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Project Number 13230.001.004

Geotechnical Investigation

28, 30 and 66 Crestview Rise, Papakura, Auckland

Submitted to:
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1 Introduction

ENGEO Limited was requested by Harbour View Heights LP Limited to undertake a geotechnical investigation of the property at 28, 30, and 66 Crestview Rise, Papakura, Auckland (herein referred to as 'the site').

The purpose of this report is to determine ground conditions within the site and assess geohazards that may affect the site's suitability for the proposed subdivision. We understand that this report will also be used to support applications for resource consent for the conversion of three rural lots to 32 medium to high density residential lots that will support 63 residential dwellings.

This work has been carried out in accordance with our signed agreement dated 24 April 2023.

2 Site Description

This irregular shaped, 3,873 m^2 site is comprised of three large rural lots, legal descriptions (Lot 123 DP549093, Lot 124 549093, and Lot 127 DP571188). It is proposed to subdivide these lots into 32 medium and high-density residential lots as shown on the Envelope proposed design plans included in Appendix 1.

The eastern lots predominantly face northwest while the south-western lots face southwest, towards Settlement Road. The majority of site is moderate to steeply sloping to the southwest.

Our study area is generally undeveloped and grassed, with mature trees in the southern area of site and multiple individual trees located in the northern part of the site. The northern and eastern parts of the site are densely vegetated with small shrubs.

Reviewing the Auckland Council GeoMaps underground service layer, a 375 mm dia AC water transmission service line runs along the south-eastern boundary of site. Additional to this, local residential service lines such as power, wastewater and stormwater are located along Crestview Rise, Kotahitanga Street, and Marples Place.

3 Development Proposal

ENGEO has been provided with the proposed development plans prepared by ENVELOPE Consultants Ltd (reference 1915-01 dated 26 August 2024). These plans depict the subdivision of the three existing rural lots into a 32-lot high density residential development and includes one joint owned access lot and one public road. These plans are attached in Appendix 1.

The size of the individual lots proposed as part of this development is consistent with the residential lots previously developed within the neighbouring Harbourview Heights residential subdivision. However, ENGEO understands development could include three dwellings per site up to three storeys as a permitted development under the MDRS. .

The plans supplied indicate that earthworks within the eastern block of lots will consist of cut and fill operations to form an access / roading lot. Within the western lots earthworks will comprise the removal of an existing stockpile. The bulk earthworks area is 8,500 m^2, with a fill volume of 1,100 m^3, and a cut volume of 13,500 m^3.

Based on the plan set provided, finished contours across some of the proposed lots are expected to be relatively steep with maximum finished contours of 1V:3H or 18 degrees.

4 Background Information

4.1 Historical Reports

Geotechnical investigations for this site had previously been undertaken by Coffey Geotechnics Ltd and are reported in "Geotechnical Investigation Report, Residential Subdivision at 162 to 166 Settlement Road, Papakura" dated 15 June 2016, reference GENZAUCK11786AC.

Further to this, ENGEO prepared reports titled:

- Retaining Structures Detailed Design Report, Revision 2, reference 13230.000.000_11 dated 18.04.2017.
- Geotechnical Earthworks Specification, 162 – 166 Settlement Road, 28 October 2016; Project number 13230.000.000.
- RC6-RC8 Plan Review, 162 – 166 Settlement Road, dated 13 February 2019, Project number 13230.000.000.
- Retaining Wall 07 Addendum Letter, 162 – 166 Settlement Road, dated 06 March 2020, Project number 13230.000.000.
- ROW Slope Redesign Lot 203, 162 – 166 Settlement Road, dated 17 April 2020, Project number 13230.000.000.
- Geotechnical Completion Report, 162 – 166 Settlement Road, dated 23 October 2020, Project number 13230.000.000.
- Geotechnical Completion Report 2C and Stage 3, 162 – 166 Settlement Road, dated 30 June 2022, Project number 13230.000.000.

4.2 Published Geology

GNS (Institute of Geological and Nuclear Sciences), map the site as being predominantly underlain by the East Coast Bays Formation (ECBF) of the Waitematā Group.

The East Coast Bays Formation was formed in a deep marine setting by turbidity (density) currents during the Miocene Epoch (20 million years ago), resulting in alternating sequences of sandstone and siltstone (termed flysch deposits) which have been measured up to 500 m thick across the wider Auckland region.

In situ weathering of the usually dark grey bedrock material has created, in most locations, an overburden comprising mixtures of silts, clays, and sands, being predominantly orange, brown and grey in colour and often containing hard, dark orange-brown iron oxide (limonitic) concentrations which are indicative of long term fluctuations in ground water levels. Underlying the East Coast Bays Formation soil there is typically a layer of dark grey, hard, silts and sands, indicative of the transition zone into rock.

Additional to the above, due to its proximity to nearby volcanic centers, we would expect ash and volcanic deposits to overlay the East Coast Bays Formation.

As part of earthworks within Stage 2 and the greater subdivision, engineered fill and topsoil stockpiles are present on the eastern side of site. Unsuitable colluvium material was undercut and removed as part of these works. The Stage 2 earthwork cut / fill As-Built depicts the fill levels and is appended in Appendix 2. Further details of these works are outlined in our Stage 2 Geotechnical completion report.

4.3 Seismicity

The Auckland area is one of the lowest earthquake activity regions in New Zealand. Over the last 150 years, only two earthquakes with magnitudes greater than M5 have been recorded in the region.

We have reviewed the GNS New Zealand Active Fault Database, which indicates there are no known active faults on-site. The nearest active fault is the Waikopua Fault located approximately 15 km southeast of the site. The Waikopua Fault dips southwest and is a normal (extensional) type fault. GNS have not established a dip angle, vertical slip rate, recurrence interval or date for the last event at the Waikopua Fault.

The north-northwest trending Drury Fault passes west of the site and is responsible for the uplift of the Papakura Hills to the east of the site. However, the Drury Fault is not considered active. A sub-parallel fault to the east of the site and due to its orientation is possible to be related to the Drury Fault.

4.4 Volcanic Activity

Volcanic activity presents a significant risk in Auckland; however, the location and timing of eruptions are difficult to predict due to the monogenetic nature of the volcanic field. The eruption history of the Auckland Volcanic Field is known to date back over the last 150,000 years; 19 eruptions are known to have occurred within the last 20,000 years; 18 of the most recent eruptions occurred between 20,000 and 10,000 years ago. Rangitoto was the last known eruption event which was estimated to be 550 years before present.

Hazards proximal to an eruption include pyroclastic surge, block fall and lava flows. Ash falls at a greater distance can cause large disturbance; with remobilisation of ash deposits possible, particularly during rainfall events.

A small basalt eruptive center known as ‘Redhill’ is located approximately two kilometers to the south of the site.

4.5 Nearby Testing

Previous geotechnical investigations within Lots 123, 124, and 127 were undertaken by Coffey Geotechnics Limited. That historical investigation consisted of three machine borehole and five hand auger boreholes. The location plan and the previous investigation logs are included in Appendix 3.

Material encountered within the study area in the historical investigation generally consisted of Landslide Colluvium, East Coast Bays Formation residual soils, and East Coast Bays Formation Rock.

The Coffey Geotechnics report also highlighted the presence of existing instability features within the location of the three rural lots (this study area). Instability features within the lots currently known as 28 and 30 Crestview Rise were earth worked and remediated as part of the Stage 1 and 2 Harbourview Heights development as outlined in previous completion letters.

5 Site Investigation

ENGEO undertook an intrusive site investigation during the period of 6 to 17 June 2023. This geotechnical investigation included supervising three machine boreholes, undertaking 16 hand auger boreholes and the recovery of three soil samples for expansive soil testing. Test locations from this investigation are shown in Appendix 4.

Three machine boreholes (MBH01 to MBH03), with associated soil strength testing (Standard Penetrometer Test), were drilled to depths ranging between 12 and 22.5 m below ground level. Full borehole records are presented in Appendix 5. Following completion of the drilling, a standpipe piezometer was installed within each of the boreholes to facilitate groundwater level measurements. The design of the piezometers are also on the borehole logs in Appendix 5.

Thirteen hand auger boreholes (HA01 to HA13), with associated soil strength testing (shear vane), were drilled to between 1.3 m and 5.0 m depth. Full borehole records are presented in Appendix 6.

Logs have been prepared in general accordance with the New Zealand Geotechnical Society field classification guidelines (NZGS, 2005).

5.1 Summary of Subsurface Conditions

Ground conditions encountered on-site were generally in accordance with the mapped geology. Subsurface investigation findings are described as follows:

Topsoil

Topsoil was encountered within all hand auger boreholes, test pits and machine boreholes to between 0.1 m and 0.6 m bgl.

Existing Fill

Undocumented fill / topsoil stockpiles (likely left over from previous earthworks) were encountered within our hand auger and machine boreholes. Existing fill was encountered within all of the boreholes except HA07 and MBH02 to a maximum depth of 7.25 m bgl.

This material predominantly comprises topsoil and silt with gravel and sand, and is intermixed dark brown, brown and orange in colour. Buried topsoil layers were encountered within the undocumented fill.

Undocumented fill can be highly variable with respect to moisture content, strength and density, and may contain organics, construction rubble, oversized boulders, and voids. As such, undocumented fill can be susceptible to total and differential settlement and undesirable geotechnical performance.

Engineered fill was placed as part of earthworks in the eastern section of site to remove colluvium and landslide debris. Our hand auger investigation encountered engineered fill within boreholes HA01, HA02, HA03, HA04, HA06, HA08, HA09, HA10, HA11, and HA12 to the maximum testing depth of 5.0 m below ground level. This material predominantly comprised of silty CLAY with minor fine to medium sand and gravel, brown and grey.

East Coast Bays Formation (ECBF)

Underlying the existing fill and colluvium, where noted above, and underlying topsoil in all other hand auger boreholes, are the native, naturally weathered silt and clay soils of the underlying East Coast Bays Formation bedrock. This unit is generally found to increase in consistency with depth, although the soils can lose strength where affected by the groundwater surface.

Measured shear strengths in this unit ranged from 45 kPa to in excess of 200 kPa, the upper limit of our shear vane dial. Weaker soil zones were typically observed relative to the observed groundwater surface in the hand auger boreholes, or where predominantly sandy or silty layers were encountered. Average shear strengths through the residual soil profile were in excess of 100 kPa, corresponding to a very stiff to hard soil.

Table 1: Summary of Ground Conditions

Top Depth Range (m)	Bottom Depth Range (m)	Material Description	Undrained Shear Strength (kPa)	Consistency
0.0	0.3 – 7.0	Fill Material	57 – 200+	St – H
0.0	0.7	Uncontrolled fill	171 – 200+	VSt – H
0.3 – 0.3	0.3 – 5.0	Auckland Volcanic Field soils	57 – 200+	St – H
0.3 – 7.0	7.5 – 19.6	East Coast Bays Formation Soils	59 – 200+	St – H
7.5 – 19.6	> 22.565	East Coast Bays formation Rock	N/A	EW – VW

[1]NA = Not Assessed

5.2 Groundwater Conditions

Standing groundwater levels were recorded by dipping each of the hand auger boreholes at the completion of drilling. Groundwater was encountered between 3.2 m and 9.91 m below ground level (bgl).

The hand auger boreholes did not encounter groundwater at the time of our investigation.

Further to our hand auger groundwater dips, piezometers were installed within all the machine boreholes.

ENGEO was provided with manual dips recorded within these piezometers, these results as well as indicative groundwater levels recorded in hand auger boreholes are presented in Table 2.

Table 2: Recorded Groundwater Levels

Borehole Number	Date	Depth (m bgl)
BH01	24/07/2023	9.91
BH02	24/07/2023	6.22
BH03	24/07/2023	8.99
HA01	07/06/2023	NGW
HA02	07/06/2023	NGW
HA03	07/06/2023	NGW
HA04	07/06/2023	NGW
HA05	07/06/2023	NGW
HA06	06/06/2023	NGW
HA07	06/06/2023	NGW
HA08	06/06/2023	NGW
HA09	06/06/2023	NGW
HA10	07/06/2023	4.4
HA11	07/06/2023	NGW
HA12	07/06/2023	NGW
HA13	06/06/2023	3.2
HA14	06/06/2023	NGW
HA15	06/06/2023	NGW
HA16	06/06/2023	NGW

It should be noted that the site investigation and groundwater measurements were taken during winter months and it is likely that seasonal fluctuation in groundwater levels may occur at the site.

5.3 Lab Testing

5.3.1 Expansive Soil

Atterberg Limits and Linear Shrinkage laboratory testing was undertaken on three samples collected from boreholes HA02, HA07, and HA15.

Three soil samples of native clay soil were selected for Atterberg limits and linear shrinkage testing in accordance with NZS4402. The approximate sampling locations are shown in Appendix 4, full results are presented in Appendix 7, and the data is summarised in Table 3.

Table 3: Expansive Soil Results

Sample Location	Depth (m)	Moisture Content (%)	Liquid Limit	Plasticity Limit	Linear Shrinkage
SS01 – HA02	0.3 – 0.5	33.8	66	25	16
SS02 – HA07	0.3 – 0.5	30.7	62	26	15
SS03 – HA15	0.3 – 0.5	44.0	65	31	14

Expansive soils are classified in NZS 3604 as soils with a liquid limit of greater than 50% and a linear shrinkage greater than 15%.

6 Geohazards and Geotechnical Assessment

6.1 Slope Stability

Slope instability presents one of the greatest geotechnical risks to the proposed residential development. The risk of instability can be mitigated by positioning the lots away from the steeper portions of site and undertaking geotechnical earthworks in accordance with the recommendations of this report. These methods will achieve acceptable long-term factors of safety for development areas.

6.1.1 Soil Parameters

Representative soil parameters including effective cohesion, undrained shear strength and angle of friction, for each of the identified geological units based on the results of site investigations are summarised in Table 4.

Table 4: Design Soil Parameters

Material	Unit Weight (kN/m^3)	Effective Cohesion c (kPa)	Effective Angle of Friction (°)	Undrained Shear Strength (kPa)
Engineered Fill	18	5	32	140
Hardfill	20	0	38	NA
Residual Soil	17	3	28	80
Transition Zone	18	5	30	NA
ECBF Rock	20	40	40	NA
Colluvium	18	3	24	70
Alluvium	20	1	26	36

6.1.2 Analysis Methodology

In order to assess the stability of the proposed finished landforms for this development, seven cross section profiles were generated through critical sections of the site. The locations of the cross sections are shown on the Envelope plan SK-8000 and is attached within Appendix 8. Interpretative ground models for the eight cross sections are presented in Appendix 9.

Numerical slope stability analyses were conducted using the software package SLIDE2, produced by Rocscience Limited. Analyses were completed using the GLE/ Morgenstern Price Method to identify areas of possible circular slope instability. Based on our on-site findings and our area wide desktop study it is considered that the most likely failure mechanism at the site will be circular failure within overburden soils.

Due to the conceptual nature of the provided building plans, we have modelled a 20 kN/m^2 and 27 kN/ m^2 surcharge across the full extent of the proposed residential lots.

Three conditions were considered to assess the final stability of the slope:

- Normal condition - measured groundwater levels.
- Transient condition with elevated worst credible groundwater profile.
- Seismic condition ULS – a seismic coefficient of 0.19 was used to model the behaviour of the slope during a 1 in 500-year seismic event.

6.1.3 Results and Discussions

The calculated Factor of Safety (FOS), for slip circles encroaching into proposed lots for each cross section is presented in Table 5 along with the Auckland Council requirements.

From the results of this analysis and subject to the recommendations of this report there are no geotechnical stability issues that would preclude a MDRS development form.

Table 5: Auckland Council Factor of Safety Criteria

	Normal Ground Water Conditions	Transient Conditions	Seismic 1 in 500-year Event (ULS)
FoS Required	**1.5**	**1.3**	**1.0**
Cross Section 1	1.6	1.6	1.4
Cross Section 2 (left to right)	1.7	1.3	1.1
Cross Section 2 (right to left)	1.5	1.3	1.7
Cross Section 3	2.0	2.0	1.7
Cross Section 4	1.5*	1.3*	1.1
Cross Section 5	>1.5	>1.3	1.1*
Cross Section 6	>1.5	>1.3	>1.1
Cross Section 7 (left to right)	>1.9	1.3	>1.1
Cross Section 7 (right to left)	1.6	1.8	1.5
Cross Section 8 (left to right)	2	2.3	1.6
Cross Section 8 (right to left)	1.6	1.8	1.6

Cross Sections 1, 2, 7, and 8 do not indicate the potential for instability which could impact the proposed development and are factors of safety fall within requirements of the Auckland Council Code of Practice for Land Development: 2022. This is subject to change based on detailed design and individual lot design.

Cross Section 3 indicates the requirement for retaining structures around the proposed JOAL to achieve the required FoS. For this analysis we have assumed this section has multiple low height retaining walls to support the proposed cuts. At the time of preparation of this report these walls have not been designed however we would expect them to be up to 1.5 m high.

Sections 4, 5, and 6 show instability within 5 m of the southern boundary of the cross section. Through analysis of the critical cross sections for this development, a specific design zone has been imposed upon Lots 27 to 35B. Construction proposed within 5 m from the southern boundary will require specific investigation and design. A specific design zone plan has been attached within Appendix 10.

6.2 Seismic Hazards

Potential seismic hazards resulting from nearby moderate to major earthquakes can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, ground lurching, regional subsidence or uplift, soil liquefaction, lateral spreading, landslides, tsunamis, flooding, or seiches.

As previously discussed, there are no known active faults located within the site and the greater Northland region is regarded as tectonically stable (GNS 2009). Based on our review of the GNS New Zealand Active Fault Database, it is our opinion that fault-related ground rupture is very unlikely within the study area.

Based on topographic and lithologic data, risk from earthquake-induced regional subsidence or uplift is considered negligible at the site.

6.3 Liquefaction and Lateral Spreading

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine-grained cohesionless materials. Empirical evidence indicates that loose to medium dense gravels, silty sands, low-plasticity silts, and some low-plasticity clays are also potentially liquefiable.

Based on the regional geological setting and data collected from our explorations, we consider liquefaction and associated lateral spreading to be a low risk to this proposed development.

6.4 Expansive Soils

Expansive soils shrink and swell as a result of seasonal fluctuation in moisture content. This can cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to volume changes associated with expansive soils can be reduced through proper foundation design. Successful performance of structures on expansive soils requires special attention during construction. It is important that exposed soils be kept moist prior to placement of concrete for foundation construction.

6.5 RMA Section 106 Assessment and Development Suitability

Section 106 of the Resource Management Act states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if it considers that:

- There is significant risk from natural hazards; or
- Sufficient provision has not been made for legal or physical access to each allotment to be created by the subdivision.

An assessment of the risk from natural hazards as required by the RMA includes the following:

- The likelihood of natural hazards occurring (whether individually or in combination);
- The material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and

- Any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

We have assessed the risk of natural hazards at the site in accordance with Section 106 of the Resource Management Act (RMA) and considered the risk to the site from erosion, rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami.

Based on our investigation, assessment and site observations we consider it is unlikely for the site to be subject to the aforementioned natural hazards providing suitable engineering measures are included in the site development (such as specifically designed retaining walls and engineered fill batters). As such, the site is considered to be generally suitable for the proposed residential development from a geotechnical perspective.

7 Geotechnical Recommendations

Based on the findings of the desktop and field investigations as discussed herein, we consider that the subject site is generally suitable for the proposed residential subdivision as depicted within the Envelope plan set.

We should be given an opportunity to review the final Engineering plans for the subdivision prior to finalising and applying for engineering approval in order to provide geotechnical guidance on the earthworks proposals and their implications for slope stability across this and neighbouring sites.

Specific recommendations are presented in the following sections.

7.1 Foundations for Buildings

Based on the findings of the on-site investigations detailed herein, we consider that an unfactored geotechnical ultimate bearing capacity of 300 kPa is likely to be suitable for shallow strip (0.4 m wide) and pad (1 m by 1 m) or waffle raft foundations constructed on either certified filling or on the native ground below any topsoil or pre-existing fill. However, this will be revisited as part of the geotechnical completion report for this site.

Based on our laboratory test results (Appendix 7) our preliminary assessment of the expansive Site Class is M (moderately expansive). This preliminary assessment will also be re-addressed at the time of preparation of our Geotechnical Completion Report.

7.1.1 Bridging Piles

Existing public service lines are present within the site, and bridging piles may be required where building foundations fall within the 45-degree zone of influence of the service lines.

Auckland Council and Watercare have specific requirements regarding bridging pile foundation design. Foundations should be designed so that they meet the following relevant requirements:

- Auckland Council – Stormwater Pipe and Manhole Construction Clearance Requirements, drawing number SW22 Revision 2, dated 1 November 2015.
- Watercare – Pipe and Manhole Clearance, reference WW 53, drawing number 2010070.044B, dated 19 May 2015.

- Watercare – Building Close to or Over Local Network Sewer, reference WW 54, drawing number 2010070.045, dated 20 November 2013.

