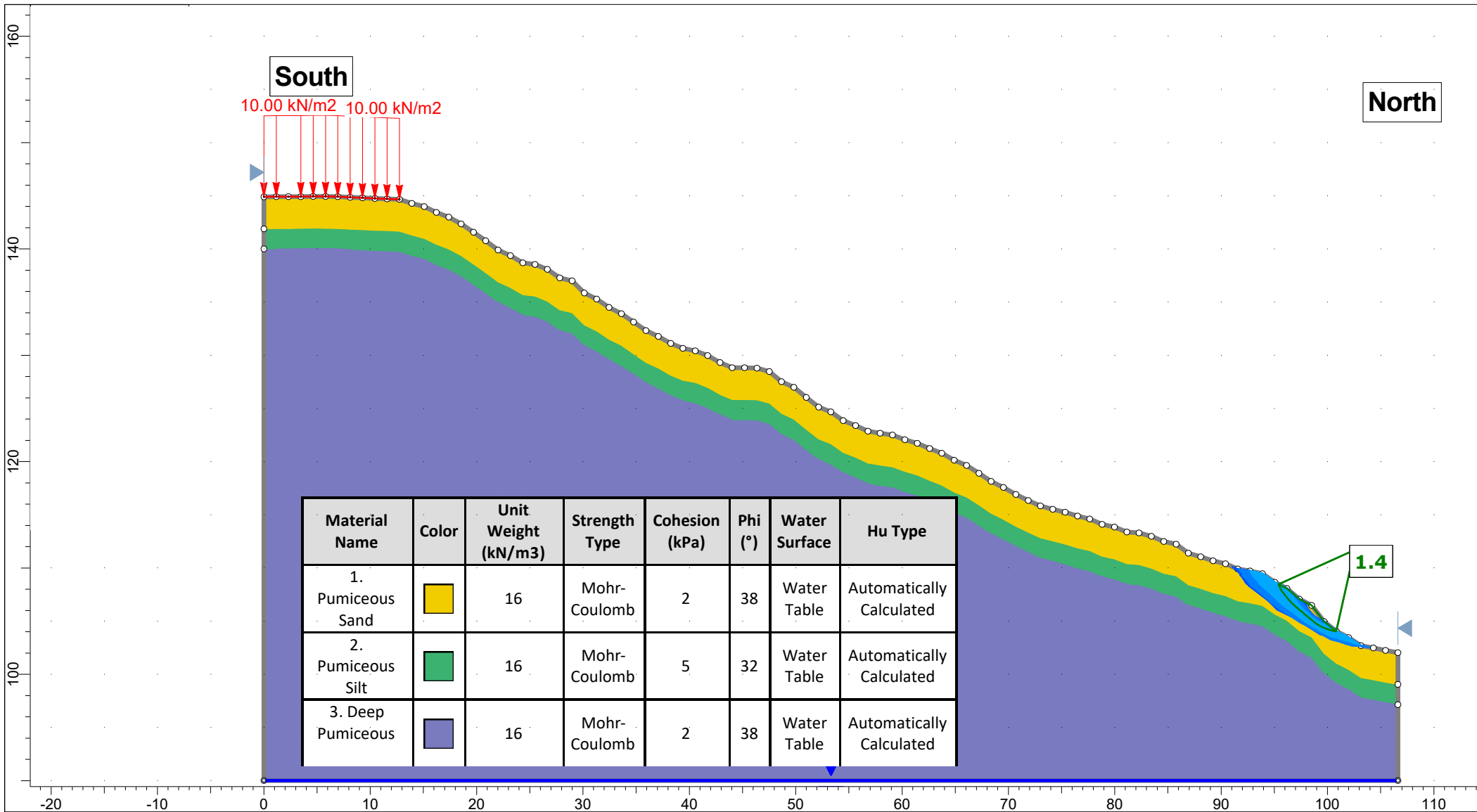


Summary of Scala Penetrometer Blowcounts vs Depth

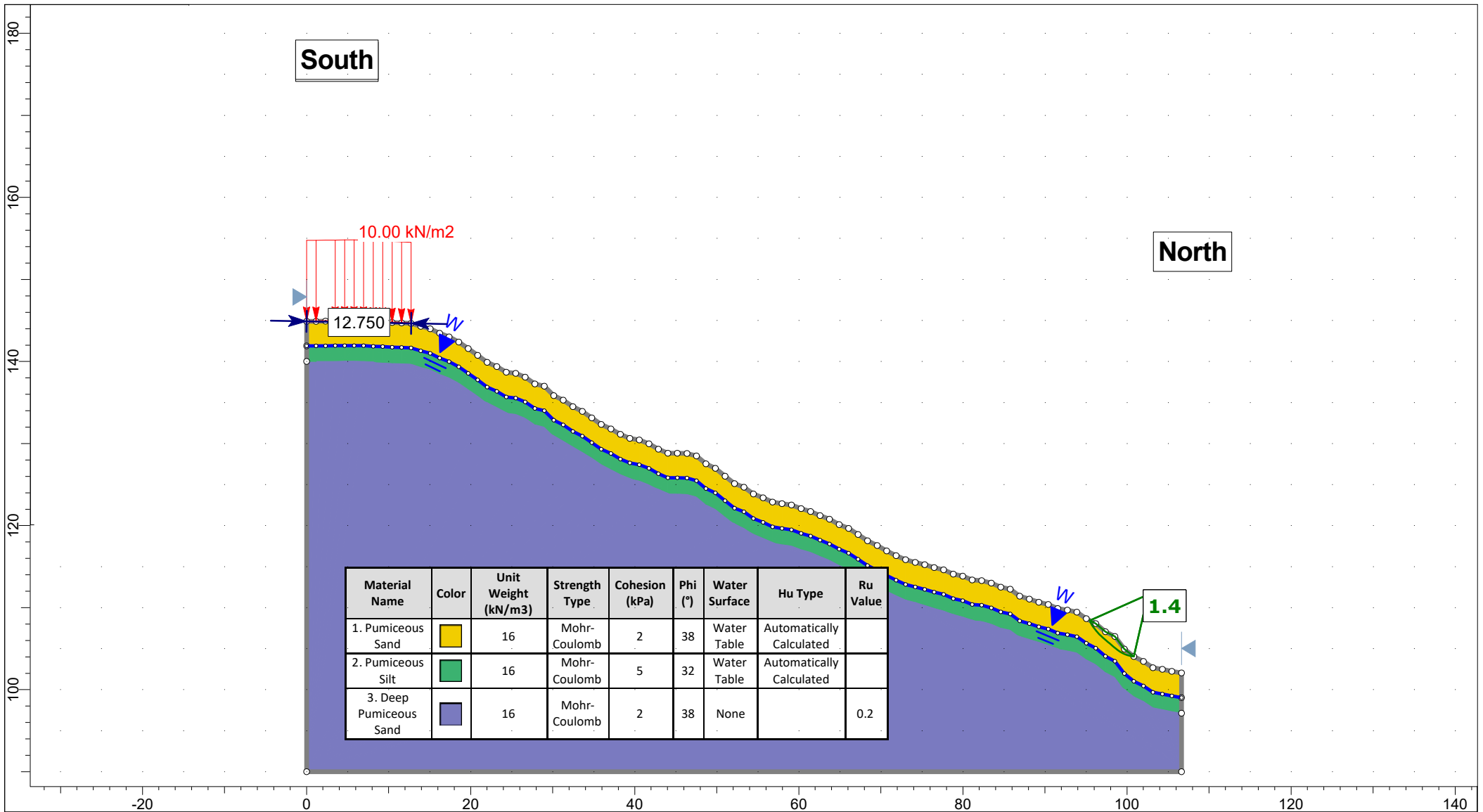



APPENDIX E

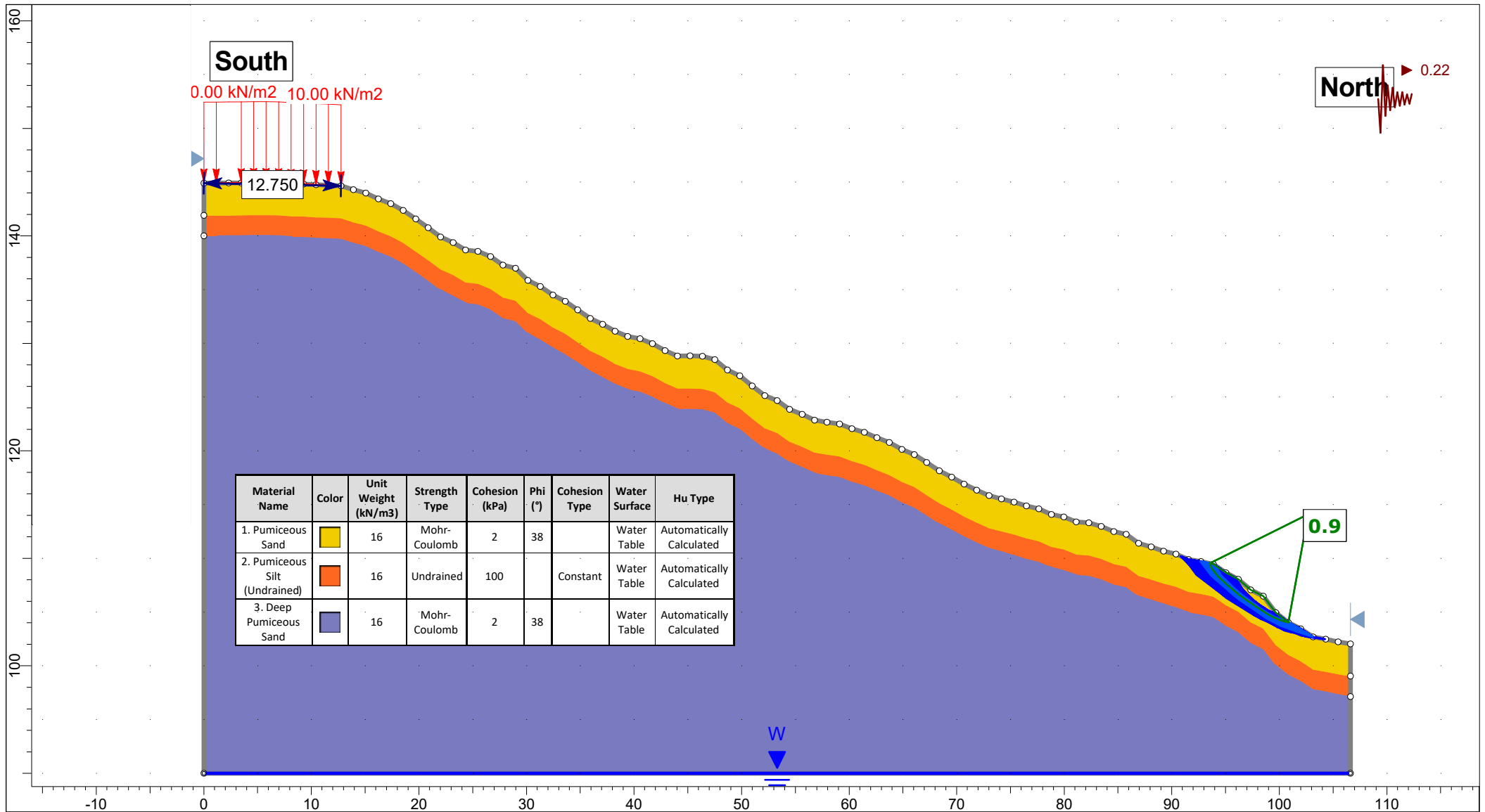
SLOPE STABILITY ANALYSIS



Project		Slide2 - An Interactive Slope Stability Program	
Group	Lot 2 - Slope A	Scenario	Normal
Drawn By		Company	
Date	21/11/2024, 3:40:06 pm	File Name	20241121_Slide_GJL.slmd

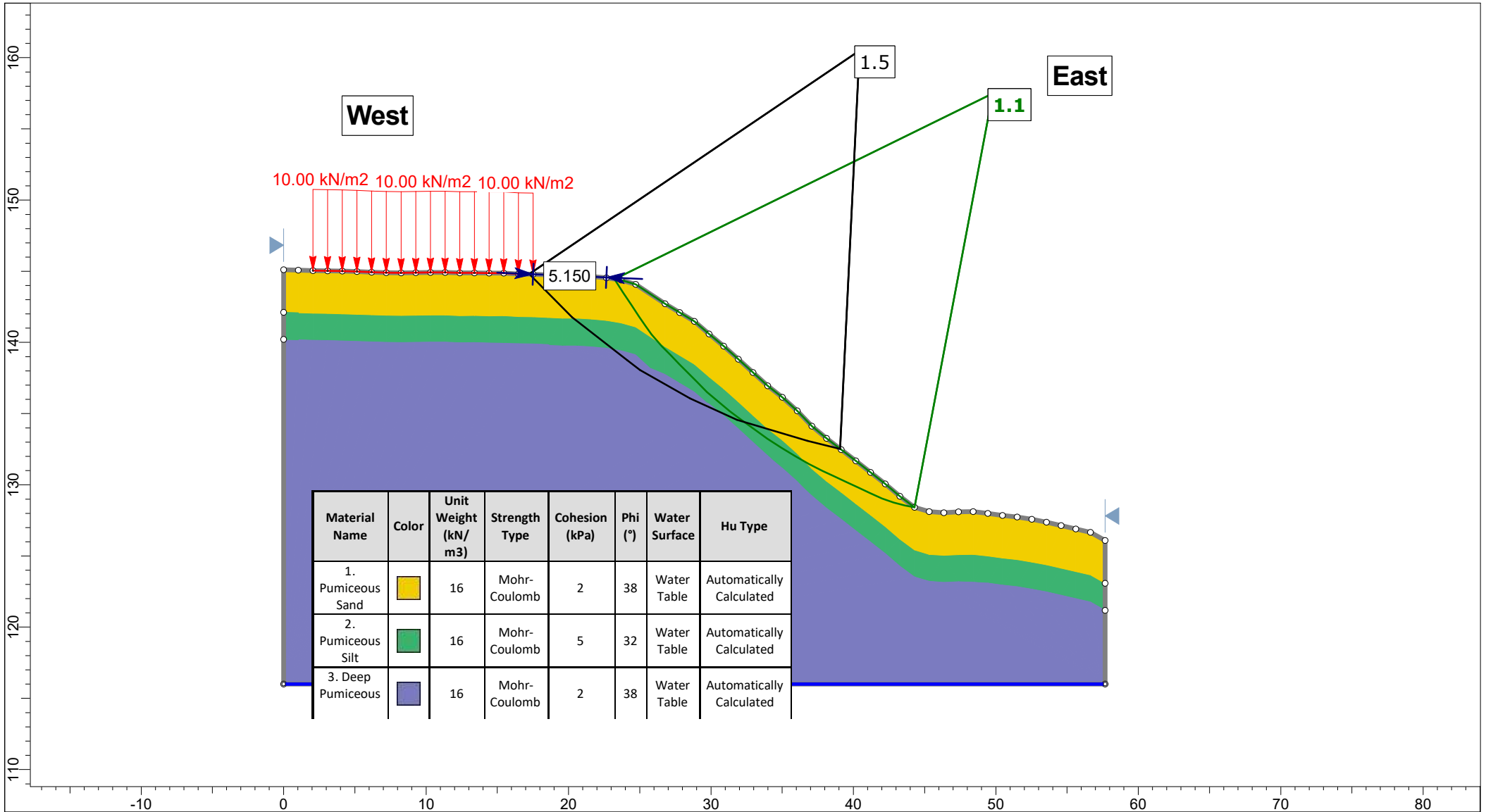


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	Group		Lot 2 - Slope A	Scenario
	Drawn By			Company
	Date		21/11/2024, 3:40:06 pm	File Name
				Worst Crdeble Groundwater
				20241121_Slide_GJL.slmd