For bored piles found in stiff to hard ECBF or engineered fill soils, we recommend adopting an unfactored preliminary geotechnical ultimate end bearing capacity of 800 kPa and a skin friction of 20 kPa for pile foundations. Skin friction should be ignored where the pile is within the 45-degree zone of influence (shown as extending from 500 mm below the base of service line within the plans referenced above) or within undocumented fill. The unfactored values provided above need to be factored by appropriate strength reduction factors to determine structural capacity of the bridging piles.

7.1.2 Differential Settlement

As required by Section B1/VM4 of the New Zealand Code Handbook, a strength reduction factor of 0.5 must be applied to all recommended geotechnical ultimate soil capacities in conjunction with their use in factored limit state design load cases for static and earthquake conditions.

7.2 Preliminary Retaining Wall Parameters

ENGEO understands the maximum height of retaining walls planned on-site will be less than 2.0 m. Due to the predominately shallow nature of our investigation, specific geotechnical design parameters should be given if wall height is greater than 2.0 m.

Table 6: Retaining Wall Design Parameters

Soil Type	Unit Weight kN/m3	Friction Angle	Effective Cohesion c' kPa	Undrained Shear Strength (Su kPa)
Cohesive Engineered Fill	18	32	5	100
East Coast Bays Formation Residual Soil	17	28	3	80
East Coast Bays Rock	20	40	40	N/A

The design of rigid retaining walls such as timber retaining walls, i.e. walls that are retained from movement at the top, should be based on an 'at rest' lateral earth pressure (Ko). Flexible walls that are free to deform or rotate at least 1% of the exposed wall height (H) may be designed utilising active soil coefficient (Ka).

These values assume a level ground surface behind the wall, and that no surcharge is placed adjacent to the top of the wall. An allowance should be made in the design for the effects of surcharge from building loads and traffic loads.

Retaining walls should be back drained to prevent the build-up of hydrostatic water pressures. Where seismic design of retained structures is required, a wall displacement factor may be applied to reduce the peak ground acceleration in accordance with Section 5.3 of the MBIE / NZGS Earthquake Geotechnical Practice Module 6 – Earthquake Resistance Retaining Wall Design.

7.3 California Bearing Ratio

Based on Scala penetrometer testing, a preliminary California Bearing Ratio (CBR) design value of 3% may be adopted for preliminary design.

CBR values should be verified during construction when pavement subgrade has been stripped and prepared. CBR values can be highly affected by moisture content (i.e. exposure to the elements) and trafficking, it is therefore recommended that subgrade is only trimmed to final level immediately prior to placing basecourse.

7.4 Soil Classification

For the purpose of seismic design, based on our on-site testing, we consider the soil classification in line with NZS 1170.5:2004 to be 'Class C – Shallow Soil Sites'.

7.5 Tree Removal

Where trees are to be removed, or have historically been removed, but stumps and root systems remain, it is important that all tree stumps and large roots (greater than thumb-size) are completely removed from the building platform and the immediate surroundings, and that the holes created, are filled with compacted hardfill to certifiable standards.

7.6 Earthworks Operations

- All engineered or structural hardfills should be placed in ≤ 200 mm lifts and be compacted to a minimum of 95% of maximum dry density, at no less than optimum moisture content. Maximum dry density for granular fill materials may be obtained from the source quarry, a geotechnical laboratory or from plateau testing undertaken on-site. Compaction should be achieved using standard plant and methodology suitable for the imported material. A water source should be maintained on-site for moisture control.

- Any filling on-site slopes should be suitably benched into slopes and include suitable underfill drainage.

- Exposed cohesive soils should be kept moist prior to pouring concrete. It is difficult to recharge clayey soils in excavations. If these soils dry out, undercutting and replacement with hardfill may be required.

- Our experience with the types of soils present on this site indicates that when they are exposed to the weather their strengths may be significantly reduced. We therefore recommend that trafficked areas and building platforms are only trimmed to final levels immediately prior to metaling and that at all times the site is shaped to avoid water ponding during rain, thereby limiting the need for additional undercutting and hardfilling. On no account should areas of trimmed subgrade be left exposed to allow the ingress of water, nor should subgrade areas be trafficked prior to drying out after rain.

- Wherever filling or soft native ground is present at foundation level it should be undercut and replaced with approved compacted hardfill. Its suitability or otherwise as a bearing material beneath the floor slab should be determined on site by the Engineer.

- All foundation cuts, pile holes and retaining wall excavations should be inspected by ENGEO (or a suitably qualified Geotechnical professional), prior to constructing foundation elements to verify founding conditions are as anticipated.

- All excavated soil should be removed from site or placed in an engineer approved stockpile to avoid unfavorable loading on construction or preconstruction slope batters.
- All excavations should be in line with the WorkSafe Good Practice Guidelines for Excavation Safety (July 2016).

7.7 Cuts and Batters

- Temporary unsupported cut slopes should not exceed a batter of 1 horizontal: 1 vertical (45° from horizontal), to a maximum height of 3.0 m and should not be left unsupported at this batter angle for longer than two weeks.
- Cuts should not be exposed to adverse weather conditions and should be covered to minimise environmental effects (i.e. with polythene plastic).
- Suitable drainage channels must be put in place to divert surface water from unsupported cut faces. Subsurface drains should also be considered for the toe of long-term slopes.
- If any permanent cuts are to be higher than 1.5 m, they should be supported with a specifically designed retaining wall and will need to be approved by a Chartered Professional Engineer practising in Geotechnical Engineering.
- Where vertical and subvertical cut faces higher than 1.0 m are required for the construction of retaining walls, in addition to the above recommendations, we recommend that this is done in shortened sections (< 5 m) and the faces are left unsupported for a minimal time period (i.e. one week) or temporarily shored, particularly in close proximity to site boundaries and structures.
- All temporary cuts and batters proximate to boundaries should take into account the potential surcharge and risk of undermining neighbouring property.
- All cuts and batters should be in line with the WorkSafe Good Practice Guidelines for Excavation Safety (July 2016).

7.8 Sediment and Erosion Control

During construction, measures should be undertaken to control and treat stormwater runoff, with silt and erosion controls complying with Auckland Council Guidance for Erosion & Sediment Control (GD05).

Surface cut-off drains or appropriate stormwater flow paths should be maintained upslope of the proposed development area both during and following construction. These drains and impervious surfaces will divert water away from any buildings and minimise possible movement in expansive soils during and post construction.

Stormwater from paved areas shall be taken in a piped system and disposed of into an approved stormwater system. Uncontrolled discharge onto land should be avoided. All service trenches should be capped with low permeability materials, so that excavations do not become points of entry for surface run-off.

8 AUP Assessment Section E7

Based on the measured groundwater levels detailed herein and the proposed cuts as shown in the Envelope plan sets included in Appendix 1 we consider that the proposed earthworks will not extend below the measured groundwater level and hence a Resource Consent for the diversion or taking of groundwater will not be required.

9 Previous Council RFIs

ENGEO was asked within the Auckland Council RFI section G2 *"Please extend the geotechnical assessment to include the land at 76 Crestview Rise and 170 Settlement Road."*

9.1 ENGEO response

This area of site is outside of the proposed development and the proposed plan change so has not been included within our scope of works. Previous investigation and stability works were undertaken with 76 Crestview Rise and 170 Settlement Road, including the development of a Mass earth stabilised wall and a retaining wall. Those works were discussed in the Geotechnical completion report referenced earlier in this report.

10 Future Work

- Given the conceptual nature of the provided plans, ENGEO (or a suitably qualified Geotechnical Engineer familiar with the content of the geotechnical report(s) for this site) should review the geotechnical aspects of the final working drawings for this development to verify that our recommendations have been interpreted as intended. We reserve the right to revisit and add to our recommendations when these plans are made available. Design Plan Review or Detailed Design to support Building Consent (walls, structures etc.).
- ENGEO (or a suitably qualified Geotechnical Engineer familiar with the content of the geotechnical reports for this site) must be given the opportunity to observe and test geotechnical aspects of the site development and construction to assess that ground conditions are as anticipated and to provide recommendations where ground conditions differ from those anticipated.

11 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Harbour View Heights, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (09) 972 2205 if you require any further information.

Report prepared by

Ben Fleetwood

Engineering Geologist

Report reviewed by

Paul Fletcher, CMEngNZ (CPEng)

Principal Geotechnical Engineer

APPENDIX 1:

Engineering Concept Plans

ENVELOPE

WWW.ENVELOPE-ENG.CO.NZ

CLIENT:
HARBOUR VIEW HEIGHTS LP

PROJECT:
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE
PAPAKURA

PLAN SET:
CIVIL ENGINEERING DESIGN

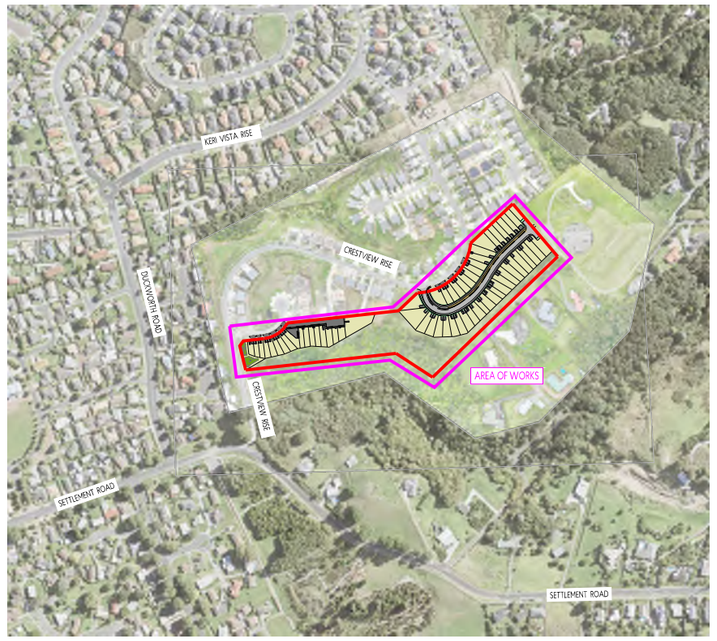
ISSUE:
PLAN CHANGE

DATE:
26-08-2024

REFERENCE:
1915-01

DRAWING INDEX

DRAWING	REVISION	TITLE
1915-01-000	-	COVER AND DRAWING INDEX
1915-01-150	C10	PROPOSED DEVELOPMENT PLAN
1915-01-200	C10	EXISTING SITE PLAN
1915-01-210	C10	PROPOSED CONTOUR PLAN - OVERALL SITE
1915-01-211	C10	PROPOSED CONTOUR PLAN - SHEET 1 OF 2
1915-01-212	C10	PROPOSED CONTOUR PLAN - SHEET 2 OF 2
1915-01-230	C10	CUT FILL CONTOUR PLAN - OVERALL SITE
1915-01-231	C10	CUT FILL CONTOUR PLAN - SHEET 1 OF 2
1915-01-232	C10	CUT FILL CONTOUR PLAN - SHEET 2 OF 2
1915-01-300	C10	ROAD AND PAVEMENT LAYOUT PLAN - OVERALL SITE
1915-01-301	C10	ROAD AND PAVEMENT LAYOUT PLAN - SHEET 1 OF 2
1915-01-302	C10	ROAD AND PAVEMENT LAYOUT PLAN - SHEET 2 OF 2
1915-01-310	C10	ROAD INTERSECTION PLAN - ROAD 1 AND CRESTVIEW RISE
1915-01-330	C10	ROAD LONGSECTION
1915-01-340	C10	TYPICAL ROAD CROSS SECTION
1915-01-400	C10	DRAINAGE PLAN - OVERALL SITE
1915-01-401	C10	DRAINAGE PLAN - SHEET 1 OF 2
1915-01-402	C10	DRAINAGE PLAN - SHEET 2 OF 2
1915-01-470	C10	STORMWATER CATCHMENT PLAN
1915-01-475	C10	OVERLAND FLOWPATH PLAN
1915-01-500	C10	WATER SUPPLY AND SERVICES PLAN - OVERALL SITE
1915-01-501	C10	WATER SUPPLY AND SERVICES PLAN - SHEET 1 OF 2
1915-01-502	C10	WATER SUPPLY AND SERVICES PLAN - SHEET 2 OF 2



LOCATION PLAN

NOTES:

THIS PLAN IS INCLUDED FOR INFORMATION ONLY AND IS NOT A SCHEME PLAN.

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

PROPOSED DEVELOPMENT PLAN

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:750
SCALE A3: 1:1500
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 150
REVISION: C10

NOTES:

1. LEVELS ARE IN TERMS OF AUCKLAND 1946.
2. EXISTING CONTOURS ARE A COMBINATION OF SITE SURVEY DATA AND COUNCIL GIS DATA.

LEGEND:

- EXISTING STORMWATER
- EXISTING WASTEWATER
- EXISTING WATERMAIN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- EXISTING CATCHPIT
- EXISTING CONTOURS SHOWN AT 0.5m INTERVALS

NOTES:

THIS PLAN IS INCLUDED FOR INFORMATION ONLY AND IS NOT A SCHEME PLAN.

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

EXISTING SITE PLAN

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED:	SKR	DRAWN:	SKR
CHECKED:	KD	PLOT DATE:	25/07/2024
SCALE A1:	1:750	SCALE A3:	1:1500
STATUS:	CONCEPT DESIGN		

PROJECT No:	DRAWING No:	REVISION:
1915-01	200	C10

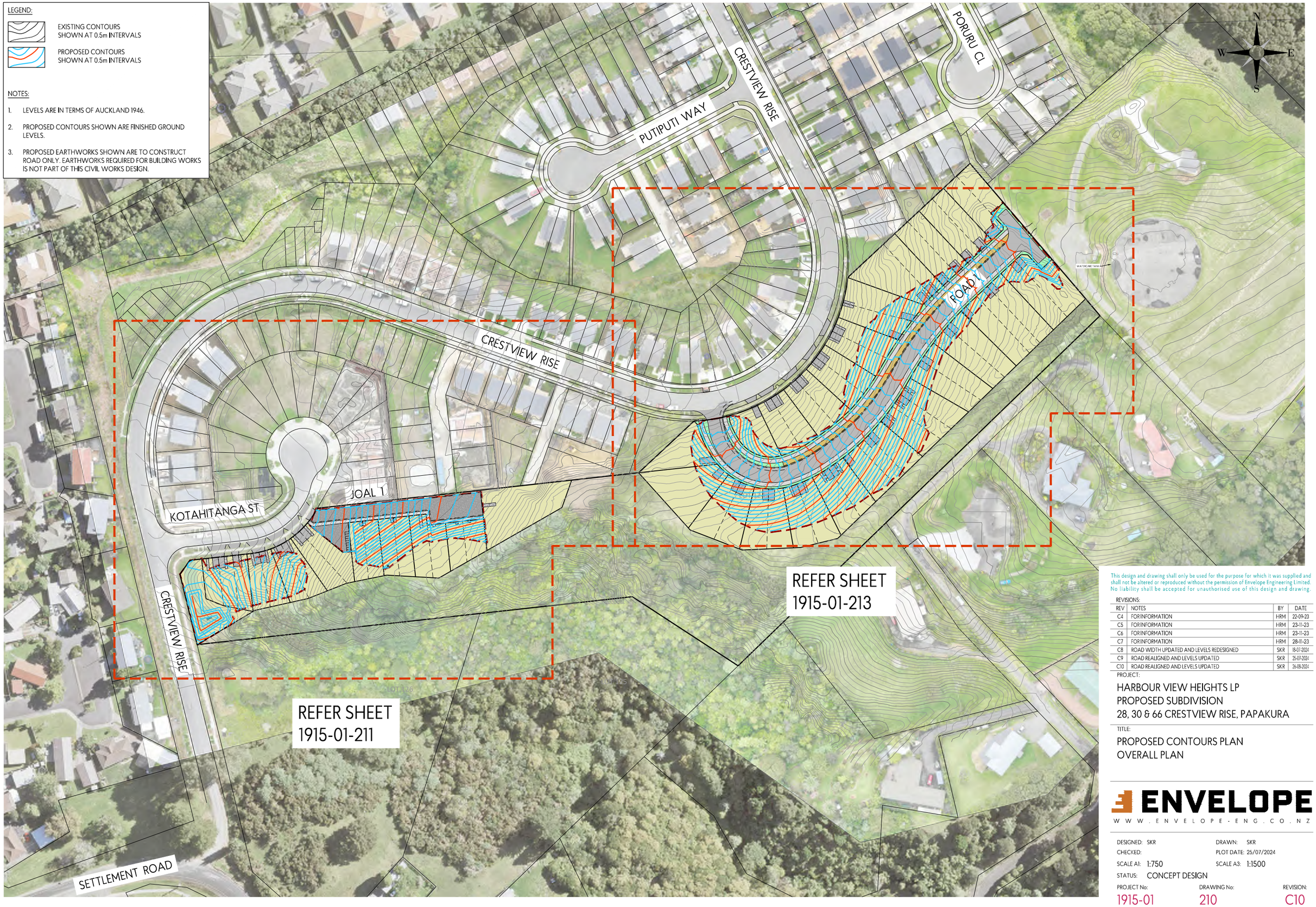
LEGEND:

EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

NOTES:

1. LEVELS ARE IN TERMS OF AUCKLAND 1946.
2. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
3. PROPOSED EARTHWORKS SHOWN ARE TO CONSTRUCT ROAD ONLY. EARTHWORKS REQUIRED FOR BUILDING WORKS IS NOT PART OF THIS CIVIL WORKS DESIGN.



REVISIONS:

REV	NOTES	BY	DATE
C4	FOR INFORMATION	HRM	22-09-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	23-11-23
C7	FOR INFORMATION	HRM	28-11-23
C8	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C9	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

PROPOSED CONTOURS PLAN
OVERALL PLAN

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED:
PLOT DATE: 25/07/2024
SCALE A1: 1:750
SCALE A3: 1:1500
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 210
REVISION: C10

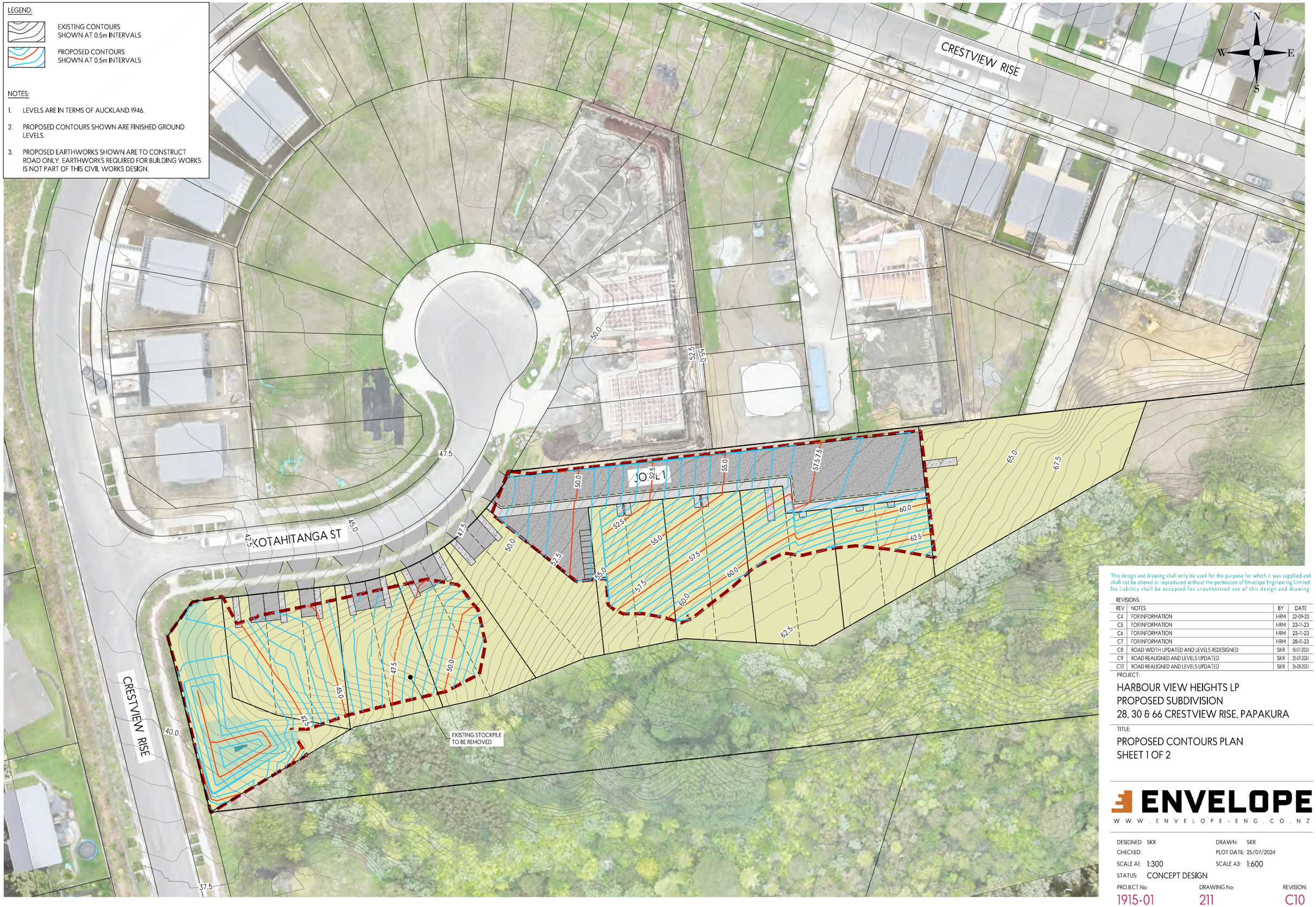
LEGEND:

EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

NOTES:

1. LEVELS ARE IN TERMS OF AUCKLAND 1946.
2. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
3. PROPOSED EARTHWORKS SHOWN ARE TO CONSTRUCT ROAD ONLY. EARTHWORKS REQUIRED FOR BUILDING WORKS IS NOT PART OF THIS CIVIL WORKS DESIGN.



REVISIONS:

REV	NOTES	BY	DATE
C4	FOR INFORMATION	HRM	22-09-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	23-11-23
C7	FOR INFORMATION	HRM	28-11-23
C8	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C9	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

PROPOSED CONTOURS PLAN
SHEET 1 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED:
PLOT DATE: 25/07/2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 211
REVISION: C10

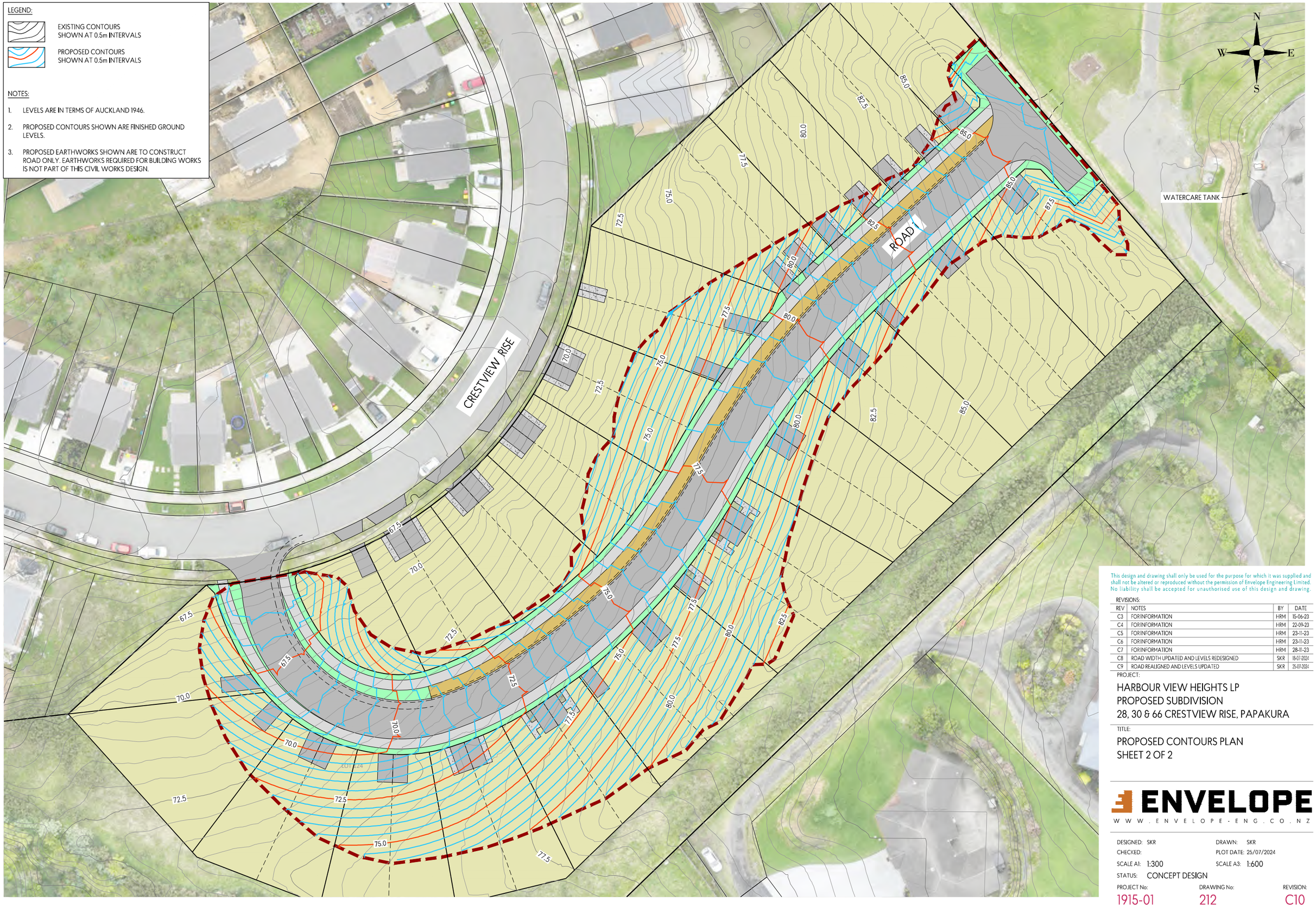
LEGEND:

EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

NOTES:

1. LEVELS ARE IN TERMS OF AUCKLAND 1946.
2. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
3. PROPOSED EARTHWORKS SHOWN ARE TO CONSTRUCT ROAD ONLY. EARTHWORKS REQUIRED FOR BUILDING WORKS IS NOT PART OF THIS CIVIL WORKS DESIGN.



REVISIONS:

REV	NOTES	BY	DATE
C3	FOR INFORMATION	HRM	15-06-23
C4	FOR INFORMATION	HRM	22-09-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	23-11-23
C7	FOR INFORMATION	HRM	28-11-23
C8	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C9	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

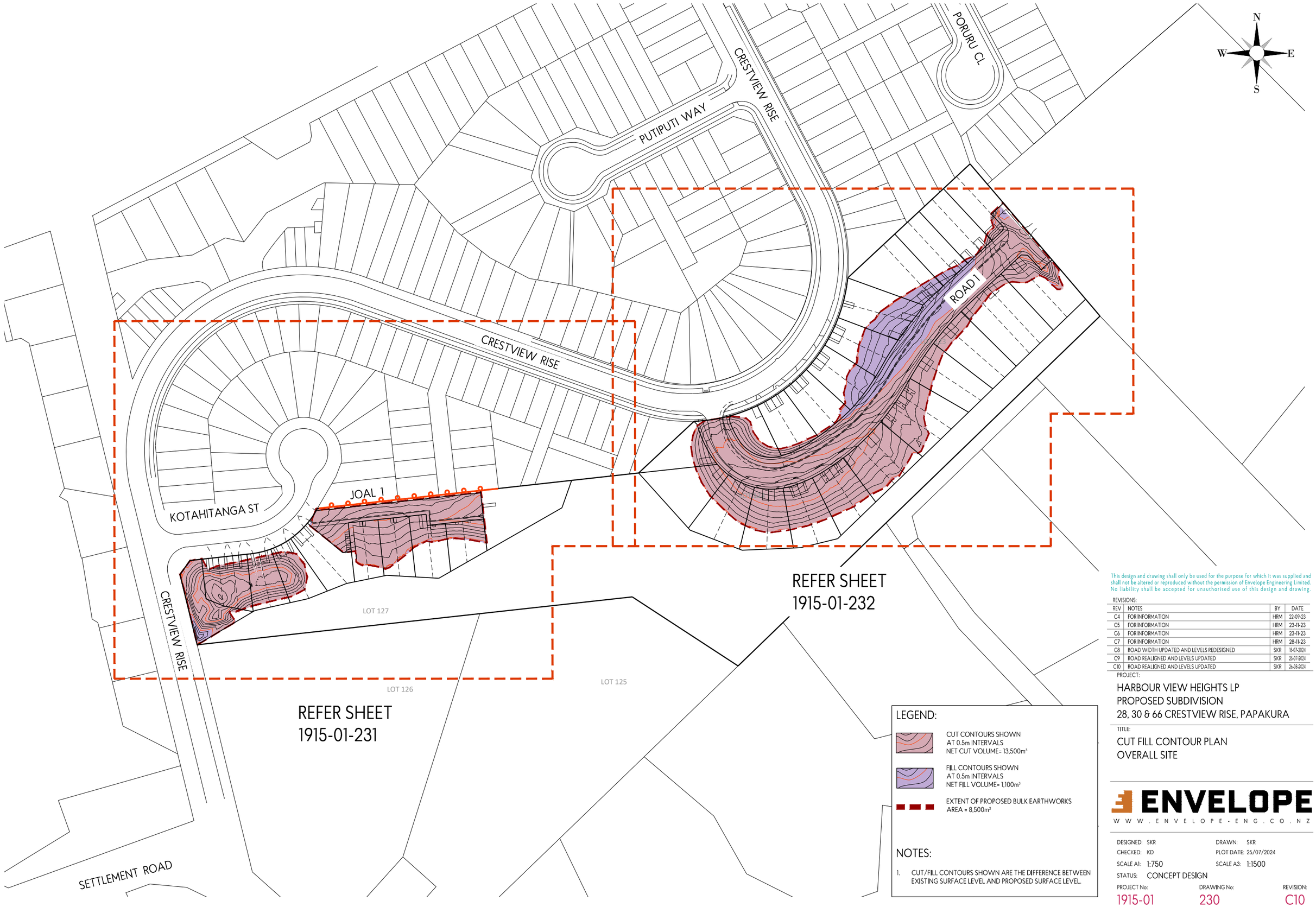
TITLE:

PROPOSED CONTOURS PLAN
SHEET 2 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED:
PLOT DATE: 25/07/2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 212
REVISION: C10



LEGEND:

- CUT CONTOURS SHOWN AT 0.5m INTERVALS NET CUT VOLUME= 13,500m³
- FILL CONTOURS SHOWN AT 0.5m INTERVALS NET FILL VOLUME= 1,100m³
- EXTENT OF PROPOSED BULK EARTHWORKS AREA = 8,500m²

NOTES:

1. CUT/FILL CONTOURS SHOWN ARE THE DIFFERENCE BETWEEN EXISTING SURFACE LEVEL AND PROPOSED SURFACE LEVEL.

REVISIONS:

REV	NOTES	BY	DATE
C4	FOR INFORMATION	HRM	22-09-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	23-11-23
C7	FOR INFORMATION	HRM	28-11-23
C8	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C9	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

CUT FILL CONTOUR PLAN
OVERALL SITE

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:750
SCALE A3: 1:1500
STATUS: CONCEPT DESIGN

PROJECT No:	DRAWING No:	REVISION:
1915-01	230	C10

NOTES:

1. REFER TO 1915-01-230 FOR OVERALL LEGEND AND NOTES.

REVISIONS:

REV	NOTES	BY	DATE
C3	FOR INFORMATION	HRM	15-06-23
C4	FOR INFORMATION	HRM	22-09-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	23-11-23
C7	FOR INFORMATION	HRM	28-11-23
C8	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C9	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

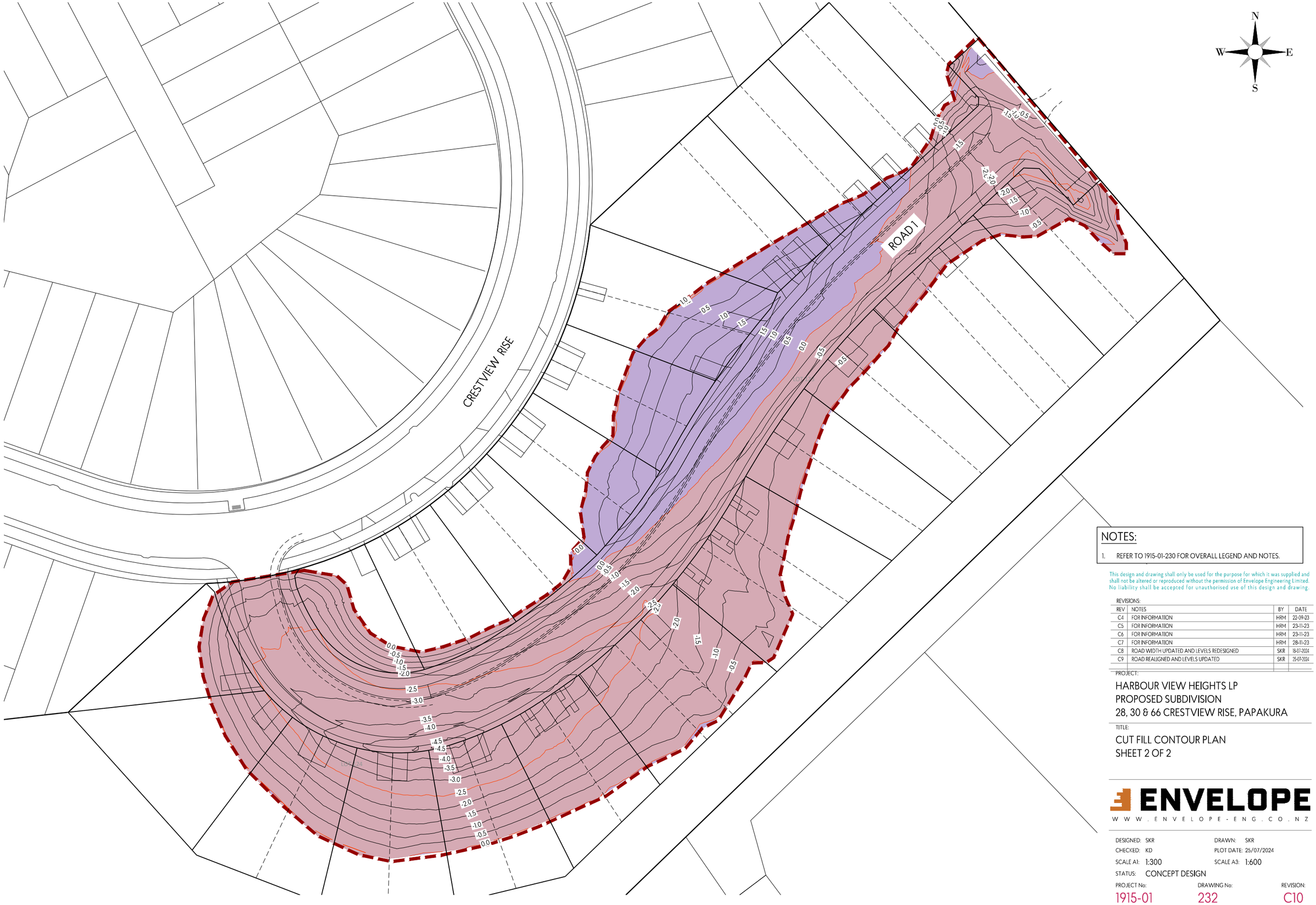
TITLE:

CUT FILL CONTOUR PLAN
SHEET 1 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 231
REVISION: C10



NOTES:

1. REFER TO 1915-01-230 FOR OVERALL LEGEND AND NOTES.

REVISIONS:

REV	NOTES	BY	DATE
C4	FOR INFORMATION	HRM	22-09-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	23-11-23
C7	FOR INFORMATION	HRM	28-11-23
C8	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C9	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

CUT FILL CONTOUR PLAN
SHEET 2 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 232
REVISION: C10

LEGEND:

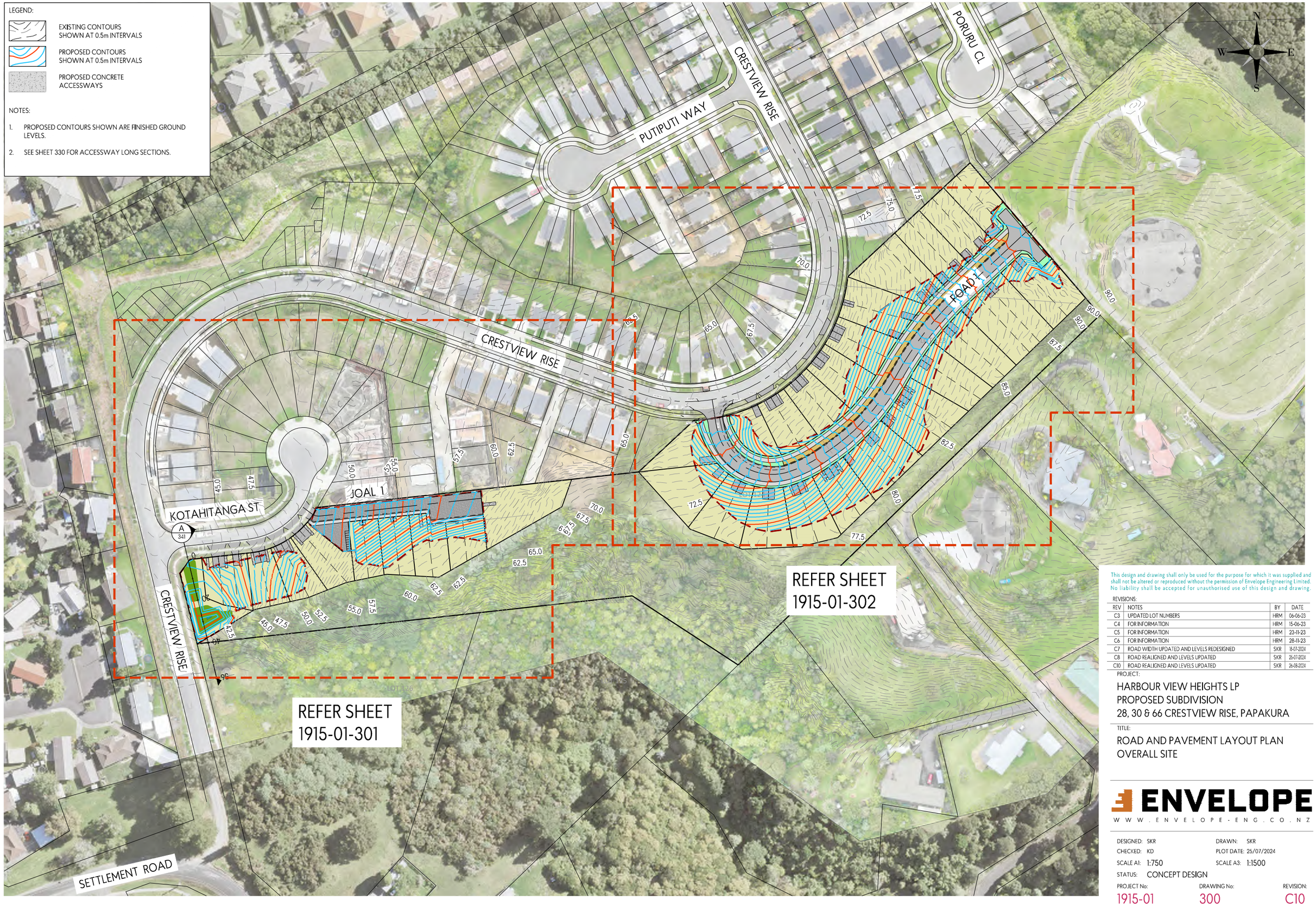
EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONCRETE
ACCESSWAYS

NOTES:

1. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
2. SEE SHEET 330 FOR ACCESSWAY LONG SECTIONS.



REVISIONS:

REV	NOTES	BY	DATE
C3	UPDATED LOT NUMBERS	HRM	06-06-23
C4	FOR INFORMATION	HRM	15-06-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	28-11-23
C7	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C8	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

ROAD AND PAVEMENT LAYOUT PLAN OVERALL SITE

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:750
SCALE A3: 1:1500
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 300
REVISION: C10

LEGEND:

EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONCRETE
ACCESSWAYS

NOTES:

1. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
2. SEE SHEET 330 FOR ACCESSWAY LONG SECTIONS.