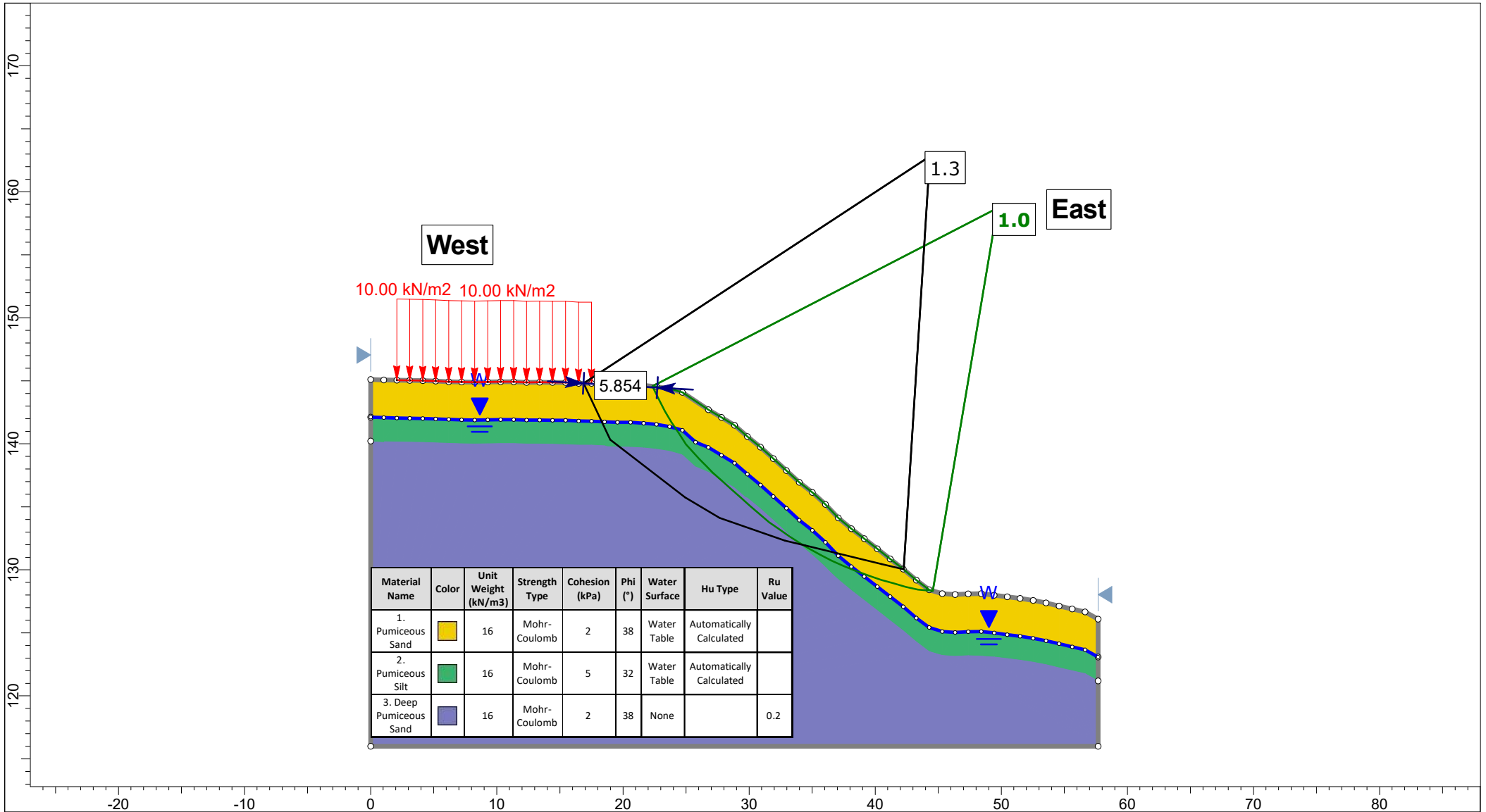



SLIDEINTERPRET 9.031

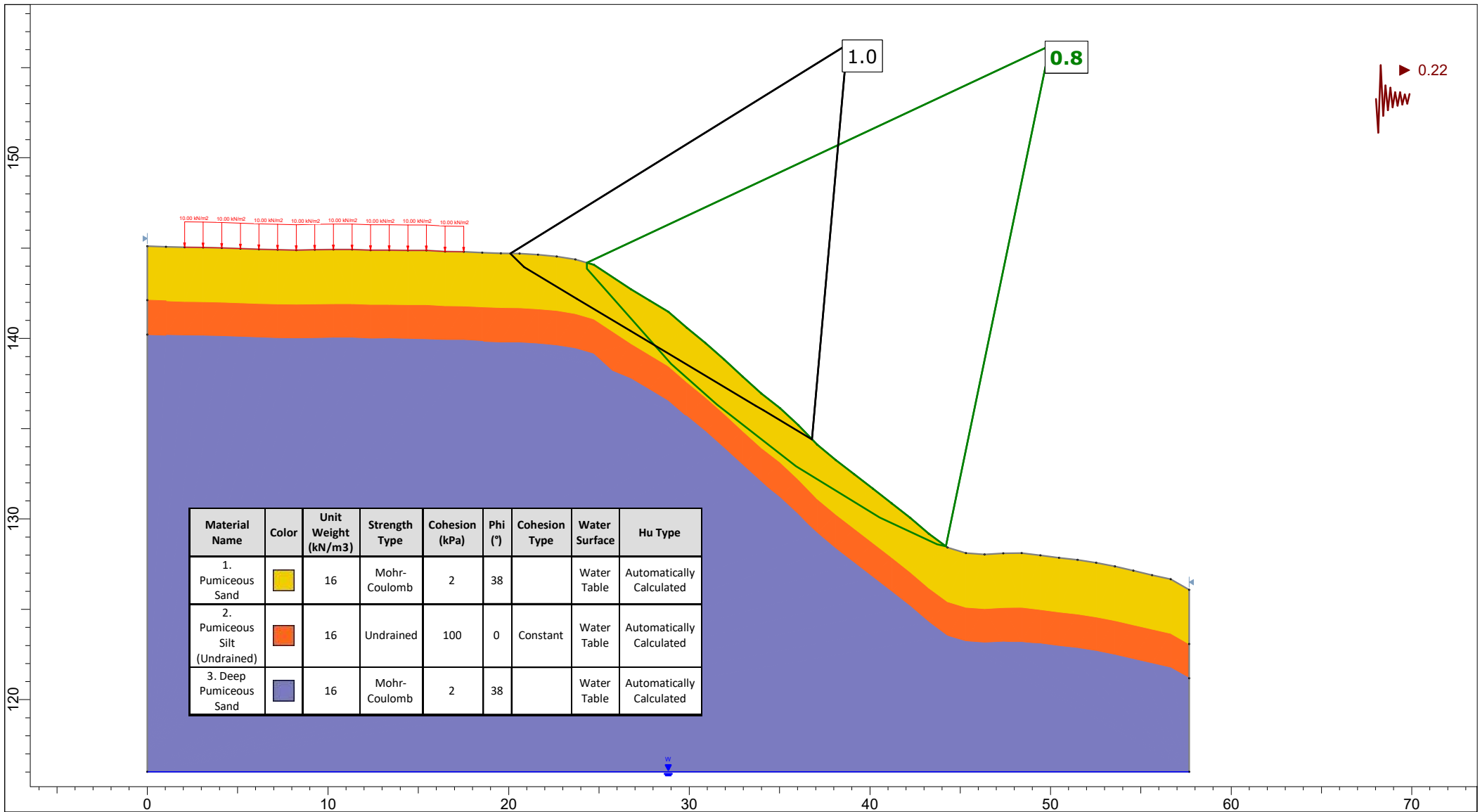
Project		Slide2 - An Interactive Slope Stability Program	
Group	Lot 2 - Slope A	Scenario	Seismic ULS
Drawn By		Company	
Date	21/11/2024, 3:40:06 pm	File Name	20241121_Slide_GJL.slmd



	Slide2 - An Interactive Slope Stability Program		220 Withy Road Lot 2	
	Group	Lot 2 Slope B	Scenario	Normal
	Drawn By	Johan Brits	Company	
	Date	21/11/2024, 3:40:06 pm	File Name	20241121_Slide_GJL.slmd



	Slide2 - An Interactive Slope Stability Program		220 Withy Road Lot 2	
	Group	Lot 2 Slope B	Scenario	Worst Credible Groundwater
	Drawn By	Johan Brits	Company	
	Date	21/11/2024, 3:40:06 pm	File Name	20241121_Slide_GJL.slmd