NOTES:

1. REFER TO 1915-01-300 FOR OVERALL LEGEND AND NOTES.

REVISIONS:

REV	NOTES	BY	DATE
C3	UPDATED LOT NUMBERS	HRM	06-06-23
C4	FOR INFORMATION	HRM	15-06-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	28-11-23
C7	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C8	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

ROAD AND PAVEMENT LAYOUT PLAN
SHEET 1 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 301
REVISION: C10

LEGEND:

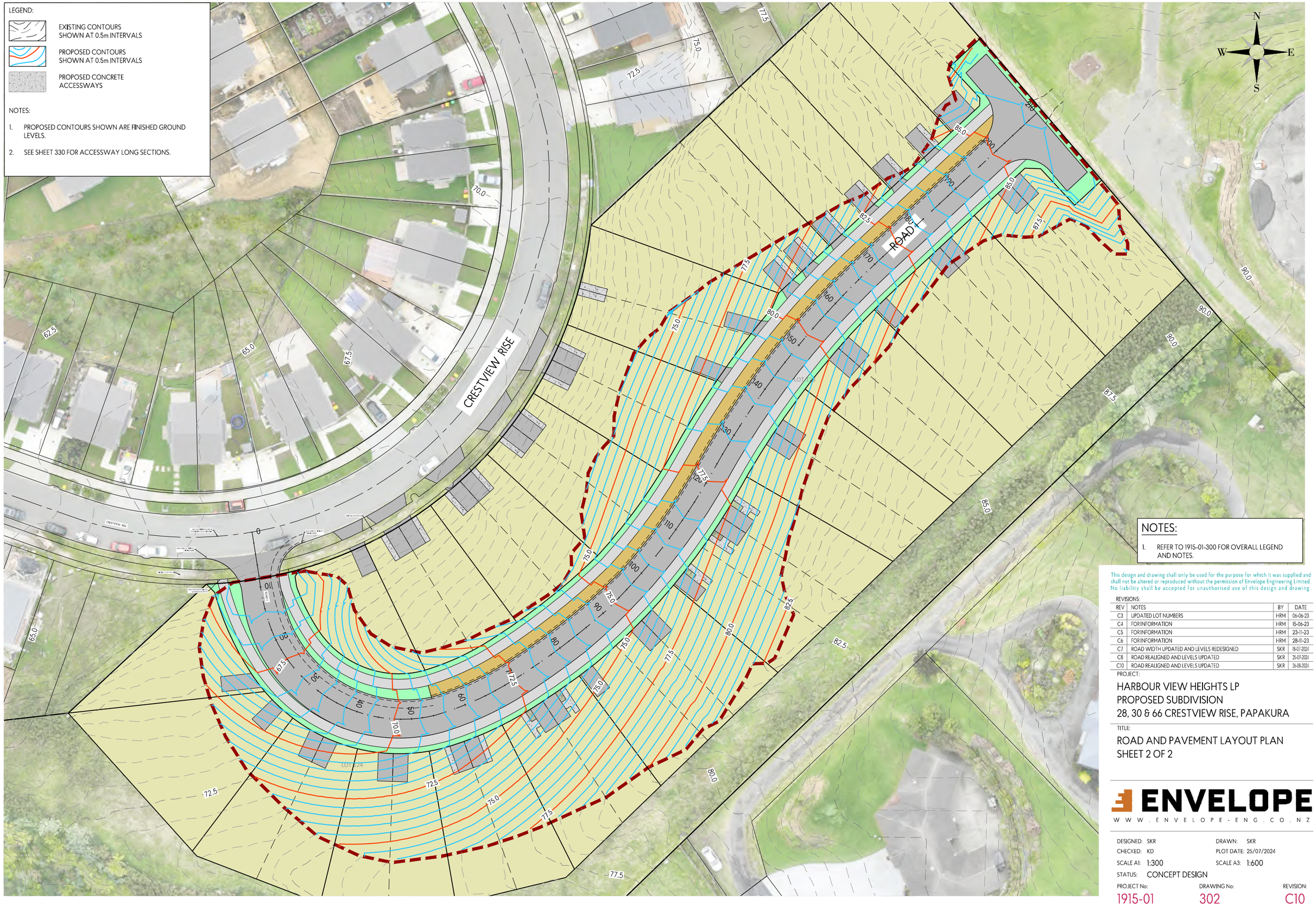
EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONCRETE
ACCESSWAYS

NOTES:

1. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
2. SEE SHEET 330 FOR ACCESSWAY LONG SECTIONS.



NOTES:

1. REFER TO 1915-01-300 FOR OVERALL LEGEND AND NOTES.

REVISIONS:

REV	NOTES	BY	DATE
C3	UPDATED LOT NUMBERS	HRM	06-06-23
C4	FOR INFORMATION	HRM	15-06-23
C5	FOR INFORMATION	HRM	23-11-23
C6	FOR INFORMATION	HRM	28-11-23
C7	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C8	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	28-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

ROAD AND PAVEMENT LAYOUT PLAN
SHEET 2 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 302
REVISION: C10

LEGEND:

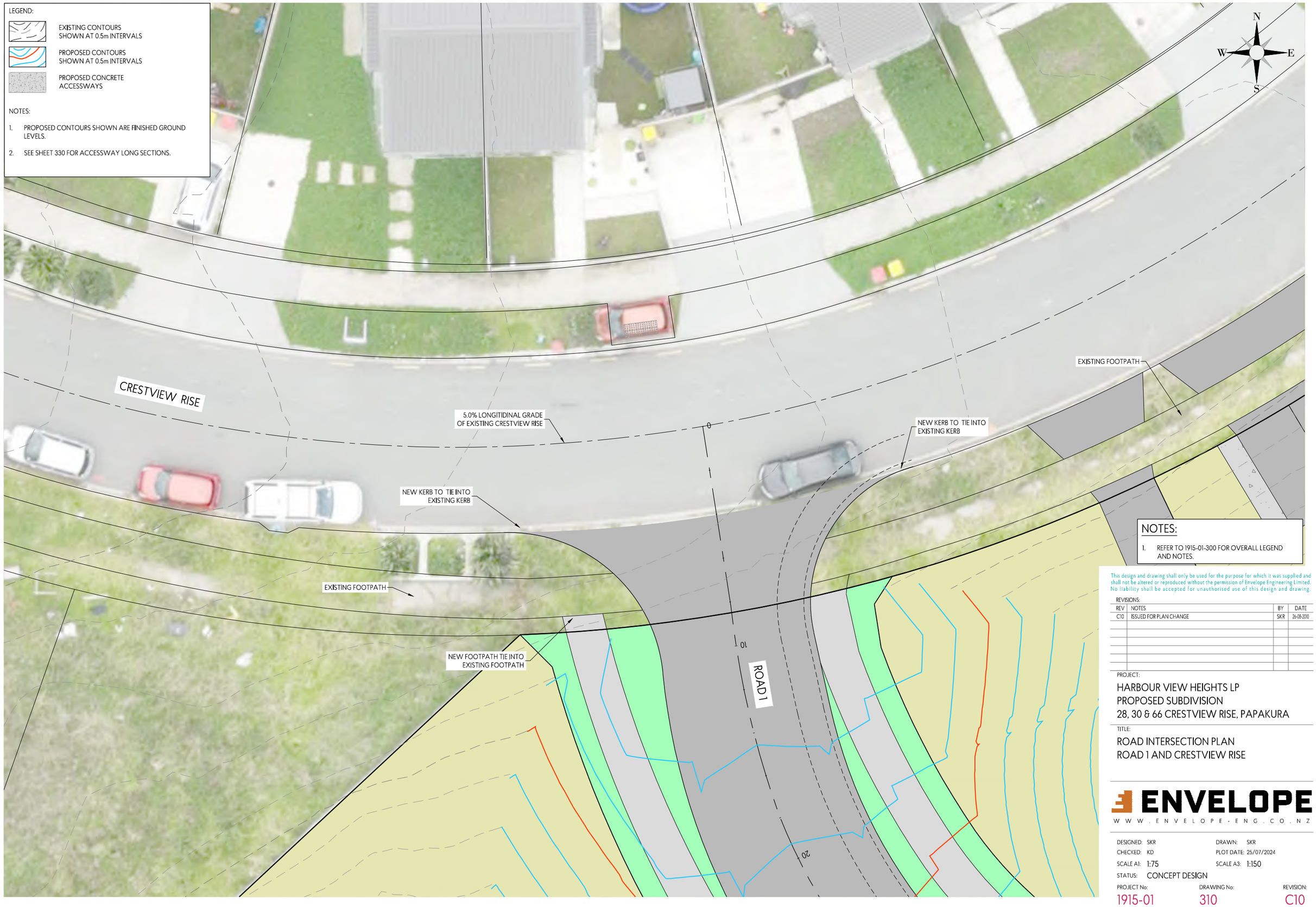
EXISTING CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONTOURS
SHOWN AT 0.5m INTERVALS

PROPOSED CONCRETE
ACCESSWAYS

NOTES:

1. PROPOSED CONTOURS SHOWN ARE FINISHED GROUND LEVELS.
2. SEE SHEET 330 FOR ACCESSWAY LONG SECTIONS.



NOTES:

1. REFER TO 1915-01-300 FOR OVERALL LEGEND AND NOTES.

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2010

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

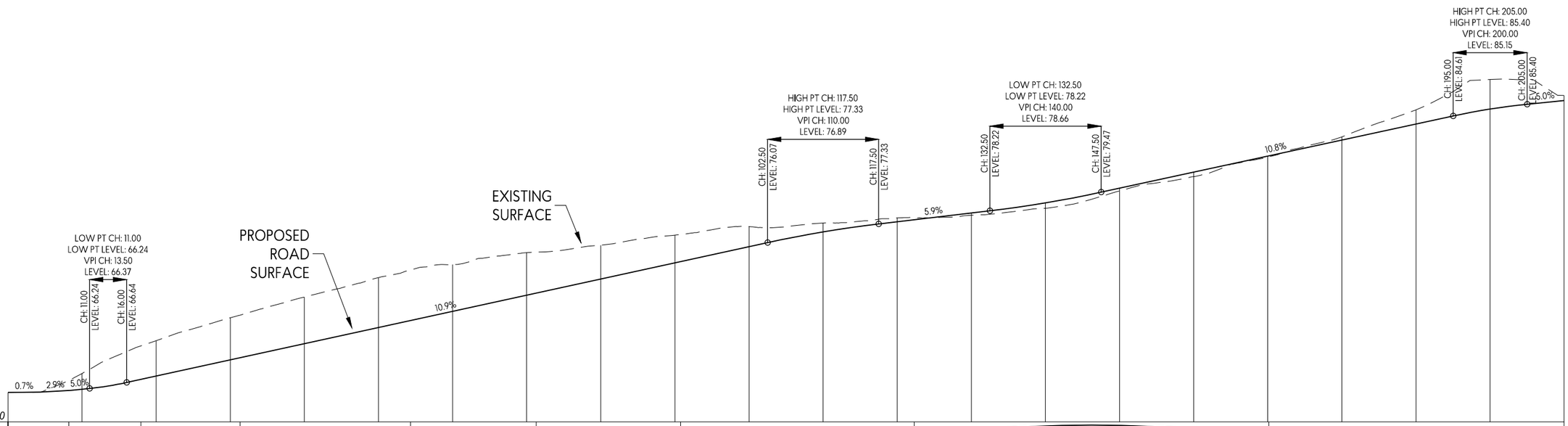
TITLE:

ROAD INTERSECTION PLAN
ROAD 1 AND CRESTVIEW RISE

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: 1:75
SCALE A3: 1:150
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 310
REVISION: C10

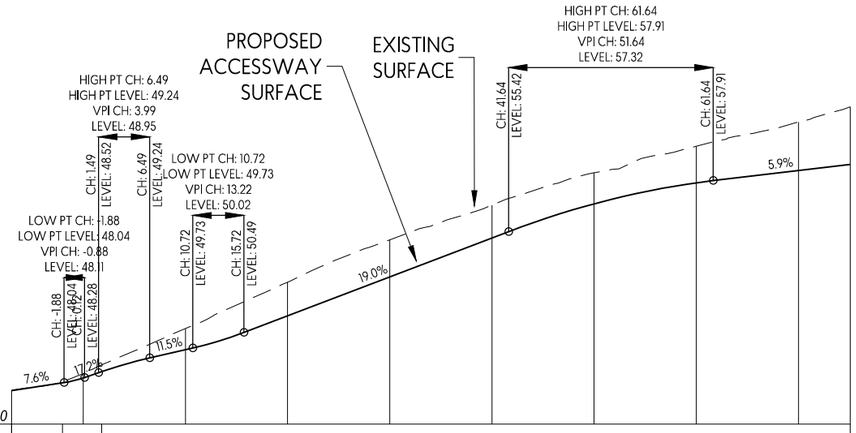


HORIZONTAL GEOMETRY		8.21m 171°05'46"	R 40.76 A 9.73	R 25.81 A 13.38	R 24.99 A 23.00	R 55.07 A 16.98	R 128.36 A 19.48	R 107.50 A 31.52	R 152.80 A 47.86	39.81m 47°01'07"												
CUT/FILL DEPTHS	0.00	-1.06	-2.39	-2.84	-3.15	-3.37	-3.16	-2.87	-2.28	-1.87	-1.36	-0.59	-0.26	0.15	0.36	0.18	0.30	0.07	-0.22	-0.96	-1.99	-0.34
EXISTING LEVELS	65.97	67.25	69.47	71.01	72.40	73.71	74.60	75.40	75.90	76.58	77.15	77.39	77.74	77.92	78.39	79.56	80.52	81.83	83.20	85.02	87.06	85.99
PROPOSED LEVELS	65.97	66.20	67.08	68.17	69.26	70.35	71.44	72.53	73.62	74.71	75.80	76.79	77.48	78.07	78.75	79.74	80.82	81.90	82.98	84.07	85.07	85.65
VERTICAL GEOMETRY		0.68%	2.93%	5.00%	VC: 5.00m K: 0.85	10.90%						VC: 15.00m K: 3.00	5.90%		VC: 15.00m K: 3.05	10.82%					VC: 10.00m K: 1.72	5.00%	
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	209.96

ROAD 1
LONGSECTION BETWEEN 0.00 AND 209.96

LONG SECTION - ROAD 1

SCALE: 1:300-A1, 1:600-A3 (Horizontal)
1:150-A1, 1:300-A3 (Vertical)



HORIZONTAL GEOMETRY		4.96m 127°36'10"	R 5.00 A 3.83	73.27m 83°42'16"						
CUT/FILL DEPTHS		-0.22	-1.03	-1.64	-1.82	-1.61	-1.52	-1.79	-2.37	-2.81
EXISTING LEVELS	47.67	48.48	50.67	52.94	55.02	56.71	58.30	59.60	60.78	61.52
PROPOSED LEVELS		48.26	49.64	51.31	53.21	55.11	56.78	57.81	58.41	58.71
VERTICAL GEOMETRY		7.59%	VC: 2.08m K: 0.27	VC: 5.00m K: 0.89	11.55%	VC: 5.00m K: 0.67	19.00%		VC: 20.00m K: 1.53	5.94%
CHAINAGE	-7.00	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	75.06

JOAL 2
LONGSECTION BETWEEN -7.00 AND 75.06

SCALE: 1:300-A1, 1:600-A3 (Horizontal)
1:150-A1, 1:300-A3 (Vertical)

NOTES:

1. REFER TO DRAWING 300 FOR PROPOSED ACCESSWAY LAYOUT PLAN.

REVISIONS:

REV	NOTES	BY	DATE
C4	FOR INFORMATION	HRM	15-06-23
C5	FOR INFORMATION	HRM	26-06-23
C6	FOR INFORMATION	HRM	22-09-23
C7	FOR INFORMATION	HRM	23-11-23
C8	FOR INFORMATION	HRM	28-11-23
C9	ROAD WIDTH UPDATED AND LEVELS REDESIGNED	SKR	18-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

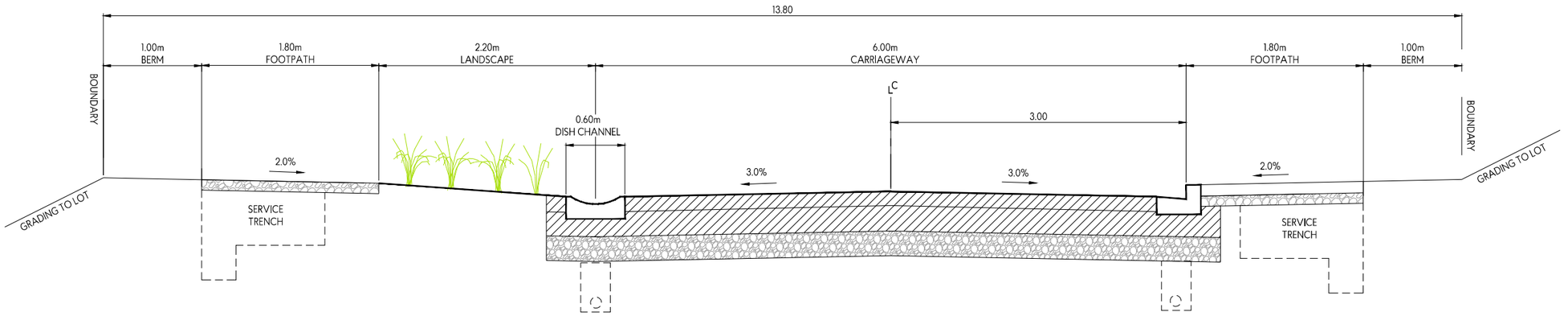
TITLE:

PROPOSED
ACCESSWAY
LONG SECTIONS

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

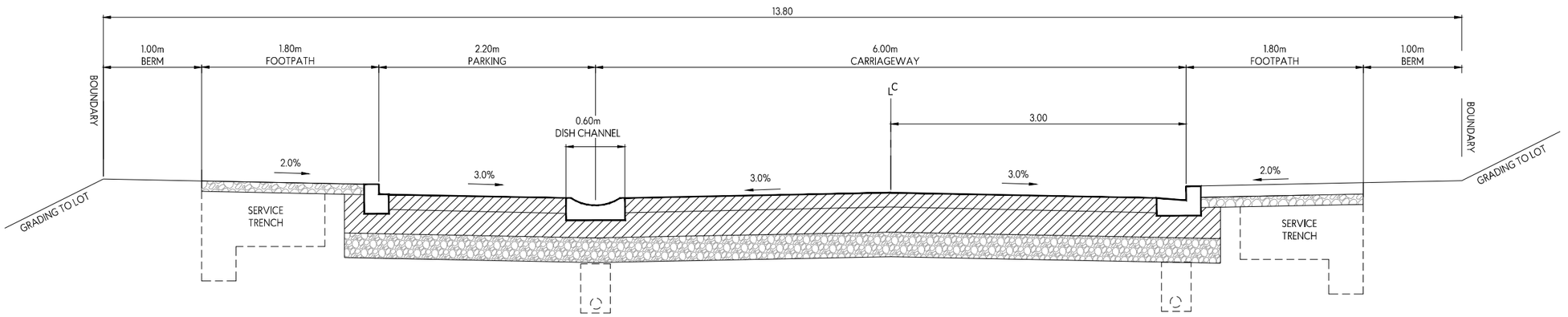
DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 25/07/2024
SCALE A1: AS SHOWN
SCALE A3:
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 330
REVISION: C10



TYPICAL ROAD CROSS-SECTION - PLANTING / RAIN GARDEN

SCALE: 1:25-A1
1:50-A3



TYPICAL ROAD CROSS-SECTION - PARKING BAY

SCALE: 1:25-A1
1:50-A3

NOTES:

1. REFER TO DRAWING 300 FOR PROPOSED ACCESSWAY LAYOUT PLAN.

REVISIONS:

REV	NOTES	BY	DATE
C1	CONCEPT PLAN	JDP	31-03-23
C2	ADDITIONAL LOTS ADDED	HRM	30-05-23
C3	ACCESSWAY WIDTHS AMENDED	LGM	24-04-23
C4	FOR INFORMATION	HRM	15-06-23
C5	ROAD WIDTH UPDATED	SKR	18-07-2024
C6	ROAD REALIGNED AND LEVELS UPDATED	SKR	25-07-2024
C10	ROAD REALIGNED AND LEVELS UPDATED	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

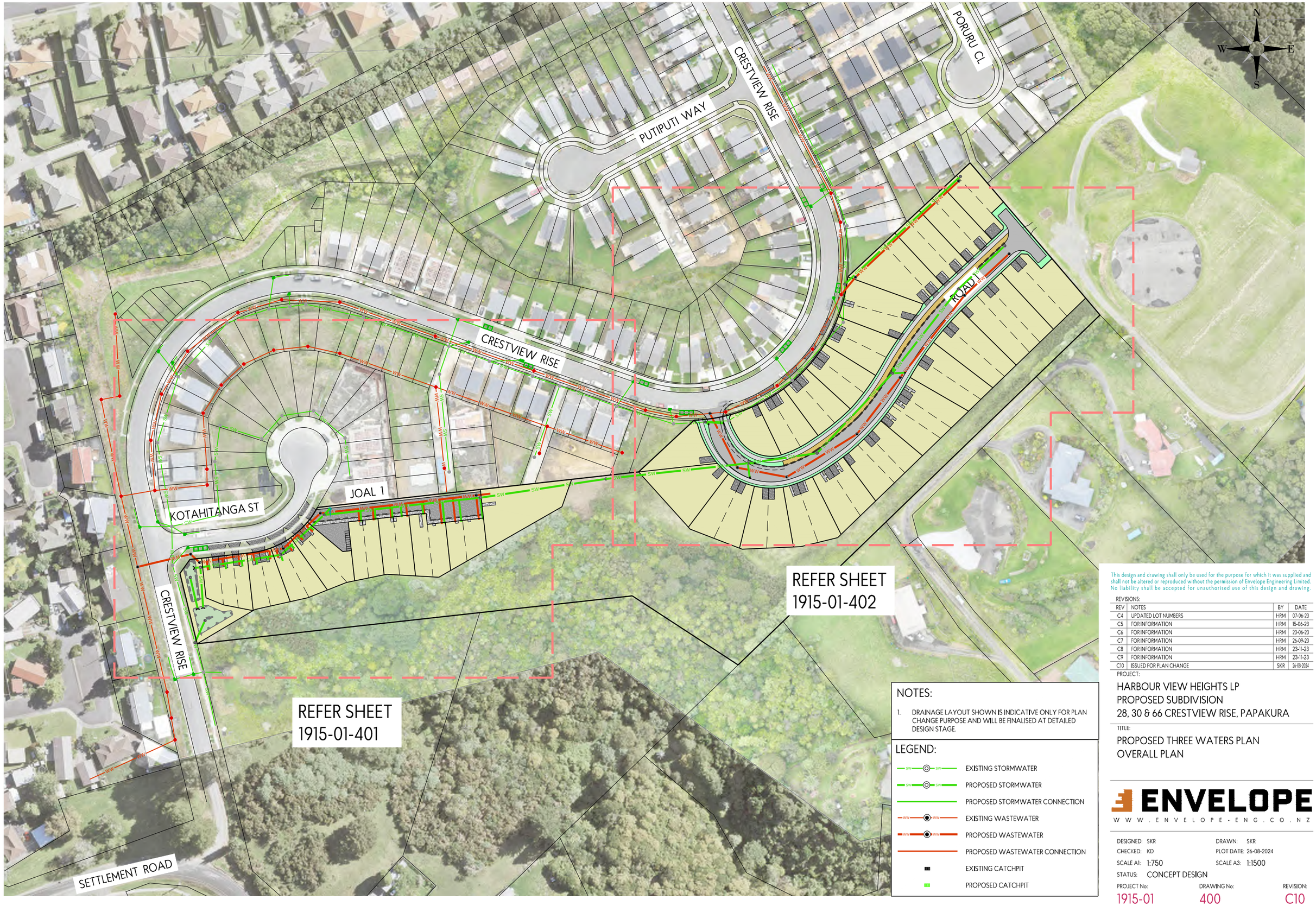
TITLE:

TYPICAL ROAD CROSS SECTION

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 01-09-2024
SCALE A1: AS SHOWN
SCALE A3: AS SHOWN
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 340
REVISION: C10



NOTES:

1. DRAINAGE LAYOUT SHOWN IS INDICATIVE ONLY FOR PLAN CHANGE PURPOSE AND WILL BE FINALISED AT DETAILED DESIGN STAGE.

LEGEND:

- EXISTING STORMWATER
- PROPOSED STORMWATER
- PROPOSED STORMWATER CONNECTION
- EXISTING WASTEWATER
- PROPOSED WASTEWATER
- PROPOSED WASTEWATER CONNECTION
- EXISTING CATCHPIT
- PROPOSED CATCHPIT

REVISIONS:

REV	NOTES	BY	DATE
C4	UPDATED LOT NUMBERS	HRM	07-06-23
C5	FOR INFORMATION	HRM	15-06-23
C6	FOR INFORMATION	HRM	23-06-23
C7	FOR INFORMATION	HRM	26-09-23
C8	FOR INFORMATION	HRM	23-11-23
C9	FOR INFORMATION	HRM	23-11-23
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

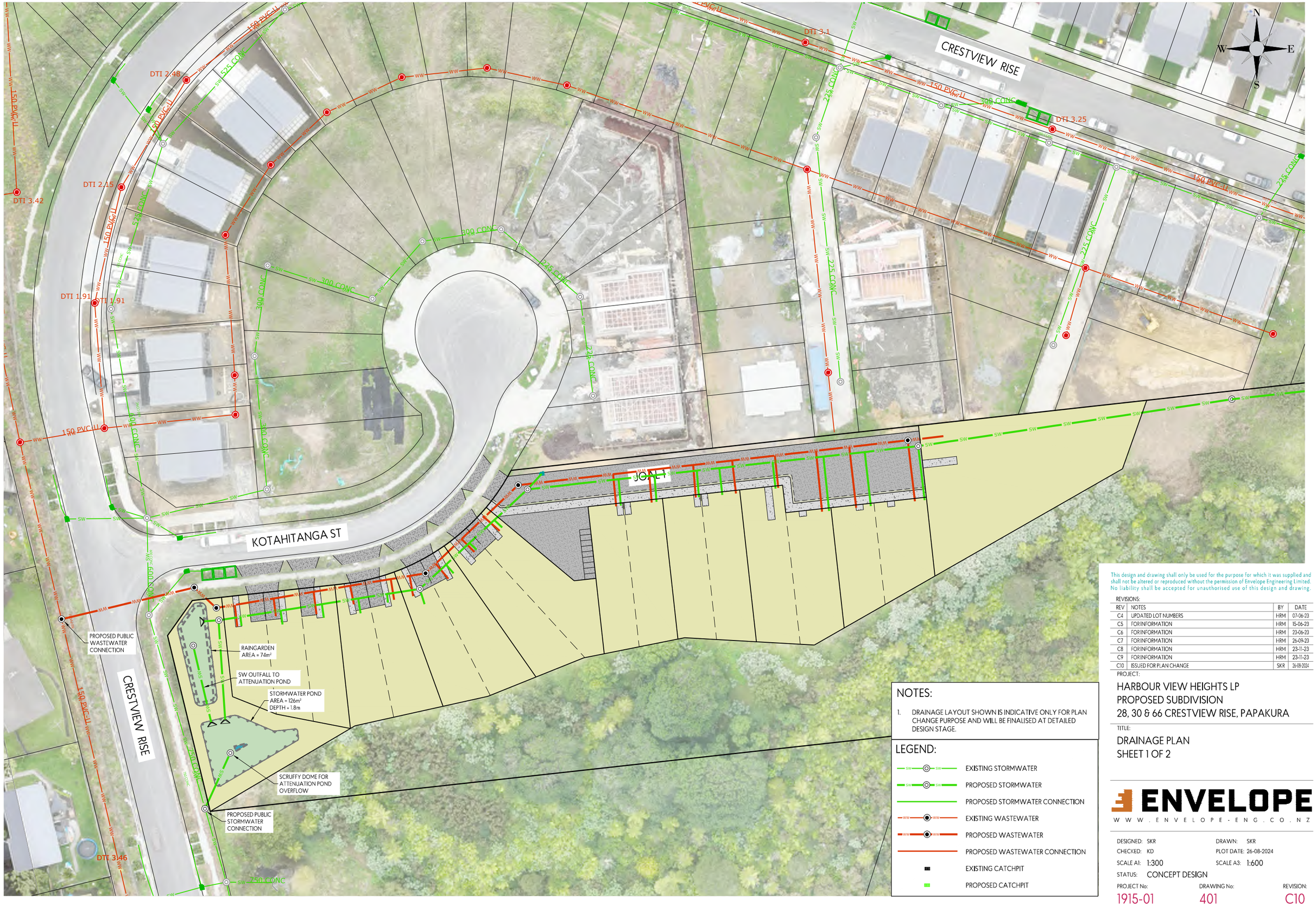
TITLE:

PROPOSED THREE WATERS PLAN
OVERALL PLAN

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 26-08-2024
SCALE A1: 1:750
SCALE A3: 1:1500
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 400
REVISION: C10



NOTES:

1. DRAINAGE LAYOUT SHOWN IS INDICATIVE ONLY FOR PLAN CHANGE PURPOSE AND WILL BE FINALISED AT DETAILED DESIGN STAGE.

LEGEND:

- EXISTING STORMWATER
- PROPOSED STORMWATER
- PROPOSED STORMWATER CONNECTION
- EXISTING WASTEWATER
- PROPOSED WASTEWATER
- PROPOSED WASTEWATER CONNECTION
- EXISTING CATCHPIT
- PROPOSED CATCHPIT

REVISIONS:

REV	NOTES	BY	DATE
C4	UPDATED LOT NUMBERS	HRM	07-06-23
C5	FOR INFORMATION	HRM	15-06-23
C6	FOR INFORMATION	HRM	23-06-23
C7	FOR INFORMATION	HRM	26-09-23
C8	FOR INFORMATION	HRM	23-11-23
C9	FOR INFORMATION	HRM	23-11-23
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

DRAINAGE PLAN
SHEET 1 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 26-08-2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 401
REVISION: C10

REVISIONS:

REV	NOTES	BY	DATE
C4	UPDATED LOT NUMBERS	HRM	07-06-23
C5	FOR INFORMATION	HRM	15-06-23
C6	FOR INFORMATION	HRM	23-06-23
C7	FOR INFORMATION	HRM	26-09-23
C8	FOR INFORMATION	HRM	23-11-23
C9	FOR INFORMATION	HRM	23-11-23
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

DRAINAGE PLAN
SHEET 2 OF 2

NOTES:

1. DRAINAGE LAYOUT SHOWN IS INDICATIVE ONLY FOR PLAN CHANGE PURPOSE AND WILL BE FINALISED AT DETAILED DESIGN STAGE.

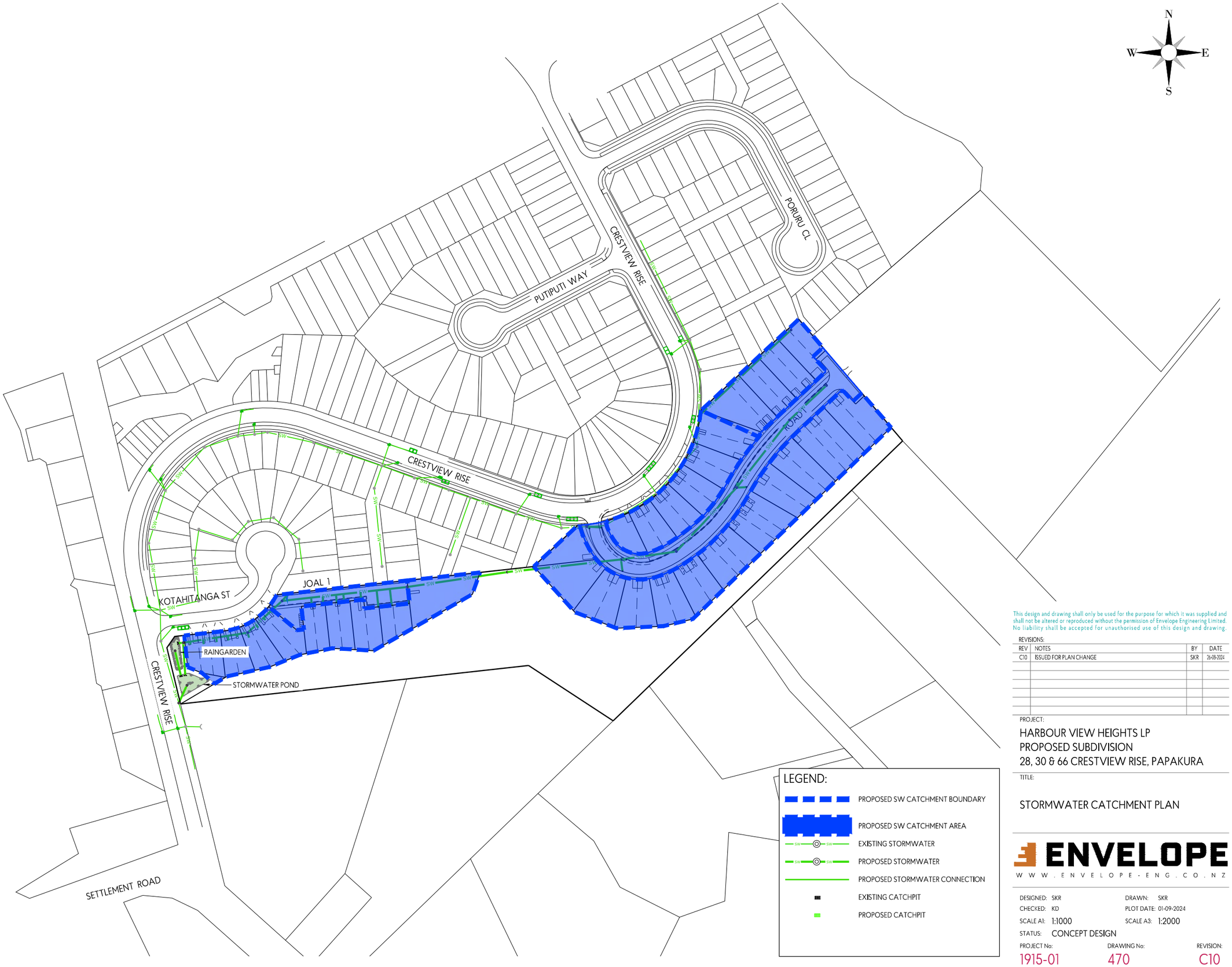
LEGEND:

- EXISTING STORMWATER
- PROPOSED STORMWATER
- PROPOSED STORMWATER CONNECTION
- EXISTING WASTEWATER
- PROPOSED WASTEWATER
- PROPOSED WASTEWATER CONNECTION
- EXISTING CATCHPIT
- PROPOSED CATCHPIT

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED:	SKR	DRAWN:	SKR
CHECKED:	KD	PLOT DATE:	26-08-2024
SCALE A1:	1:300	SCALE A3:	1:600
STATUS:	CONCEPT DESIGN		

PROJECT No:	DRAWING No:	REVISION:
1915-01	402	C10



LEGEND:

- PROPOSED SW CATCHMENT BOUNDARY
- PROPOSED SW CATCHMENT AREA
- EXISTING STORMWATER
- PROPOSED STORMWATER
- PROPOSED STORMWATER CONNECTION
- EXISTING CATCHPIT
- PROPOSED CATCHPIT

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

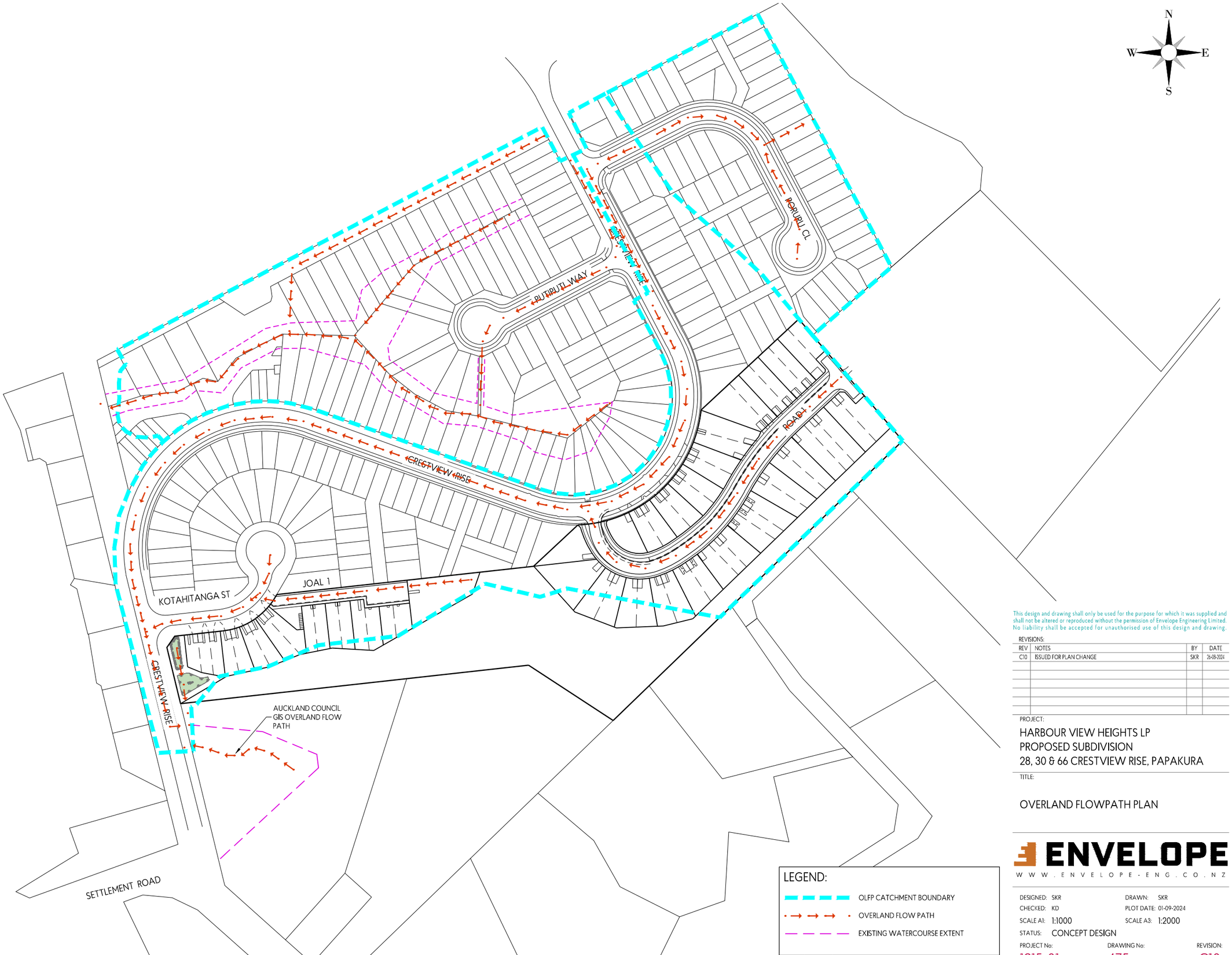
TITLE:

STORMWATER CATCHMENT PLAN

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 01-09-2024
SCALE A1: 1:1000
SCALE A3: 1:2000
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 470
REVISION: C10



REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

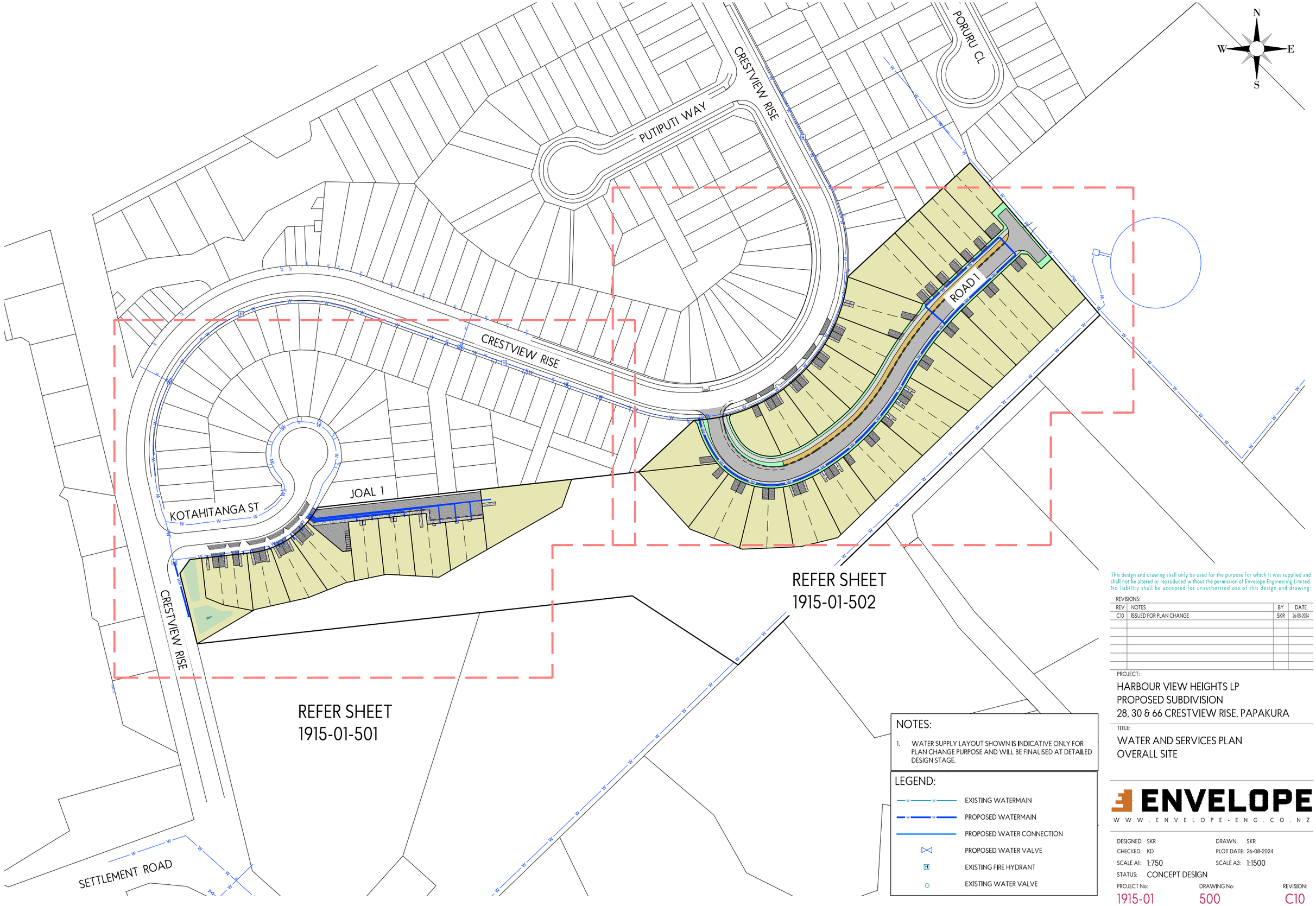
TITLE:

OVERLAND FLOWPATH PLAN

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 01-09-2024
SCALE A1: 1:1000
SCALE A3: 1:2000
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 475
REVISION: C10



NOTES:

1. WATER SUPPLY LAYOUT SHOWN IS INDICATIVE ONLY FOR PLAN CHANGE PURPOSE AND WILL BE FINALISED AT DETAILED DESIGN STAGE.

LEGEND:

- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- PROPOSED WATER CONNECTION
- PROPOSED WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

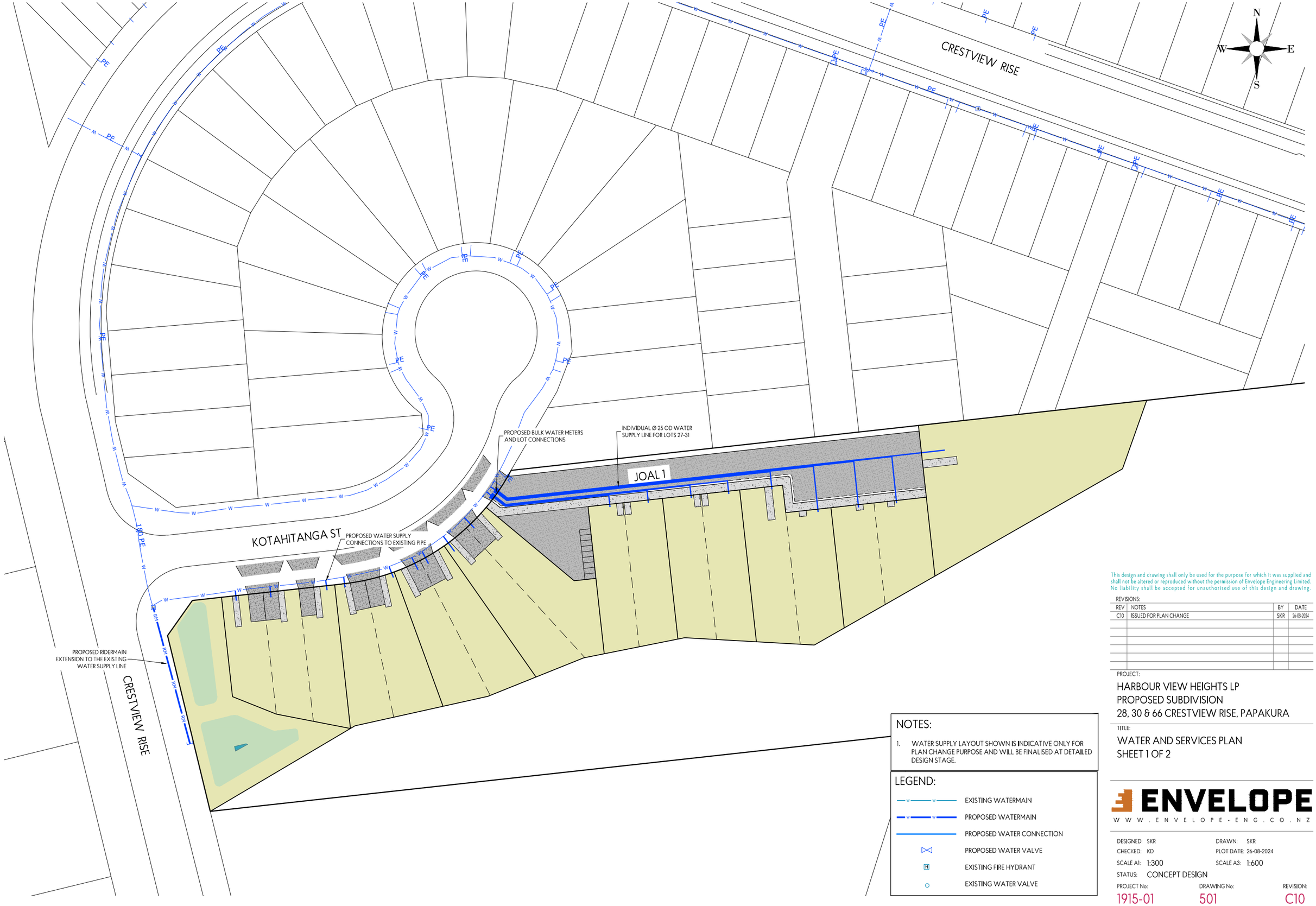
TITLE:

WATER AND SERVICES PLAN
OVERALL SITE

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 26-08-2024
SCALE A1: 1:750
SCALE A3: 1:1500
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 500
REVISION: C10



NOTES:

1. WATER SUPPLY LAYOUT SHOWN IS INDICATIVE ONLY FOR PLAN CHANGE PURPOSE AND WILL BE FINALISED AT DETAILED DESIGN STAGE.

LEGEND:

- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- PROPOSED WATER CONNECTION
- PROPOSED WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

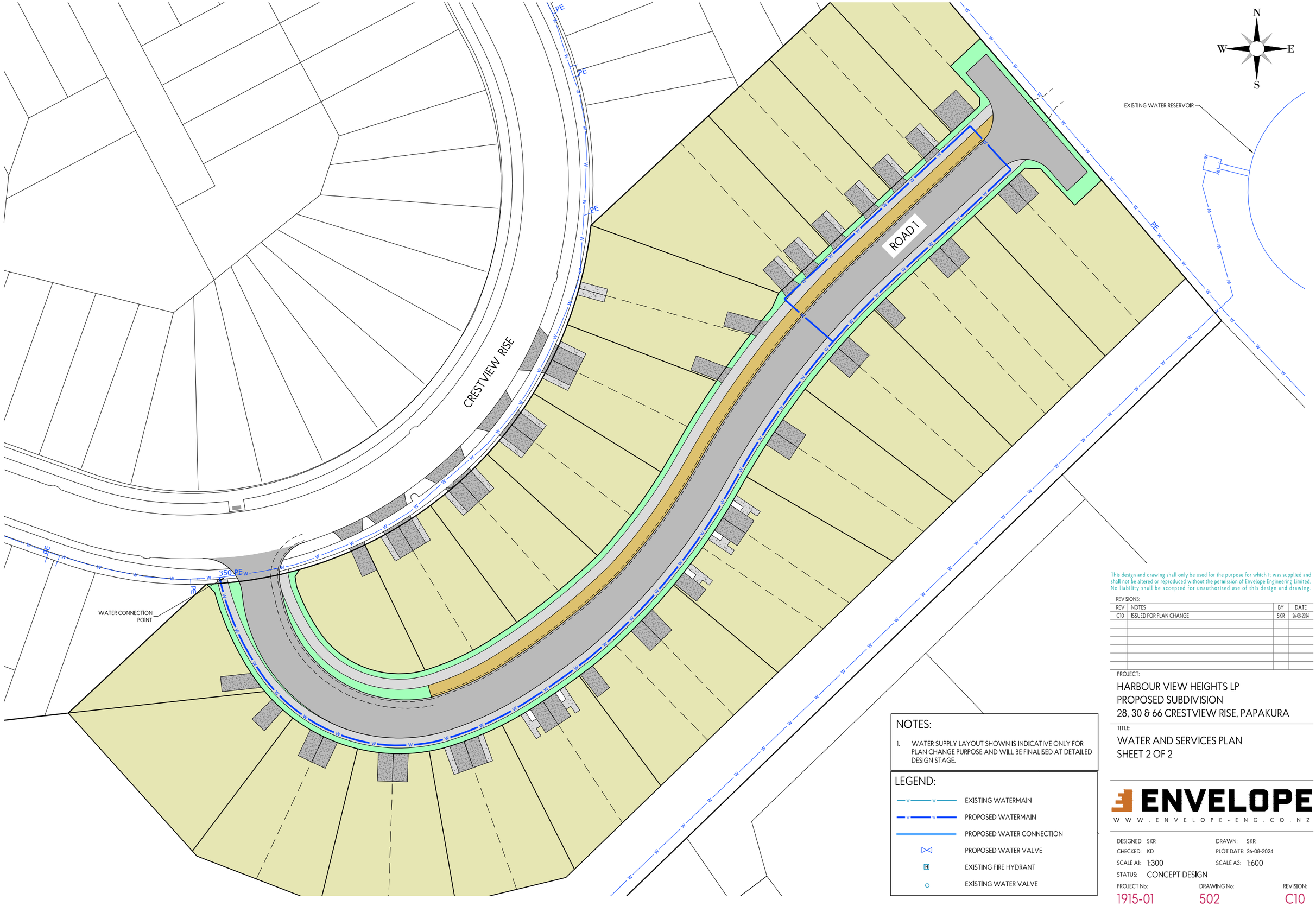
TITLE:

WATER AND SERVICES PLAN
SHEET 1 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 26-08-2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 501
REVISION: C10



NOTES:

1. WATER SUPPLY LAYOUT SHOWN IS INDICATIVE ONLY FOR PLAN CHANGE PURPOSE AND WILL BE FINALISED AT DETAILED DESIGN STAGE.

LEGEND:

- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- PROPOSED WATER CONNECTION
- PROPOSED WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

REVISIONS:

REV	NOTES	BY	DATE
C10	ISSUED FOR PLAN CHANGE	SKR	26-08-2024

PROJECT:

HARBOUR VIEW HEIGHTS LP
PROPOSED SUBDIVISION
28, 30 & 66 CRESTVIEW RISE, PAPAKURA

TITLE:

WATER AND SERVICES PLAN
SHEET 2 OF 2

ENVELOPE
WWW.ENVELOPE-ENG.CO.NZ

DESIGNED: SKR
DRAWN: SKR
CHECKED: KD
PLOT DATE: 26-08-2024
SCALE A1: 1:300
SCALE A3: 1:600
STATUS: CONCEPT DESIGN

PROJECT No: 1915-01
DRAWING No: 502
REVISION: C10

29/08/2024 11:32:08

VERIFY ALL DIMENSIONS ON THE JOB BEFORE PREPARING SHOP DRAWINGS OR COMMENCING WORK. THIS DRAWING IS COPYRIGHT AND IS PROPERTY OF URBAN FORM DESIGN LIMITED. DO NOT SCALE THIS DRAWING.

DRAWING REVISIONS

REV	DATE	DESCRIPTION
A	31.08.2024	For Private Plan Change - RFI

For Private Plan Change

URBAN FORM DESIGN

Architecture | Master Planning | Urban Design

WEBSITE: www.urbanformdesign.co.nz
EMAIL: office@urbanformdesign.co.nz

IN COLLABORATION WITH:

ENVELOPE
RESET URBAN DESIGN
RDBCONSULT

CLIENT
Harbour View Heights L.P.

PROJECT NAME
Crestview Rise Plan Change

28, 30, 66 & 76 Crestview Rise, 170 Settlement Road

SHEET TITLE
Indicative Site Plan - Public Road

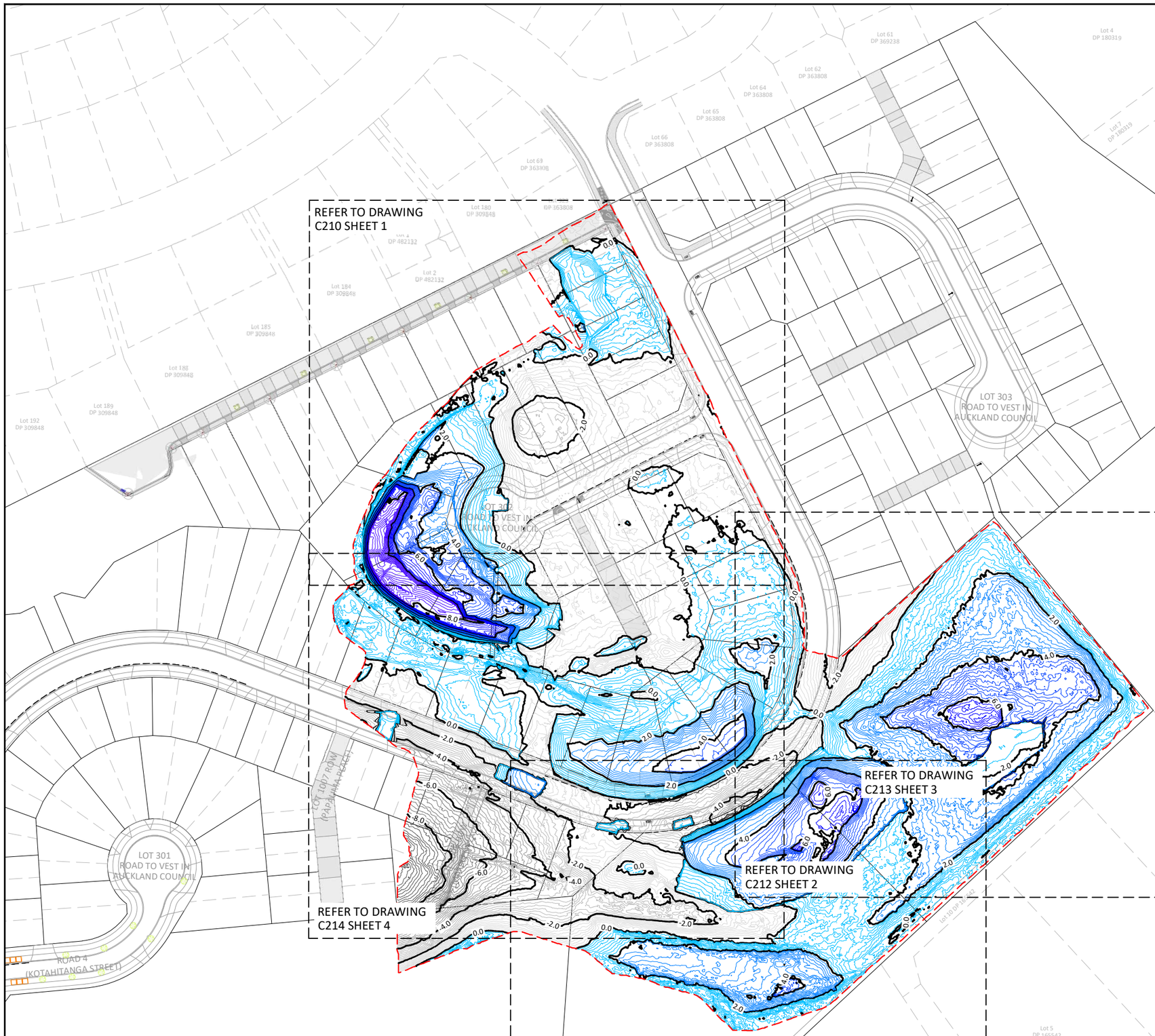
SCALE @ A1	SCALE @ A3	JOB NUMBER
1 : 750		20010

SHEET NUMBER	REVISION
PLCH-UD616	A

For Private Plan Change - RFI

APPENDIX 2:

Stage 2 Earthwork As-Builts



Surface Analysis: Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m)
1		-10.675	-8.000	384
2		-8.000	-6.000	1438
3		-6.000	-4.000	3240
4		-4.000	-2.000	7110
5		-2.000	0.000	20400
6		0.000	2.000	38082
7		2.000	4.000	17012
8		4.000	6.000	5305
9		6.000	8.000	1421
10		8.000	10.376	381

AS BUILT

REVISION	CHANGES	CHECKED	DATE
0	AS BUILT ISSUE	GMR	19/10/20

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POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT

HARBOUR VIEW HEIGHTS LP

PROJECT

162-166 SETTLEMENT ROAD, PAPAKURA STAGE 2A

TITLE

EARTHWORKS CUT & FILL AS-BUILT PLAN STAGE 2A

DRAWN	GMR	SCALE A1	1:750
DESIGNED	NA	A3	1:1500
PROJECT No 1152	DRAWING No C210	REVISION	0

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:
- *THE COORDINATES (X, Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ± 50mm.*
- *THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ± 10mm.*

SIGNED:
DATE: 02/11/20
NAME: Gregory Richardson

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:
- *THE COORDINATES (X, Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ± 50mm.*
- *THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ± 10mm.*

SIGNED:
DATE: 02/11/20
NAME: Gregory Richardson

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X, Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ± 50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ± 10mm.

SIGNED: .....

DATE: 02/11/20

NAME: Gregory Richardson

Lot 180 DP 309848

Lot 323 DP 363808

Lot 1 DP 482132

Lot 2 DP 482132

Lot 184 DP 309848

LOT 40

LOT 41

LOT 42

LOT 43

LOT 44

LOT 45

LOT 46

LOT 50

LOT 51

LOT 52

LOT 53

LOT 54

LOT 55

LOT 56

LOT 57

LOT 58

LOT 59

LOT 60

LOT 61

LOT 62

LOT 63

LOT 66

LOT 67

LOT 68

LOT 69

LOT 70

LOT 71

LOT 30

LOT 31

LOT 2

LOT 3

LOT 302 ROAD TO VEST IN AUCKLAND COUNCIL

0.0

2.0

4.0

6.0

Surface Analysis: Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m)
1		-10.675	-8.000	384
2		-8.000	-6.000	1438
3		-6.000	-4.000	3240
4		-4.000	-2.000	7110
5		-2.000	0.000	20400
6		0.000	2.000	38082
7		2.000	4.000	17012
8		4.000	6.000	5305
9		6.000	8.000	1421
10		8.000	10.376	381

AS BUILT

REVISION	CHANGES	CHECKED	DATE
0	AS BUILT ISSUE	GMR	19/10/20

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WEB www.crangcivil.co.nz
ADDRESS 1016a Great South Road, Penrose, Auckland
POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT

HARBOUR VIEW HEIGHTS LP

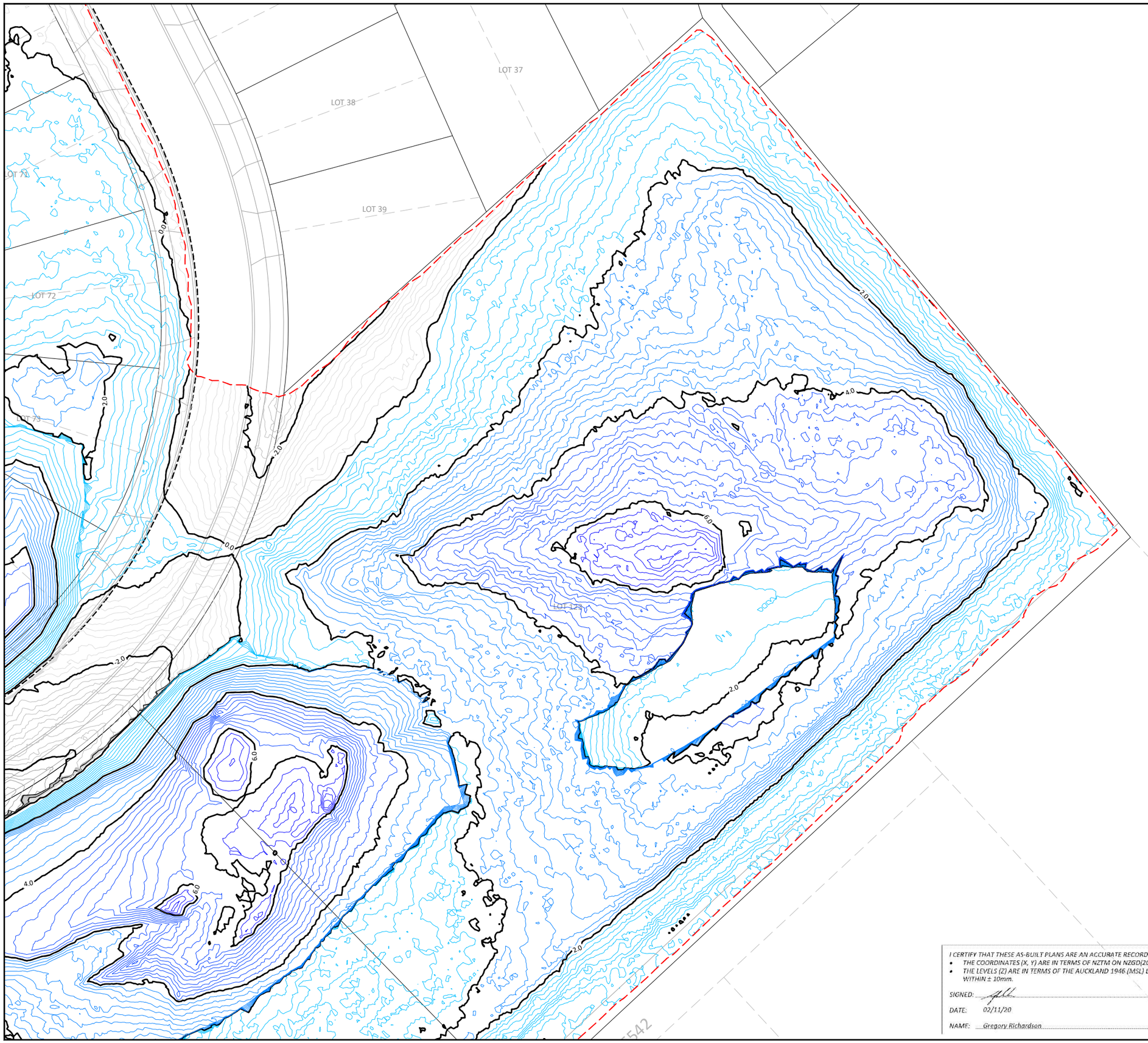
PROJECT

162-166 SETTLEMENT ROAD, PAPAKURA STAGE 2A

TITLE

EARTHWORKS CUT & FILL AS-BUILT PLAN STAGE 2A SHEET 1

DRAWN	GMR	SCALE A1	1:250
DESIGNED	NA	A3	1:500
PROJECT No 1152	DRAWING No C211	REVISION	0



Lot 1
DP 79740

Surface Analysis: Elevation Ranges				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m)
1		-10.675	-8.000	384
2		-8.000	-6.000	1438
3		-6.000	-4.000	3240
4		-4.000	-2.000	7110
5		-2.000	0.000	20400
6		0.000	2.000	38082
7		2.000	4.000	17012
8		4.000	6.000	5305
9		6.000	8.000	1421
10		8.000	10.376	381