SLIDEINTERPRET 9.037

Slide2 - An Interactive Slope Stability Program

220 Withy Road
Lot 2

Group Lot 2 Slope B

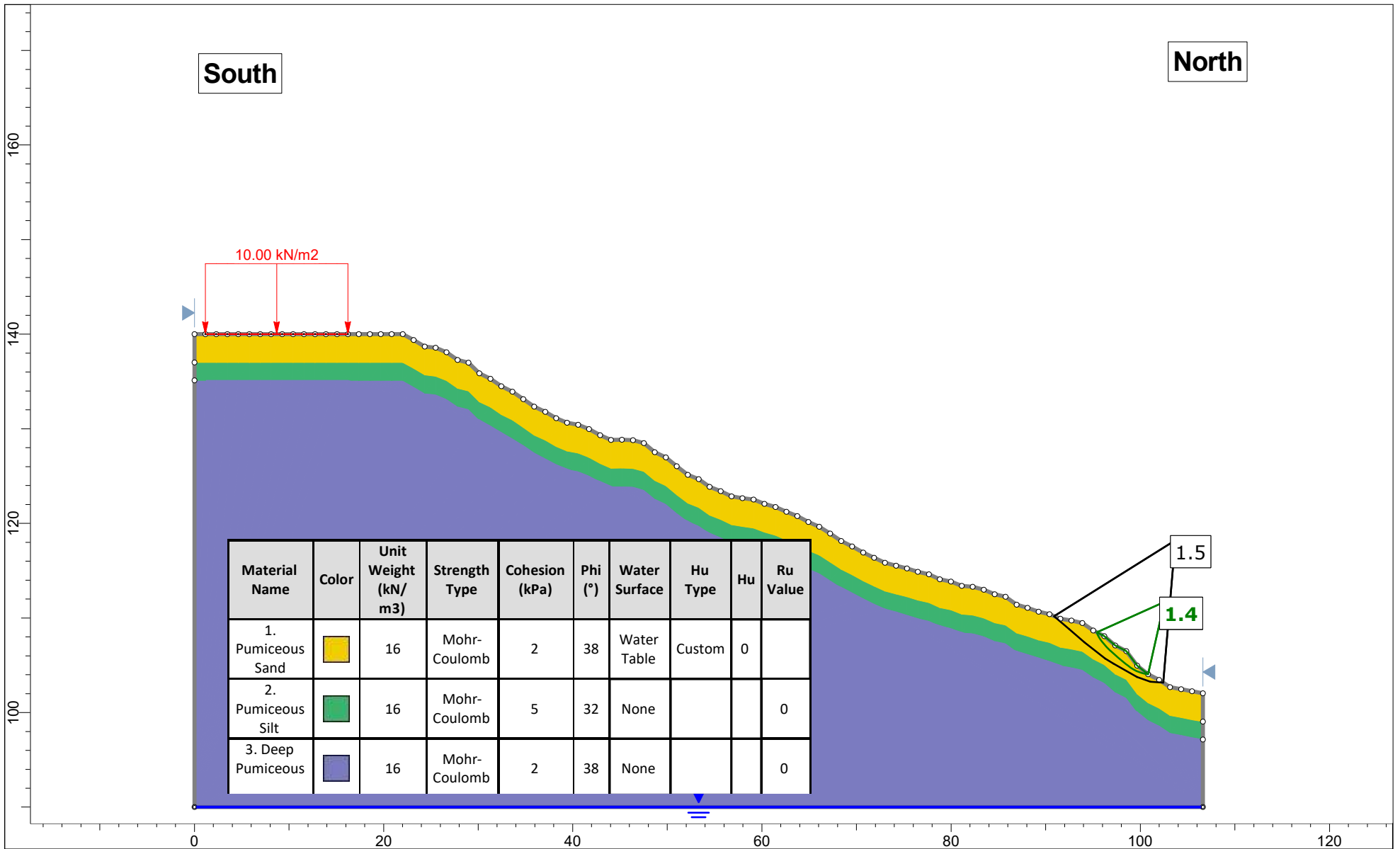
Scenario Seismic ULS

Drawn By Johan Brits

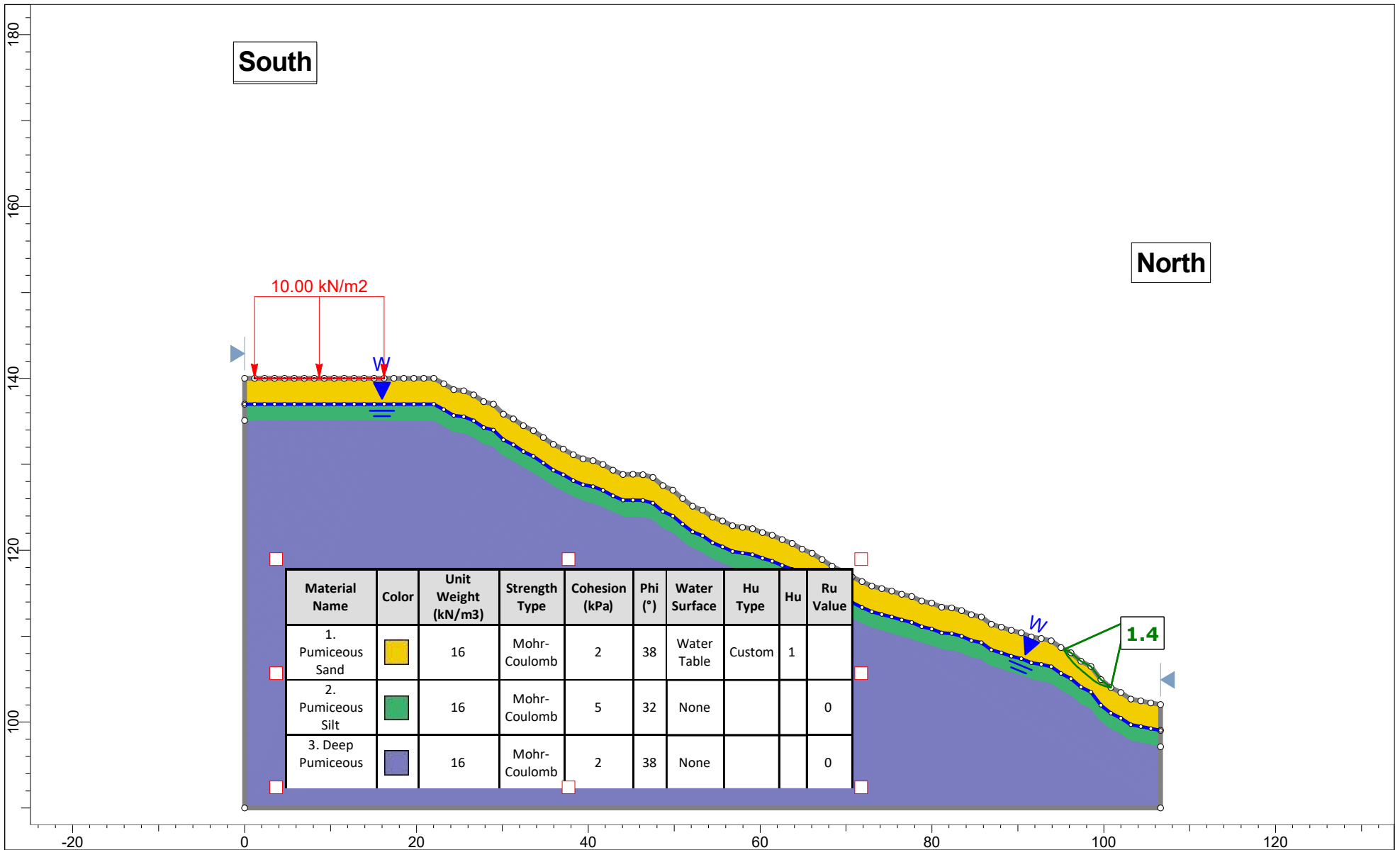
Company

Date 21/11/2024, 3:40:06 pm

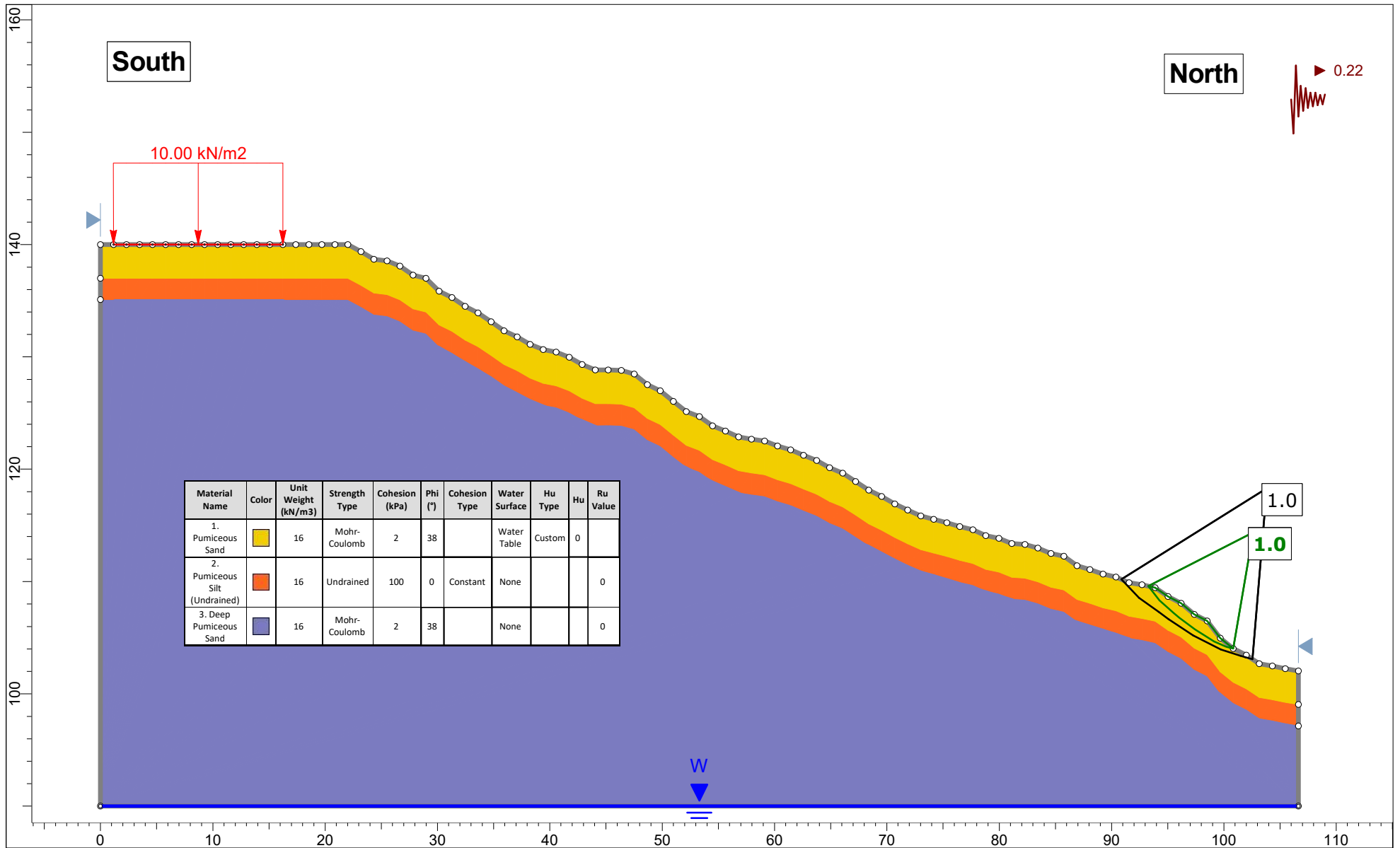
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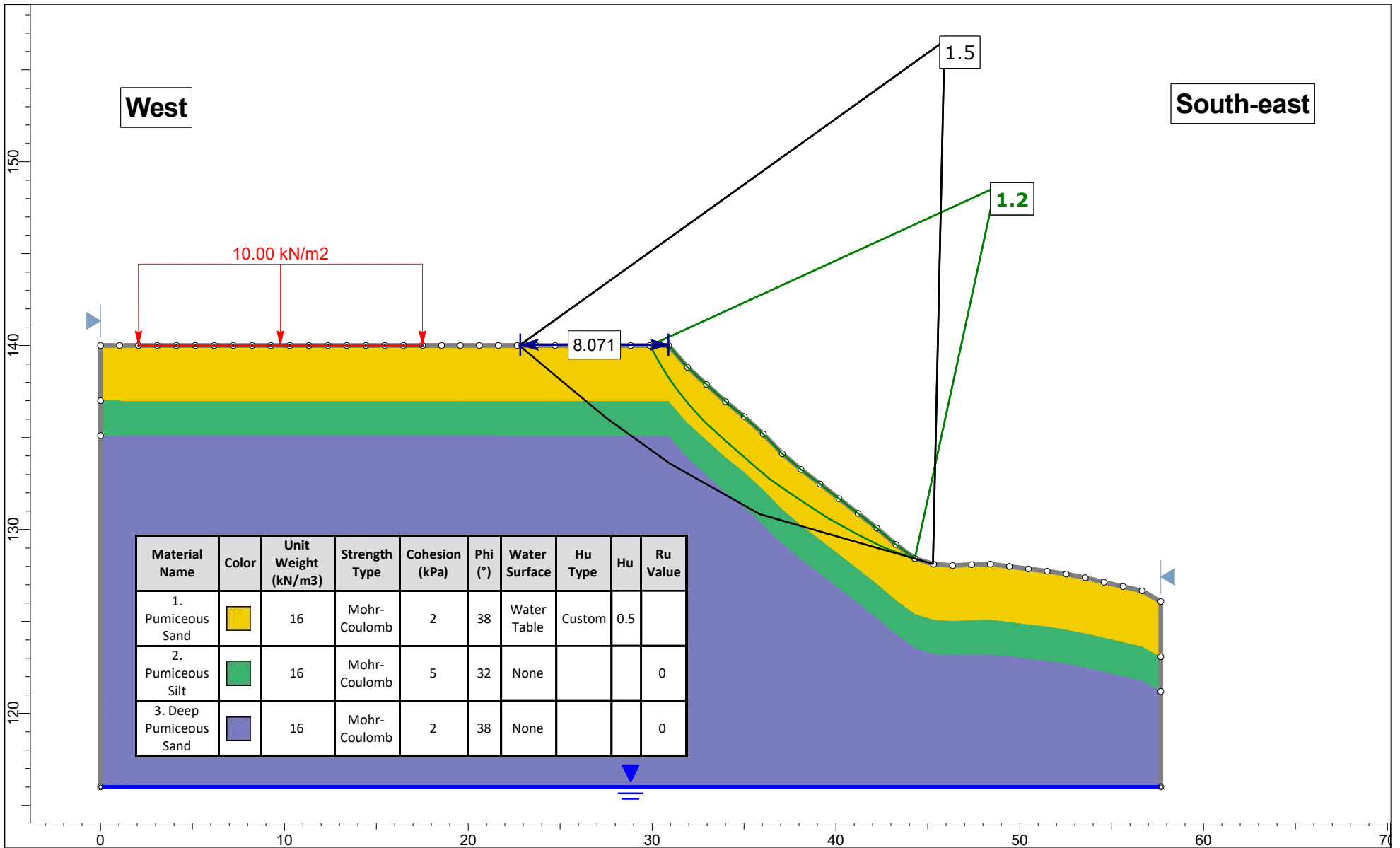
Project		220 Withy Road Lot 3 Slope A - A'	
Group	51008	Scenario	Normal
Drawn By	Johan Brits	Company	EDC
Date	22/11/2024 1:10:53 pm	File Name	20241122_Slide Lot 3.sldm