AS BUILT

0	AS BUILT ISSUE	GMR	19/10/20
REVISION	CHANGES	CHECKED	DATE

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PHONE +64 09 320 3325
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ADDRESS 1016a Great South Road, Penrose, Auckland
POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT

HARBOUR VIEW HEIGHTS LP

PROJECT

162-166 SETTLEMENT ROAD, PAPAKURA STAGE 2A

TITLE

EARTHWORKS CUT & FILL AS-BUILT PLAN STAGE 2A SHEET 2

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

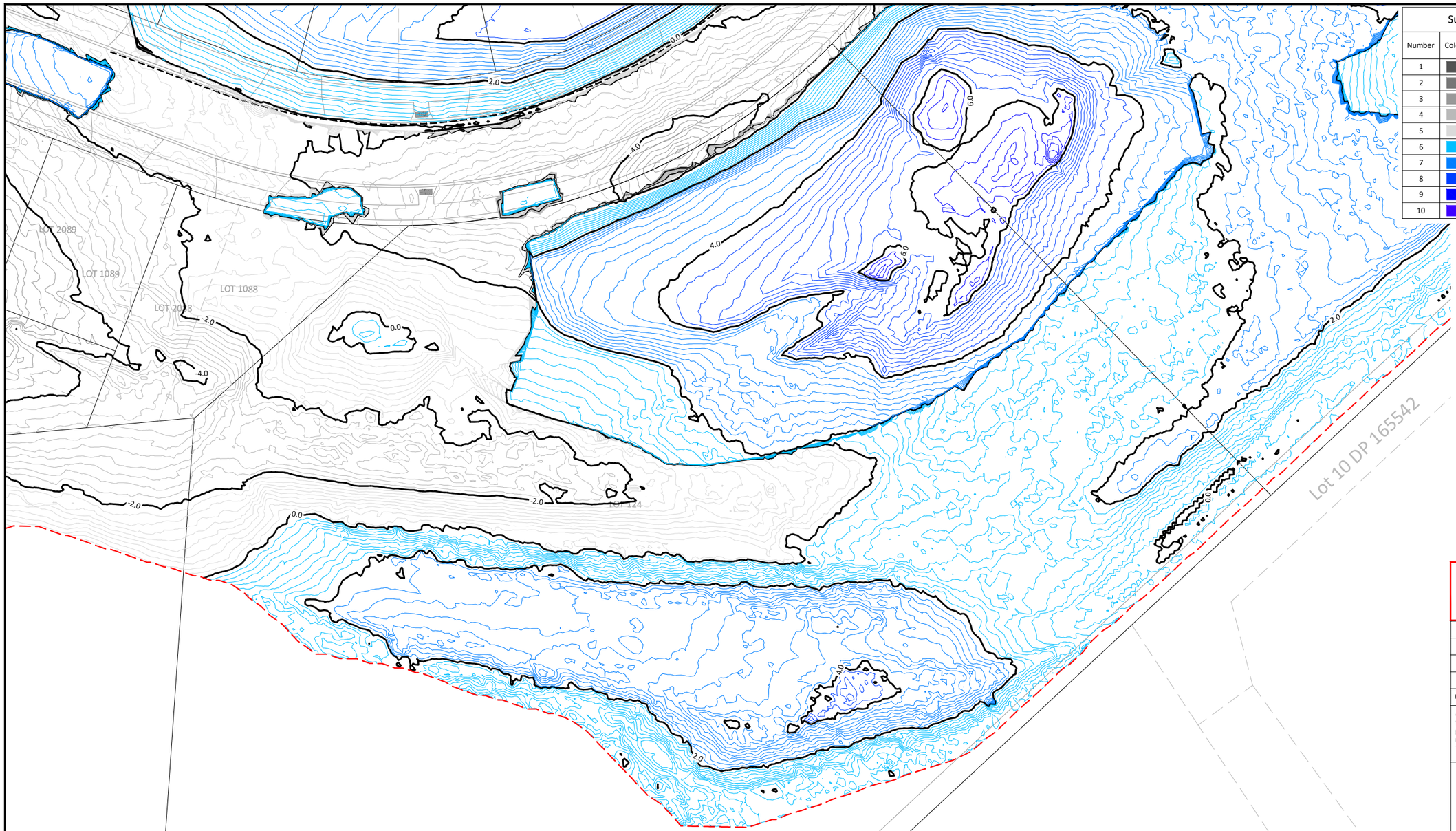
- *THE COORDINATES (X, Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ± 50mm.*
- *THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ± 10mm.*

SIGNED:

DATE: 02/11/20

NAME: Gregory Richardson

DRAWN	GMR	SCALE A1	1:250
DESIGNED	NA	A3	1:500
PROJECT No 1152	DRAWING No C212	REVISION 0	



Surface Analysis: Elevation Ranges				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m)
1		-10.675	-8.000	384
2		-8.000	-6.000	1438
3		-6.000	-4.000	3240
4		-4.000	-2.000	7110
5		-2.000	0.000	20400
6		0.000	2.000	38082
7		2.000	4.000	17012
8		4.000	6.000	5305
9		6.000	8.000	1421
10		8.000	10.376	381

AS BUILT

REVISION	CHANGES	CHECKED	DATE
0	AS BUILT ISSUE	GMR	19/10/20

CRANGCIVIL
CONSULTING ENGINEERS

PHONE +64 09 320 3325
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ADDRESS 1016a Great South Road, Penrose, Auckland
POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT

HARBOUR VIEW HEIGHTS LP

PROJECT

162-166 SETTLEMENT ROAD, PAPAKURA STAGE 2A

TITLE

EARTHWORKS CUT & FILL AS-BUILT PLAN STAGE 2A SHEET 3

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

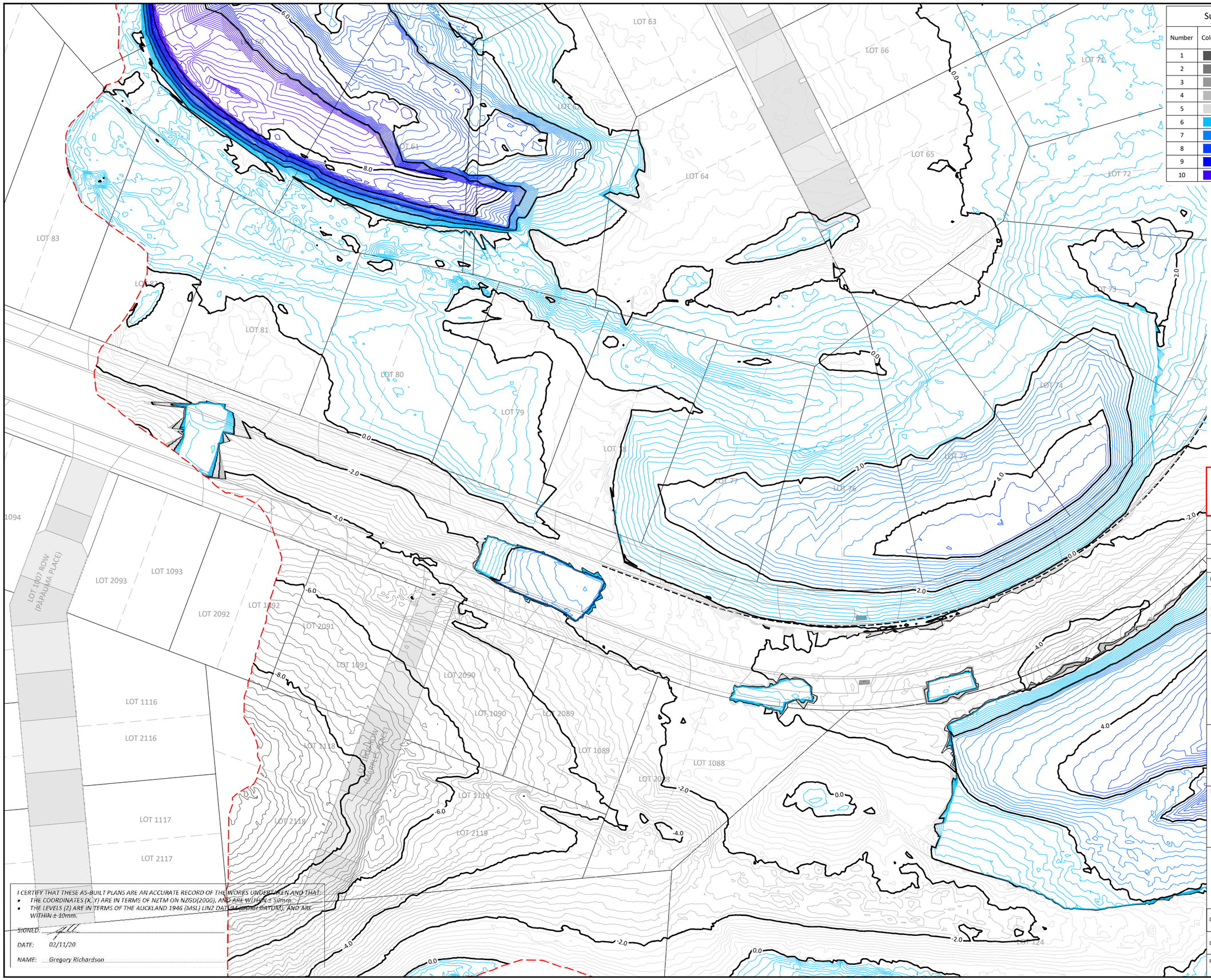
- *THE COORDINATES (X, Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ± 50mm.*
- *THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ± 10mm.*

SIGNED:

DATE: 02/11/20

NAME: Gregory Richardson

DRAWN	GMR	SCALE A1	1:250
DESIGNED	NA	A3	1:500
PROJECT No 1152	DRAWING No C213	REVISION 0	



Surface Analysis: Elevation Ranges				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m)
1		-10.675	-8.000	384
2		-8.000	-6.000	1438
3		-6.000	-4.000	3240
4		-4.000	-2.000	7110
5		-2.000	0.000	20400
6		0.000	2.000	38082
7		2.000	4.000	17012
8		4.000	6.000	5305
9		6.000	8.000	1421
10		8.000	10.376	381

AS BUILT

REVISION	CHANGES	CHECKED	DATE
0	AS BUILT ISSUE	GMR	19/10/20

CRANGCIVIL CONSULTING ENGINEERS
PHONE +64 09 320 3325
WEB www.crangcivil.co.nz
ADDRESS 1016a Great South Road, Penrose, Auckland
POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT

HARBOUR VIEW HEIGHTS LP

PROJECT

162-166 SETTLEMENT ROAD, PAPAKURA STAGE 2A

TITLE

EARTHWORKS CUT & FILL AS-BUILT PLAN STAGE 2A SHEET 4

DRAWN	GMR	SCALE A1	1:250
DESIGNED	NA	A3	1:500
PROJECT No 1152	DRAWING No C214	REVISION 0	

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- *THE COORDINATES (X, Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ± 50mm.*
- *THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DEAD DATUM), AND ARE WITHIN ± 10mm.*

SIGNED:

DATE: 02/11/20

NAME: Gregory Richardson

APPENDIX 3:

Previous Relevant Geotechnical Data

LEGEND

- MACHINE BOREHOLE drilled 2016
- MACHINE BOREHOLE drilled 2007
- HAND AUGER BOREHOLE drilled 2016
- HAND AUGER BOREHOLE drilled 2004
- TRIAL PIT excavated 2007
- TRIAL PIT excavated 2005
- TRIAL PIT excavated 2004
- CROSS SECTION

SOURCE PLAN: SURVEY WORKS LIMITED, DRAWING NUMBER C150 & C151, SHEET 1 OF 2 & SHEET 2 OF 2

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

Horizontal Scale 0 30.0 60.0 90.0 120.0 Metres

Vertical Scale 0 30.0 60.0 90.0 120.0 Metres

drawn	RB
approved	PBCB
date	28/04/16
scale	1:2000
original size	A3

coffey

client: RDL TRUSTEE LIMITED

project: 162 - 166 SETTLEMENT ROAD PAPAKURA

title: SITE PLAN

project no: ENZAUCK11786AC | figure no: 1 | rev: A

LE□END

- SLOPE DEBRIS MOUND
- MA□OR HEAD SCARP
- MINOR HEAD SCARP
- WATERCOURSE
- OVERLAND □LOW PATH
- RID□ELINE

SOURCE PLAN□ SURVEY WOR□ LIMITED, DRAWIN□ NUMBER C150□ C151, SHEET 1 O□ 2 □ SHEET 2 O□ 2

revi□ion	no.	de□cri□tion	drawn	a□□roved	date
	A	ORI□INAL ISSUE			

0 30.0 60.0 90.0 120.0
Horizontal Scale □□etre□□

0 30.0 60.0 90.0 120.0
Vertical Scale □□etre□□

drawn	RB
a□□roved	PBCB
date	28□04□16
□cale	1□2000
original □ize	A3

coffey

client□ RDL TRUSTEE LIMITED

□ro□ect□ 162 - 166 SETTLEMENT ROAD PAPAKURA

title□ □EOMORPHOLO□ICAL SITE PLAN

□ro□ect no□ □ENZAUCK11786AC | □igure no□ 2 | rev□ A

PLOT DATE□31/05/2016 8:59:26 □□ DW□ □ILE□C:\USERS\RAY.BERRY\DESKTOP\SETTLEMENT RD\O□□\THE SERVER\140316 11786AB CAD□OR PLAN CHAN□E 11786AB SITE PLAN.DW□

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Engineering Log - Borehole

Borehole ID.	***MH101/16***
sheet:	1 of 3
project no.	***GENZAUCK11786AC***
client:	***RDL Limited***
date started:	***01 Mar 2016***
principal:	
date completed:	***01 Mar 2016***
project:	***162-166 Settlement Road, Papakura***
logged by:	***JJ***
location:	***Refer to Site Plan***
checked by:	***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.: 4612

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (remoulded / peak) (kPa) 50 100 150 200	structure and additional observations
HW casing		Not Observable			0.0			**SILT**: non plastic, brown, friable.	M	VSt		**TOPSOIL** Core Run (0.0-0.5 m): 30% recovery
							CH	**Silty CLAY**: high plasticity, pale grey speckled orange.				**RESIDUAL EAST COAST BAYS FORMATION** Core Run (0.5-1.0 m): 86% recovery VS >239 kPa
					1.0		MH	**Clayey SILT**: medium plasticity, pale grey speckled orange.				Core Run (1.0-1.5 m): 100% recovery VS 133/ 65 kPa
			SPT 2, 2, 3 N*=5					1.5 m: contains 50mm to 80mm bands of limonite staining, with fine orange sand				Core Run (1.5-3.0 m): 81% recovery VS 111/ 61 kPa
					2.0							
OB			SPT 2, 3, 5 N*=8		3.0			2.75 m: 50mm band of HW siltstone, pale grey mottled orange and black, EW-VW, disaggragates to clayey SILT, medium plasicity with firm hand pressure 3.0 m: 50mm band of HW siltstone, pale grey mottled orange and black, EW-VW, disaggragates to clayey SILT, medium plasicity with firm hand pressure 3.1 m: becomes low plasticity 3.5 to 3.66 m: HW siltstone bands, VW				Core Run (3.0-4.5 m): 89% recovery VS UTP
					4.0							
N			SPT 6, 9, 12 N*=21				ML	4.25 to 4.35 m: HW siltstone band, EW, disaggregates to a clayey SILT, grey speckled orange and black with firm hand pressure		St		Core Run (4.5-6.0 m): 77% recovery VS UTP
								Clayey SILT: low plasticity, pale grey/brown speckled orange and black, with minor fine sand. 4.8 m: 10mm bands of orange and black sand				
					5.0							
								5.32 m: 10mm band of HW sandstone, pale grey speckled black and orange, EW, disaggregates as a silty SAND, medium dense, with firm hand pressure				

CDF_0_9_06_LIBRARY.GLB rev:AM Log COF BOREHOLE: NON CORED MH11786AB.GPJ <<DrawingFile>> 21/03/2016 17:20

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
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Engineering Log - Borehole

Borehole ID.	***MH101/16***
sheet:	2 of 3
project no.	***GENZAUCK11786AC***
client:	***RDL Limited***
date started:	***01 Mar 2016***
principal:	
date completed:	***01 Mar 2016***
project:	***162-166 Settlement Road, Papakura***
logged by:	***JJ***
location:	***Refer to Site Plan***
checked by:	***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.: 4612

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (remoulded ⊕ peak ⊙) (kPa) 50 100 150 200	structure and additional observations
OB — N		Not Observable	SPT 4, 5, 7 N*=12				ML	**Sandy SILT**: brown/orange, sand is fine, with minor clay. *(continued)*	M	MD to D		**RESIDUAL EAST COAST BAYS FORMATION** Core Run (6.0-7.5 m): 60% recovery VS UTP
								NO CORE: 0.60m (6.45-7.05 m)				
					7.0		ML	**Sandy SILT**: brown/orange, sand is fine, with minor clay, with minor black sand.				
			SPT 4, 7, 8 N*=15					7.45 m: with black speckles			⊙	Core Run (7.5-9.0 m): 100% recovery VS 36/ 11 kPa
					8.0		MH	**Clayey SILT**: medium plasticity, pale grey speckled orange.		VSt to H		
								8.65 m: limonite staining				
			SPT 6, 5, 9 N*=14		9.0							Core Run (9.0-10.5 m): 97% recovery VS UTP
							CL-CH	9.4 to 9.45 m: band of HW siltstone, EW-VW, disaggregates to a fine sandy SILT, pale grey speckled orange and black, with firm finger pressure	W	S to F		
								Sandy CLAY: medium plasticity, pale grey/brown, sand is medium to coarse.				
					10.0						⊙	
			SPT 1, 3, 5 N*=8					10.6 m: becomes orange				Core Run (10.5-11.5 m): 68% recovery VS 34/ 8 kPa
					11.0		MH	**Clayey SILT**: medium plasticity, dark grey.	M	H		**TRANSITIONAL EAST COAST BAYS FORMATION**
								Borehole MH101/16 continued as cored hole				

CDF_0_9_06_LIBRARY.GLB rev:AM Log COF BOREHOLE: NON CORED MH111786AB.GPJ <<DrawingFile>> 21/03/2016 17:20

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Cored Borehole

Borehole ID.	***MH101/16***
sheet:	3 of 3
project no.	***GENZAUCK11786AC***
client: ***RDL Limited***	date started: ***01 Mar 2016***
principal:	date completed: ***01 Mar 2016***
project: ***162-166 Settlement Road, Papakura***	logged by: ***JJ***
location: ***Refer to Site Plan***	checked by: ***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.: 4612

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & UCS (VW W MS S VS ES)	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run details	defect spacing (mm) (20 60 200 600 2000)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
HQ3	Not Observable		12.0		start coring at 11.50m **SILTSTONE**: dark grey, indistinct. 11.65 to 11.70 m: 50mm SANDSTONE layer, fine grained, dark grey, SW, VW	UW			TCR= 74% SCR= 20% RQD= 20%		Drilling Break, 0 - 5° Drilling Break, 0 - 5°
					Sandy SILT (ML): dark grey, sand is fine.						
					NO CORE: 0.30 m 12.50 to 12.95 m: solid SPT recovered as a sandy CLAY, sand is coarse grained			SPT 4, 6, 7 Nc=13			
			13.0		**Sandy SILT (ML)**: dark grey, sand is fine.						
					SILTSTONE: dark grey, indistinct.				TCR= 70% SCR= 57% RQD= 57%		**EAST COAST BAYS FORMATION BEDROCK** JT, 5 - 10°, PL, SO, CN
											Drilling Break, 0 - 5° Drilling Break, 0 - 5°
			14.0		14.00 to 14.20 m: core disturbed by SPT			SPT 50/135mm Nc=R			
									TCR= 100% SCR= 87% RQD= 87%		Drilling Break, 0 - 5°
			15.0		15.10 to 16.35 m: cored disturbed / damaged when transfering to core box						
								SPT 50/100mm Nc=R			
			16.0						TCR= 100% SCR= 100% RQD= 100%		Drilling Break, 0 - 5° Drilling Break, 0 - 5° Drilling Break, 0 - 5°
			17.0		Borehole MH101/16 terminated at 17.00 m Target depth			SPT 50/60mm Nc=R			

CDF_0_9_06_LIBRARY.GLB rev:AM Log COF BOREHOLE: CORED MH11786AB.GPJ <<DrawingFile>> 21/03/2016 17:21

method & support
- AS auger screwing
- AD auger drilling
- CB claw or blade bit
- W washbore
- NMLC NMLC core (51.9 mm)
- NQ wireline core (47.6mm)
- HQ wireline core (63.5mm)
- PQ wireline core (85.0mm)
- SPT standard penetration test
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

water
- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
- core recovered (graphic symbols indicate material)
- no core recovered

core run details
- barrel withdrawn

TCR = Total Core Recovery (%)
SCR = Solid Core Recovery (%)
RQD = Rock Quality Designation (%)

weathering & alteration*
- RS residual soil
- CW completely weathered
- HW highly weathered
- MW moderately weathered
- SW slightly weathered
- UW unweathered