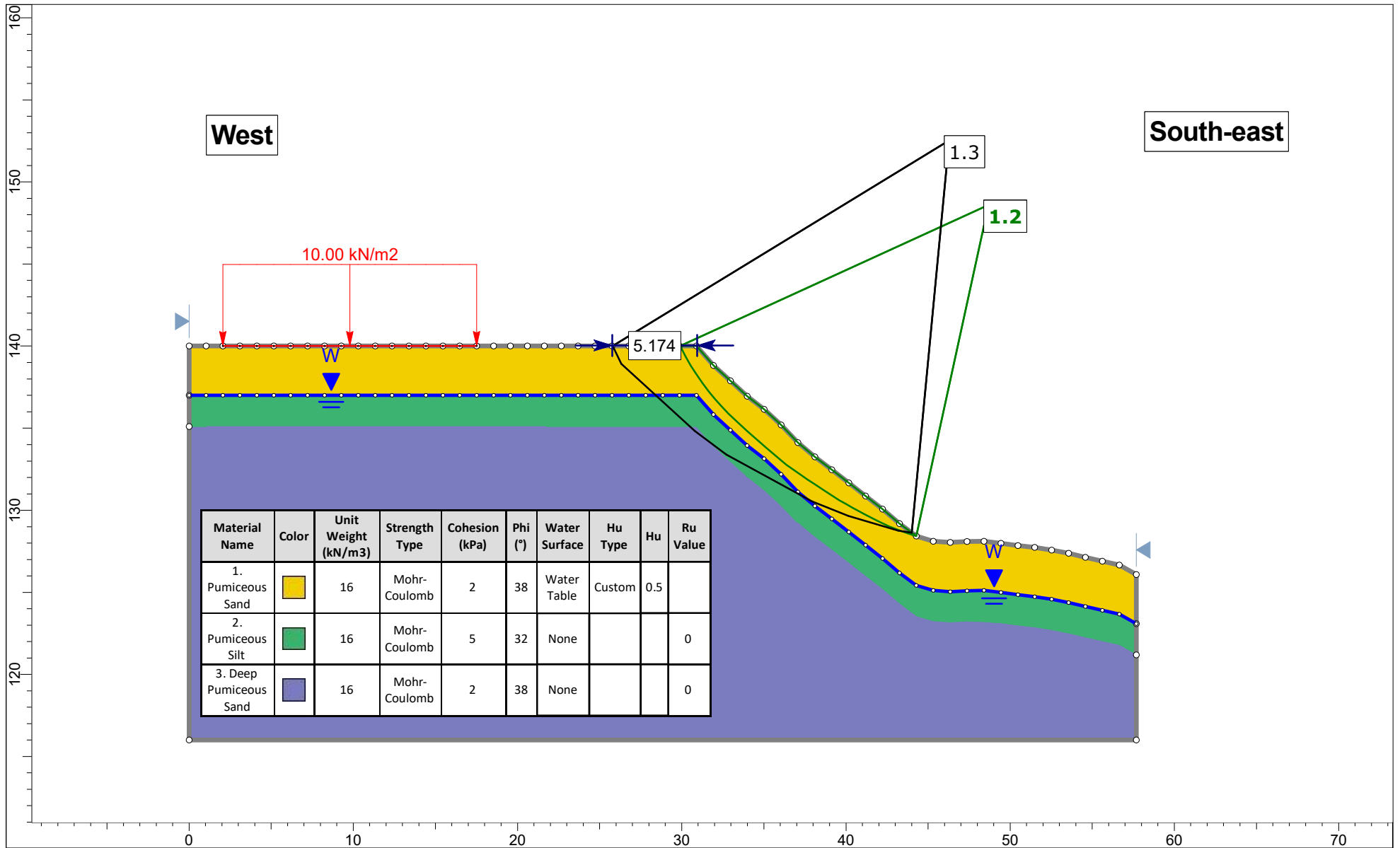
<i>Project</i>		220 Wothy Road Lot 3 Slope A - A'	
<i>Group</i>	51008	<i>Scenario</i>	Worst Crdeble Groundwater
<i>Drawn By</i>	Johan Brits	<i>Company</i>	EDC
<i>Date</i>	22/11/2024 1:10:54 pm	<i>File Name</i>	20241122_Slide Lot 3.sldm



	Project		220 Worthy Road Lot 3 Slope A - A'	
	Group	51008	Scenario	Seismic ULS
	Drawn By	Johan Brits	Company	EDC
	Date	22/11/2024 1:10:54 pm	File Name	20241122_Slide Lot 3.sldm



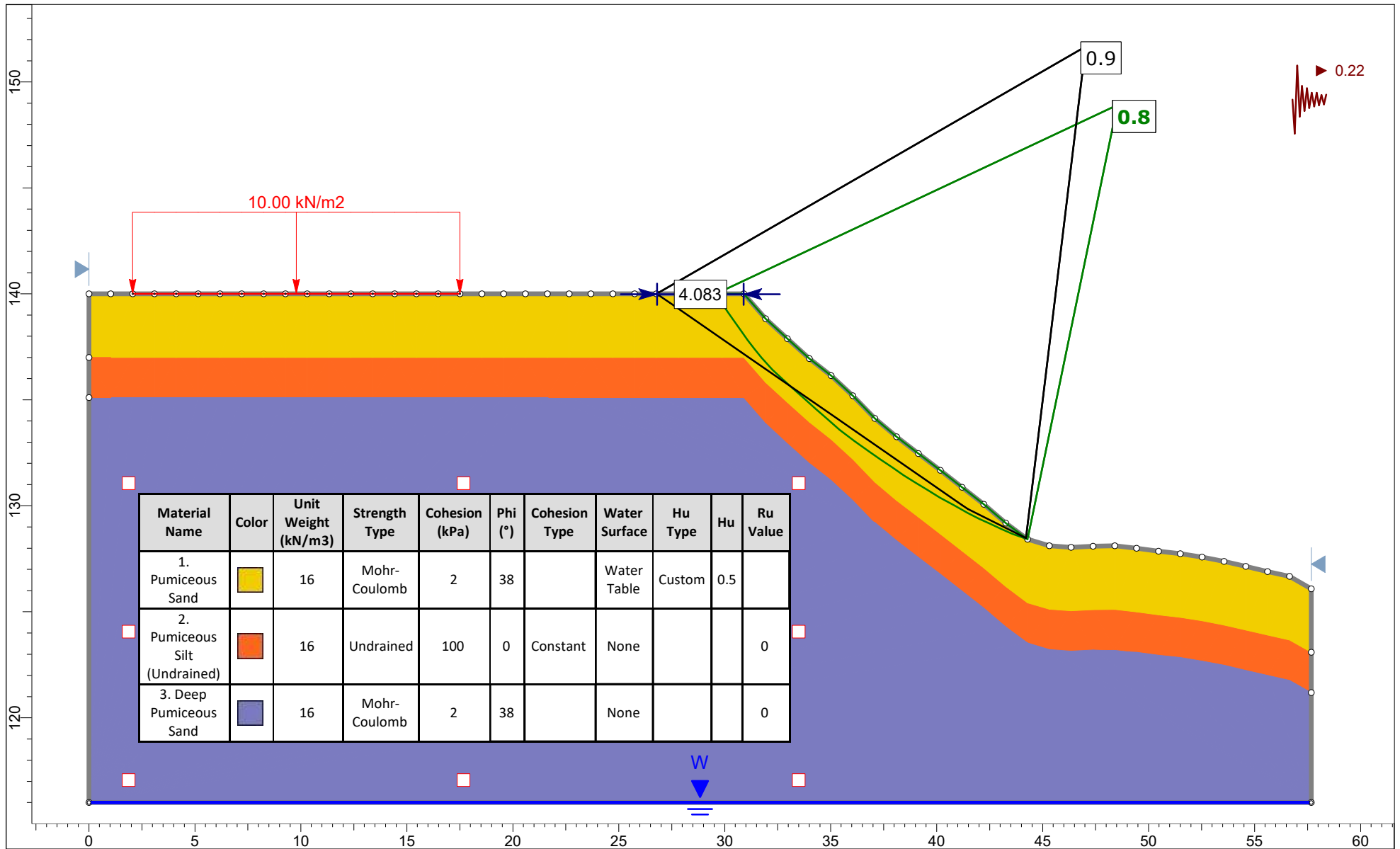
Project		220 Wothy Road Lot 3 Slope B - B'	
Group	51008	Scenario	Normal
Drawn By	Johan Brits	Company	EDC
Date	22/11/2024 1:15:46 pm	File Name	20241122_Slide Lot 3.sldm



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value
1. Pumiceous Sand	Yellow	16	Mohr-Coulomb	2	38	Water Table	Custom	0.5	
2. Pumiceous Silt	Green	16	Mohr-Coulomb	5	32	None			0
3. Deep Pumiceous Sand	Purple	16	Mohr-Coulomb	2	38	None			0

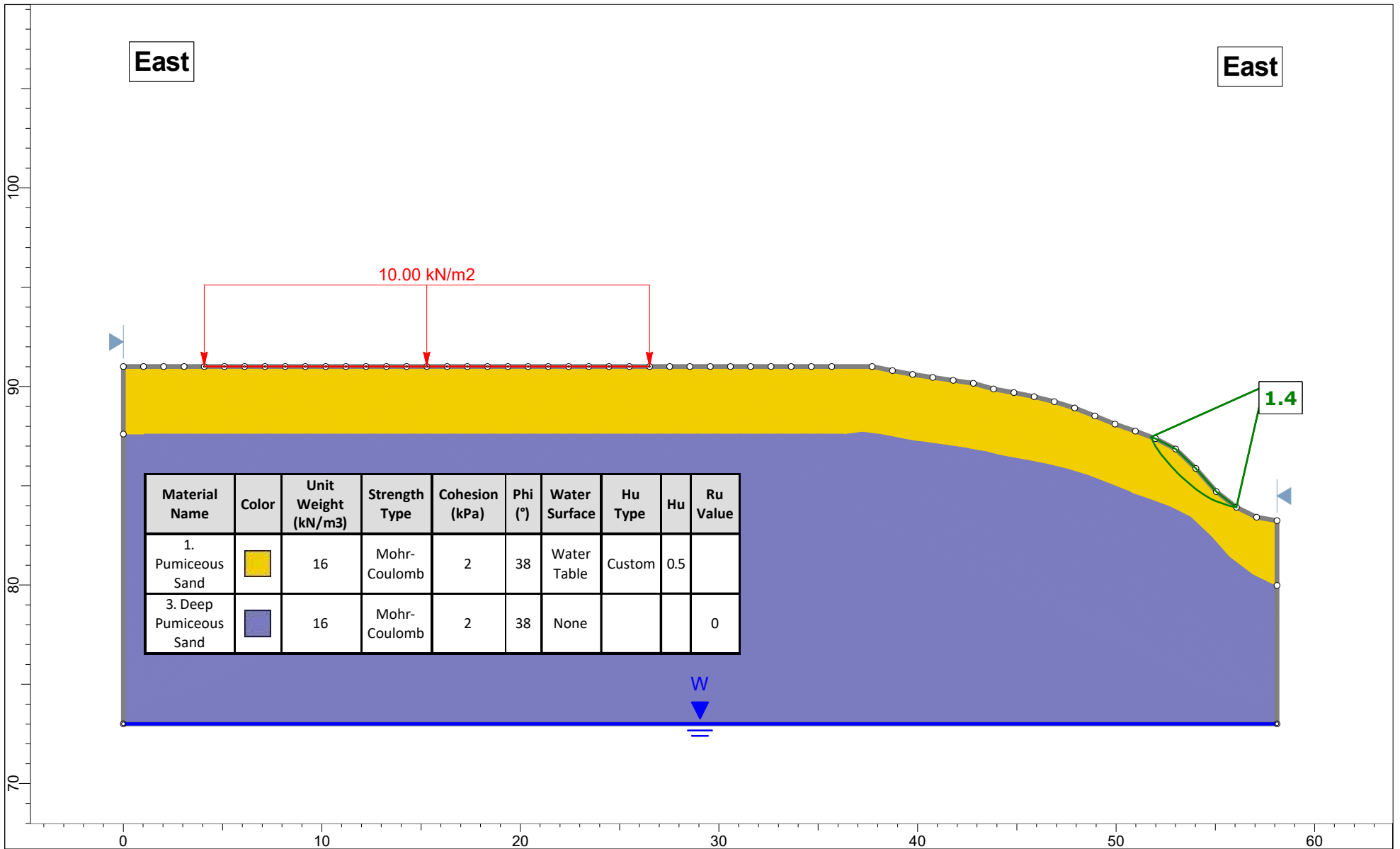


Project		220 Withy Road Lot 3 Slope B - B'	
Group	51008	Scenario	Worst Credible Groundwater
Drawn By	Johan Brits	Company	EDC
Date	22/11/2024 1:15:47 pm	File Name	20241122_Slide Lot 3.sldm

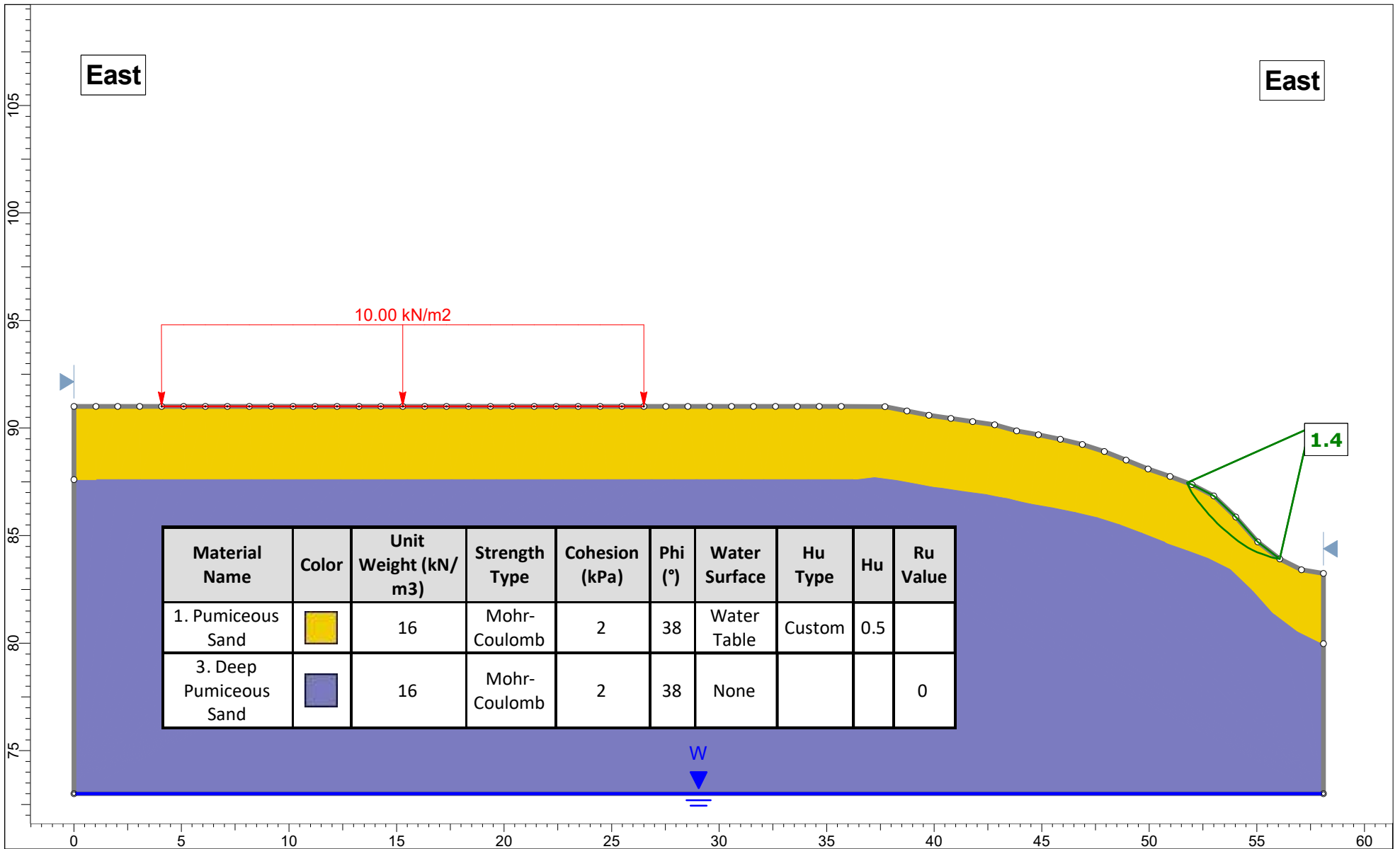




Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Water Surface	Hu Type	Hu	Ru Value
1. Pumiceous Sand		16	Mohr-Coulomb	2	38		Water Table	Custom	0.5	
2. Pumiceous Silt (Undrained)		16	Undrained	100	0	Constant	None			0
3. Deep Pumiceous Sand		16	Mohr-Coulomb	2	38		None			0


	Project		220 Withy Road Lot 3 Slope B - B'		
	Group		51008	Scenario	Seismic ULS
	Drawn By		Johan Brits	Company	EDC
	Date		22/11/2024 1:15:48 pm	File Name	20241122_Slide Lot 3.sldm

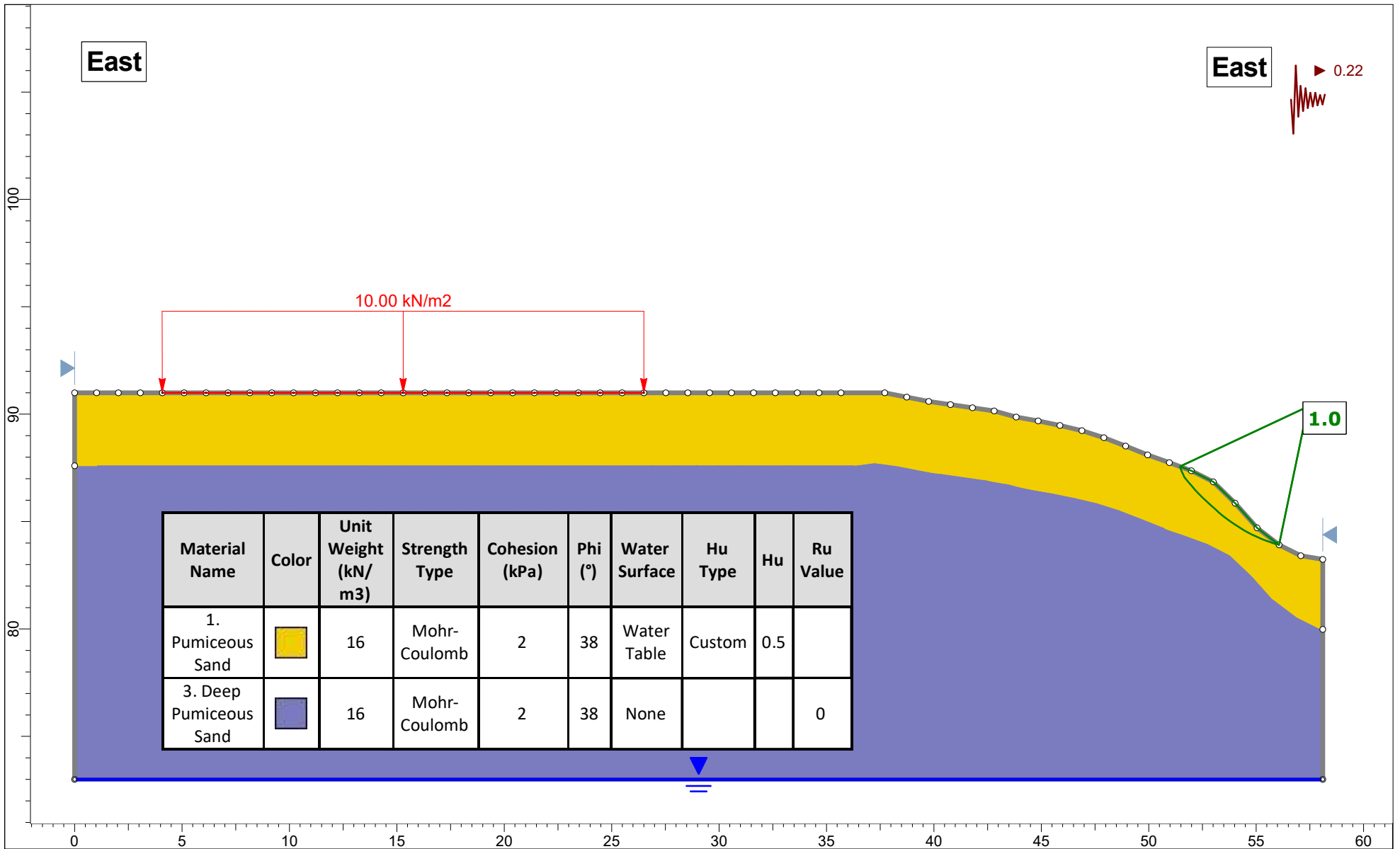




<i>Project</i>	220 Withy Road Lot 14 Slope B - B'		
<i>Group</i>	51008	<i>Scenario</i>	Normal
<i>Drawn By</i>	Johan Brits	<i>Company</i>	EDC
<i>Date</i>	25/11/2024 8:14:31 am	<i>File Name</i>	20241122_Slide Lot 14.slmd



Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value
1. Pumiceous Sand		16	Mohr-Coulomb	2	38	Water Table	Custom	0.5	
3. Deep Pumiceous Sand		16	Mohr-Coulomb	2	38	None			0

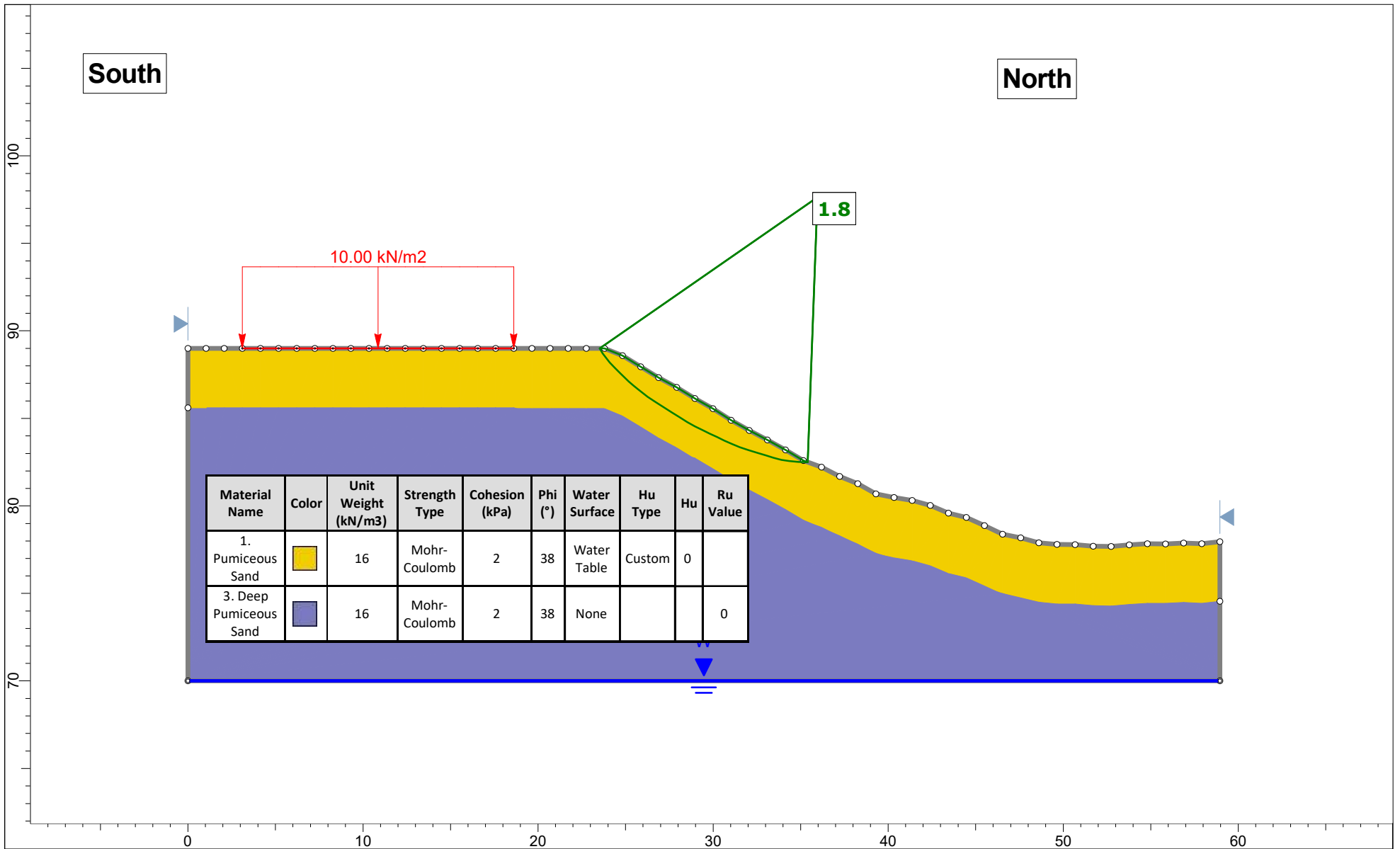
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	Group		51008	Scenario
	Drawn By		Johan Brits	Company
	Date		25/11/2024 8:14:32 am	File Name
				Worst Credible Groundwater
				EDC
				20241122_Slide Lot 14.slm



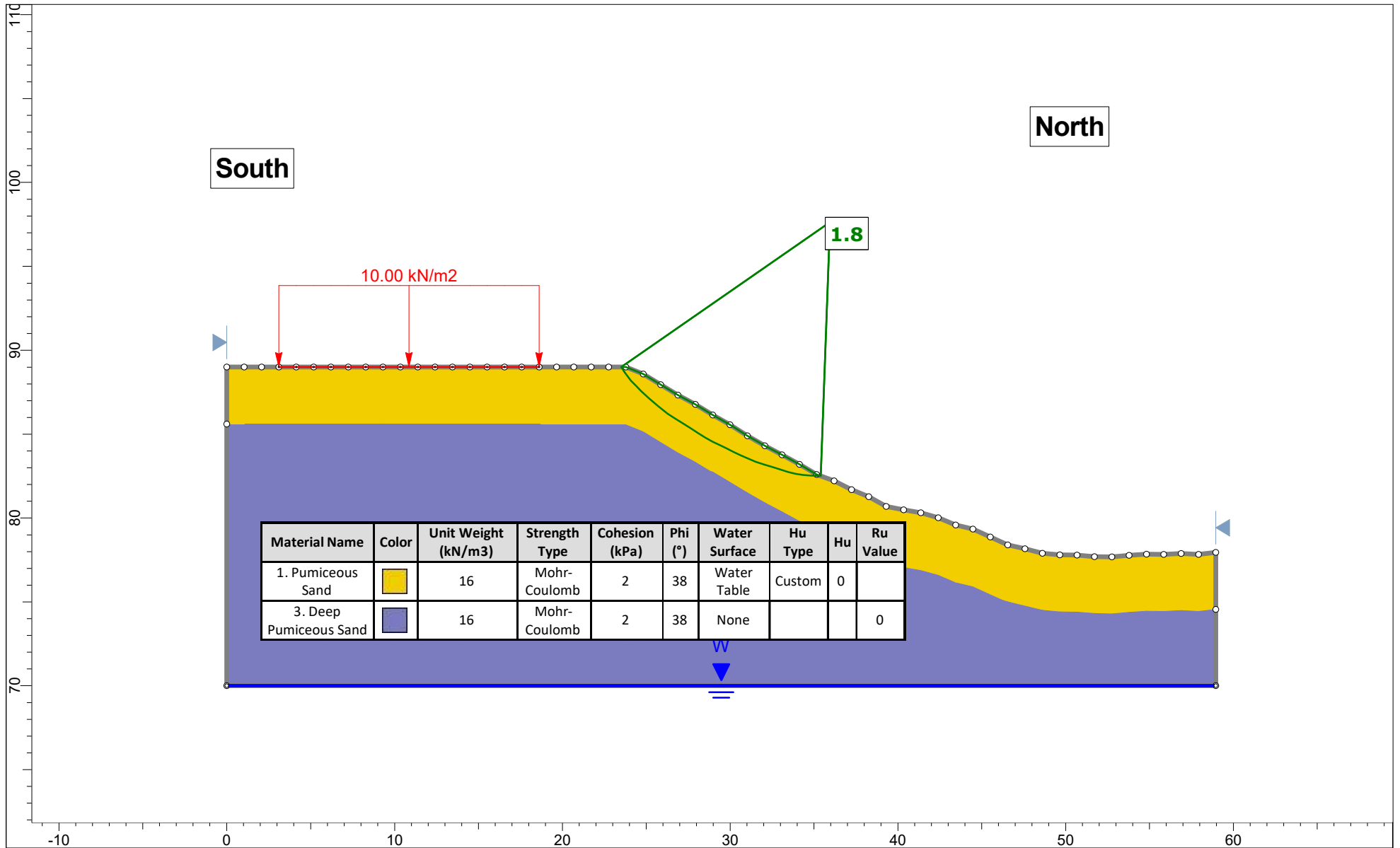
Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value
1. Pumiceous Sand		16	Mohr-Coulomb	2	38	Water Table	Custom	0.5	
3. Deep Pumiceous Sand		16	Mohr-Coulomb	2	38	None			0





<i>Project</i>		220 Withy Road Lot 14 Slope B - B'	
<i>Group</i>	51008	<i>Scenario</i>	Seismic ULS
<i>Drawn By</i>	Johan Brits	<i>Company</i>	EDC
<i>Date</i>	25/11/2024 8:14:32 am	<i>File Name</i>	20241122_Slide Lot 14.sldm



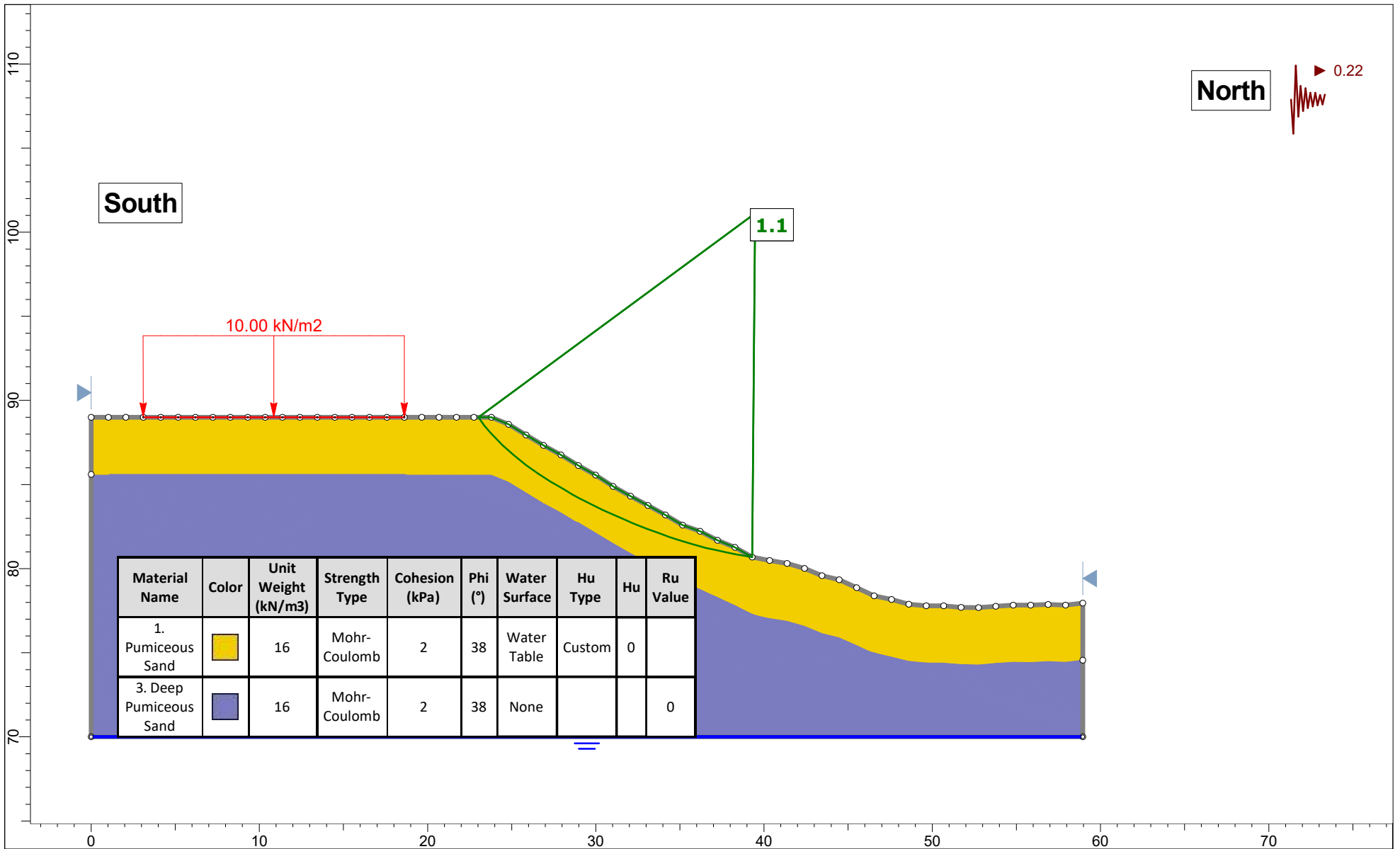
Project	220 Withy Road Lot 14 Slope A - A'		
Group	51008	Scenario	Normal
Drawn By	Johan Brits	Company	EDC
Date	25/11/2024 8:10:53 am	File Name	20241122_Slide Lot 14.slm





Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value
1. Pumiceous Sand		16	Mohr-Coulomb	2	38	Water Table	Custom	0	
3. Deep Pumiceous Sand		16	Mohr-Coulomb	2	38	None			0



<i>Project</i>		220 Withy Road Lot 14 Slope A - A'	
<i>Group</i>	51008	<i>Scenario</i>	Worst Crdeble Groundwater
<i>Drawn By</i>	Johan Brits	<i>Company</i>	EDC
<i>Date</i>	25/11/2024 8:10:54 am	<i>File Name</i>	20241122_Slide Lot 14.slm



Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Hu Type	Hu	Ru Value
1. Pumiceous Sand		16	Mohr-Coulomb	2	38	Water Table	Custom	0	
3. Deep Pumiceous Sand		16	Mohr-Coulomb	2	38	None			0



<i>Project</i>		220 Withy Road Lot 14 Slope A - A'	
<i>Group</i>	51008	<i>Scenario</i>	Seismic ULS
<i>Drawn By</i>	Johan Brits	<i>Company</i>	EDC
<i>Date</i>	25/11/2024 8:10:55 am	<i>File Name</i>	20241122_Slide Lot 14.sldm

APPENDIX F

LOT-SPECIFIC SUMMARY TABLE