*W replaced with A for alteration

strength
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

defect type
- BS bedding shear
- PT parting
- JT joint
- SZ shear zone
- SS shear surface
- CO contact
- CS crushed seam
- SM seam

roughness
- SL slickensided
- POL polished
- SO smooth
- RO rough
- VR very rough

planarity
- PL planar
- CU curved
- UN undulating
- ST stepped
- IR Irregular

coating
- CN clean
- SN stain
- VN veneer
- CO coating

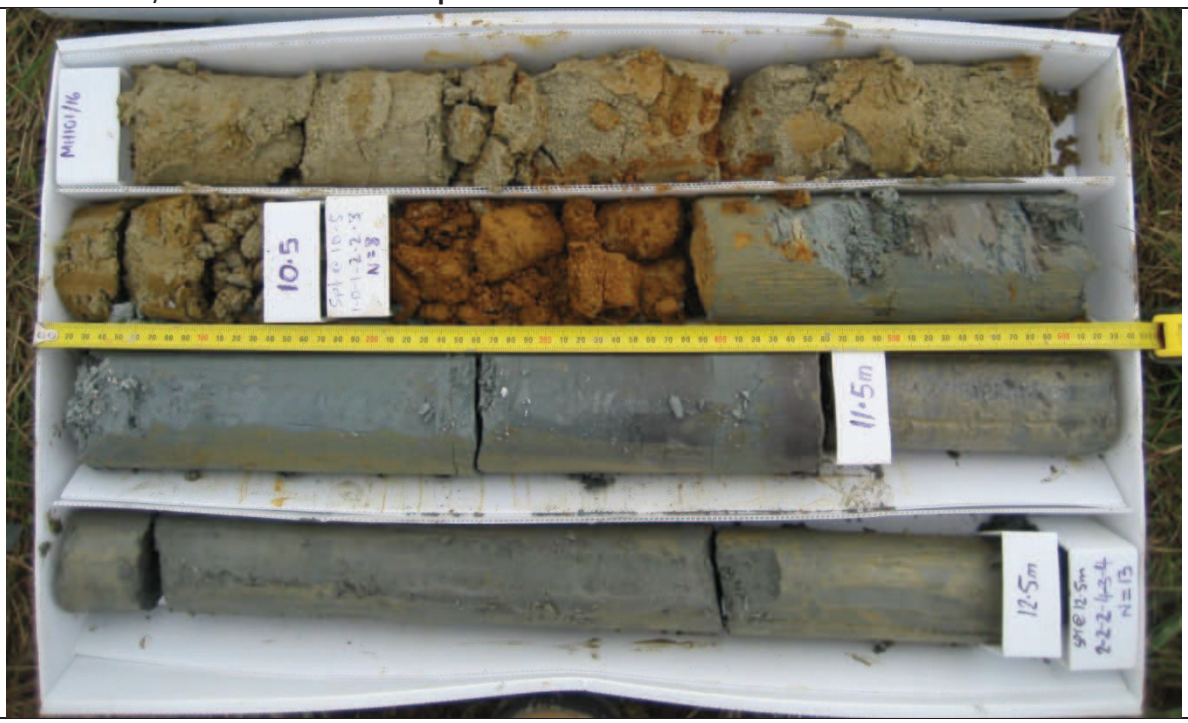
Client:	RDL Limited	Project no:	GENZAUCK11786AB		
Project: coffey	162 – 166 Settlement Road, Papakura	Figure no:			
		Compiled:	JJ	Date:	02/03/16
Title:	MH101/16 CORE BOX PHOTOGRAPHS				

Borehole ID: MH101/16 **Depth:** 0.0 m to 3.45 m

Borehole ID: MH101/16 **Depth:** 3.45 m to 6.45 m

Client:	RDL Limited	Project no:	GENZAUCK11786AB		
Project: coffey	162 – 166 Settlement Road, Papakura	Figure no:			
		Compiled:	JJ	Date:	02/03/16
Title:	**MH101/16 CORE BOX PHOTOGRAPHS**				

Borehole ID: MH101/16 **Depth:** 6.45 m to 9.80 m



Borehole ID: MH101/16 **Depth:** 9.50 m to 12.50 m

Client:	RDL Limited	Project no:	GENZAUCK11786AB		
Project: coffey	162 – 166 Settlement Road, Papakura	Figure no:			
		Compiled:	JJ	Date:	02/03/16
Title:	MH101/16 CORE BOX PHOTOGRAPHS				

Borehole ID: MH101/16 **Depth:** 12.50 m to 15.90 m

Borehole ID: MH101/16 **Depth:** 15.90 m to 17.00 m

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Engineering Log - Borehole

Borehole ID.	***MH100/16***
sheet:	1 of 4
project no.	***GENZAUCK11786AC***
client: ***RDL Limited***	date started: ***29 Feb 2016***
principal:	date completed: ***01 Mar 2016***
project: ***162-166 Settlement Road, Papakura***	logged by: ***JJ***
location: ***Refer to Site Plan***	checked by: ***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.:

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	structure and additional observations
HW casing OB		Not Observable			0.0			**SILT**: non plastic, brown, friable.	M to W	VSt		**TOPSOIL** Core Run (0.0-0.5 m): 100% recovery
							CH	**Silty CLAY**: high plasticity, pale grey mottled orange.				**RESIDUAL EAST COAST BAYS FORMATION** Core Run (0.5-1.0 m): 100% recovery
					1.0		ML	**Clayey SILT**: low plasticity, pale brown speckled orange. 1.0 to 1.05 m: 50mm band of HW siltstone, pale grey speckled orange, EW, dissagregates to a SILT, St-VSt 1.5 m: becomes pale grey				Core Run (1.0-1.5 m): 70% recovery
			SPT 1, 2, 2 N*=4									Core Run (1.5-3.0 m): 100% recovery
					2.0		ML	**Sandy SILT**: brown/orange, sand is fine, with minor clay. 2.25 m: 30mm band of HW sandstone, EW dissagregates to a SILT and sand SILT with firm finger pressure	W	L		
							CL	**Silty CLAY**: low plasticity, pale grey speckled orange.		F to St		
			SPT 2, 2, 3 N*=5		3.0		CH	**Silty CLAY**: medium plasticity, grey/dark grey.	M			Core Run (3.0-4.5 m): 100% recovery
N					4.0							
			SPT 2, 4, 4 N*=8									**TRANSITIONAL EAST COAST BAYS FORMATION** Core Run (4.5-6.0 m): 100% recovery
					5.0							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	***MH100/16***
sheet:	2 of 4
project no.	***GENZAUCK11786AC***
client: ***RDL Limited***	date started: ***29 Feb 2016***
principal:	date completed: ***01 Mar 2016***
project: ***162-166 Settlement Road, Papakura***	logged by: ***JJ***
location: ***Refer to Site Plan***	checked by: ***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.:

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	structure and additional observations
OB N		Not Observable	SPT 5, 5, 7 N*=12				CH	**Silty CLAY**: medium plasticity, grey/dark grey. *(continued)*	M	F to St		**TRANSITIONAL EAST COAST BAYS FORMATION** Core Run (6.0-7.5 m): 100% recovery
			SPT 6, 9, 12 N*=21		7.0		ML	**Clayey SILT**: low plasticity, dark grey, with orange staining.		VSt		Core Run (7.5-9.0 m): 100% recovery
			SPT 12, 17, 22 N*=39		8.0			8.6 m: 40mm band of HW siltstone, dark grey/black, VW				Core Run (9.0-10.5 m): 100% recovery
			SPT 11, 14, 17 N*=31		9.0 10.0 11.0			10.25 m: 50mm band of CLAY, dark grey, medium plasticity	M to W			Core Run (10.5-12.0 m): 100% recovery
								11.7 m: 70mm band of CLAY, dark grey, medium plasticity		VSt to H		

CDF_0_9_06_LIBRARY.GLB rev:AM Log COF BOREHOLE: NON CORED MH11786AB.GPJ <<DrawingFile>> 21/03/2016 17:20

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	***MH100/16***
sheet:	3 of 4
project no.	***GENZAUCK11786AC***
client: ***RDL Limited***	date started: ***29 Feb 2016***
principal:	date completed: ***01 Mar 2016***
project: ***162-166 Settlement Road, Papakura***	logged by: ***JJ***
location: ***Refer to Site Plan***	checked by: ***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.:

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	structure and additional observations
HQ3		Not Observable	SPT 9, 11, 15 N*=26		13.0		ML	**Clayey SILT**: low plasticity, dark grey, with orange staining. *(continued)* Borehole MH100/16 continued as cored hole	M to W	VSt to H		**TRANSITIONAL EAST COAST BAYS FORMATION** Core Run (12.0-13.5 m): 100% recovery
					14.0							
					15.0							
					16.0							
					17.0							

CDF_0_9_06_LIBRARY.GLB rev:AM Log COF BOREHOLE: NON CORED MH11786AB.GPJ <<DrawingFile>> 21/03/2016 17:20

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Cored Borehole

Borehole ID.	***MH100/16***
sheet:	4 of 4
project no.	***GENZAUCK11786AC***
client: ***RDL Limited***	date started: ***29 Feb 2016***
principal:	date completed: ***01 Mar 2016***
project: ***162-166 Settlement Road, Papakura***	logged by: ***JJ***
location: ***Refer to Site Plan***	checked by: ***DJS***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Tractor | drilling fluid: water | casing diameter : HW | vane id.:

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & UCS (VW W MS S VS ES)	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run details	defect spacing (mm) (20 60 200 600 2000)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
HQ3	Not Observable				start coring at 13.50m						
					SILTSTONE: dark grey, indistinct.	UW		SPT 10, 23, 27/135mm Nc=R	TCR= 72% SCR= 47% RQD= 37%		**EAST COAST BAYS FORMATION BEDROCK** JT, 20°, UN, RO, CN JT, 40 - 45°, UN, RO, CN Drilling Break, 0 - 5°
			14.0								Drilling Break, 0 - 5° JT, 0 - 5°, UN, RO, CN Drilling Break, 0 - 5° Drilling Break, 0 - 5°
			15.0		**NO CORE:** 0.20 m						
					SILTSTONE: dark grey, indistinct.			SPT 24, 30, 20 Nc=R	TCR= 47% SCR= 53% RQD= 51%		CS, 0 - 5°, UN, RO, CN, siltstone clasts (100%), fine to coarse, UW, VW CS, 0 - 5°, UN, RO, CN, siltstone clasts (100%), fine to coarse, UW, VW JT, 50°, PL, SO, CN Drilling Break, 0 - 5° Drilling Break, 0 - 5° JT, 5 - 10°, IR, RO, CN
			16.0								
			17.0		17.00 to 17.15 m: core disturbed by SPT			SPT 39, 50/70mm Nc=R	TCR= 83% SCR= 83% RQD= 75%		
			18.0								Drilling Break, 0 - 5°
					Borehole MH100/16 terminated at 18.20 m Target depth			SPT 39, 44, 6/30mm Nc=R			
			19.0								

CDF_0_9_06_LIBRARY.GLB rev:AM Log COF BOREHOLE: CORED MH11786AB.GPJ <<DrawingFile>> 21/03/2016 17:21

method & support
- AS auger screwing
- AD auger drilling
- CB claw or blade bit
- W washbore
- NMLC NMLC core (51.9 mm)
- NQ wireline core (47.6mm)
- HQ wireline core (63.5mm)
- PQ wireline core (85.0mm)
- SPT standard penetration test
- HQ3 HQ3 core barrel (61.1mm)
- OB open barrel

water
- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
- core recovered (graphic symbols indicate material)
- no core recovered

core run details
- barrel withdrawn

TCR = Total Core Recovery (%)
SCR = Solid Core Recovery (%)
RQD = Rock Quality Designation (%)

weathering & alteration*
- RS residual soil
- CW completely weathered
- HW highly weathered
- MW moderately weathered
- SW slightly weathered
- UW unweathered

*W replaced with A for alteration

strength
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

defect type
- BS bedding shear
- PT parting
- JT joint
- SZ shear zone
- SS shear surface
- CO contact
- CS crushed seam
- SM seam

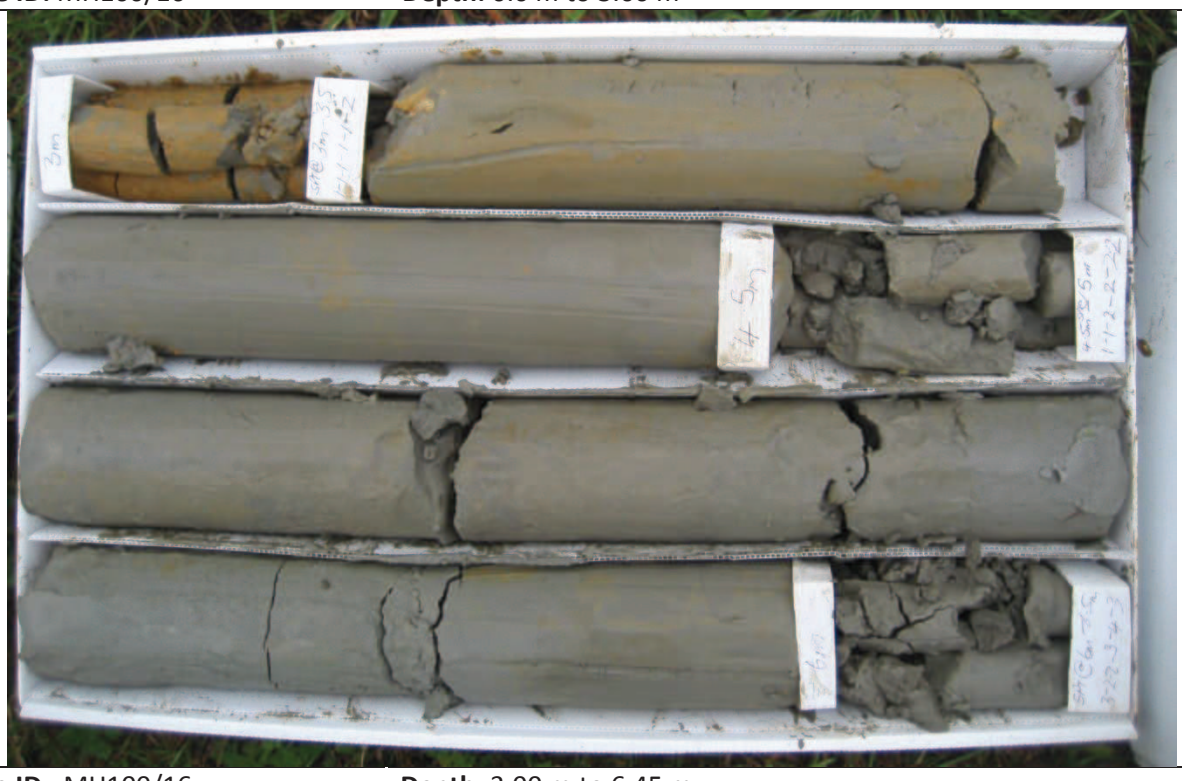
planarity
- PL planar
- CU curved
- UN undulating
- ST stepped
- IR Irregular

roughness
- SL slickensided
- POL polished
- SO smooth
- RO rough
- VR very rough

coating
- CN clean
- SN stain
- VN veneer
- CO coating

Client:	RDL Limited	Project no:	GENZAUCK11786AB		
Project: coffey	162 – 166 Settlement Road, Papakura	Figure no:			
		Compiled:	JJ	Date:	01/03/16
Title:	MH100/16 CORE BOX PHOTOGRAPHS				

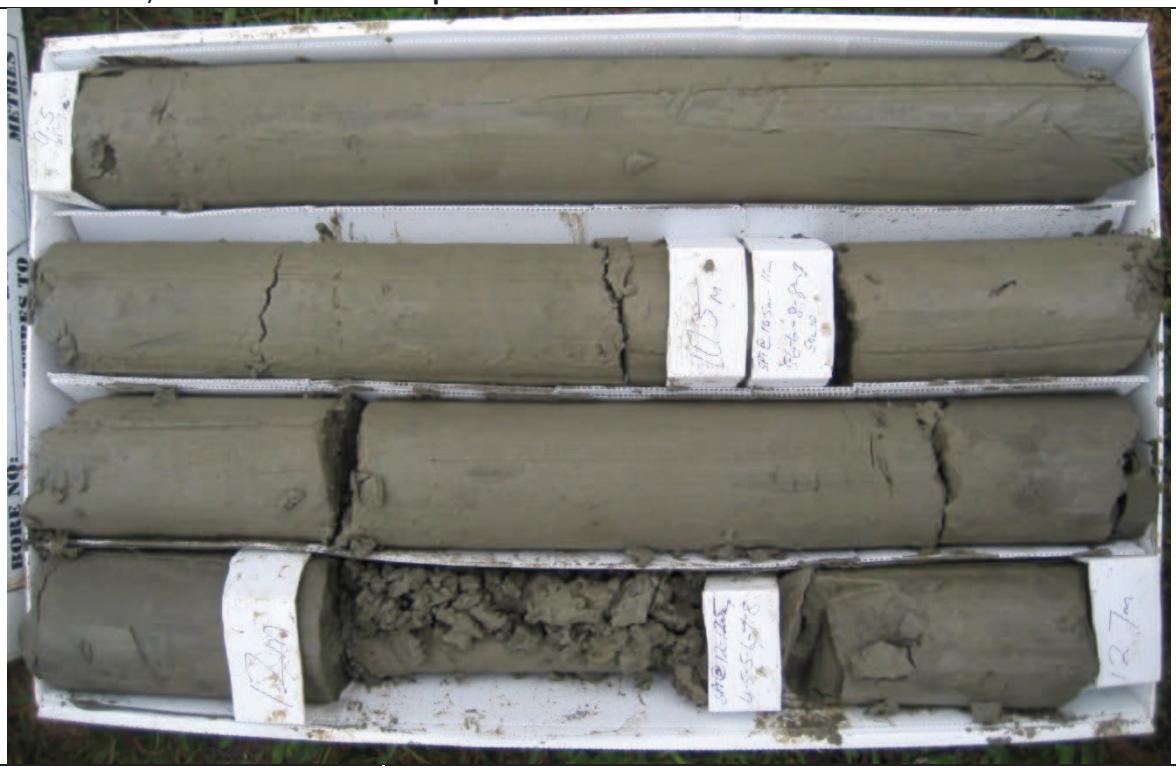
Borehole ID: MH100/16 **Depth:** 0.0 m to 3.00 m



Borehole ID: MH100/16 **Depth:** 3.00 m to 6.45 m

Client:	RDL Limited	Project no:	GENZAUCK11786AB		
Project: coffey	162 – 166 Settlement Road, Papakura	Figure no:			
		Compiled:	JJ	Date:	01/03/16
Title:	MH100/16 CORE BOX PHOTOGRAPHS				

Borehole ID: MH100/16 **Depth:** 6.45 m to 9.50 m



Borehole ID: MH100/16 **Depth:** 9.50 m to 12.70 m

Client:	RDL Limited	Project no:	GENZAUCK11786AB		
Project: coffey	162 – 166 Settlement Road, Papakura	Figure no:			
		Compiled:	JJ	Date:	01/03/16
Title:	MH100/16 CORE BOX PHOTOGRAPHS				

Borehole ID: MH100/16 **Depth:** 12.70 m to 15.70 m

Borehole ID: MH100/16 **Depth:** 15.70 m to 18.20 m

coffey geotechnics

Engineering Log - Borehole

Borehole No.	**M8**
Sheet	1 of 1
Project No:	**11786**
Client:	***Contue Jinwan Enterprise Group (NZ) Limited***
Date started:	**6.9.2007**
Principal:	
Date completed:	**6.9.2007**
Project:	***162 To 166 Settlement Road, Papakura***
Logged by:	**PF**
Borehole Location:	
Checked by:	

drill model and mounting: Pro Drill Track Rig | Easting: | slope: -90° | R.L. Surface: | Vane No: 452 livil

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
WAITEMATA GROUP	HQ OB	C				0			TOPSOIL				
						1		MC	NATURAL : Clayey SILT, with trace organics (rootlets), light brown mottled orange, non-plastic				
									- becoming light brown streaked orange, slightly plastic				
						2							
						3		CVM	Silty CLAY, light brown streaked orange, very plastic				
								MSI	ALLUVIALS : Fine to medium sandy SILT, light grey/ green streaked orange, slightly plastic				
						4		MCI	Clayey SILT, with trace fine sand, light grey streaked orange/ brown, moderately plastic				
TWG				Piezometer P1 3.0-6.0m				MCI	CRUSH ZONE/ SHEAR ZONE : Slightly clayey SILT, orange streaked dark orange, slightly plastic - heavily fractured and all fractures infilled with limonite				
								M					
						5		MCI	SILT, with trace fine sand, light brown/ orange streaked dark orange, non-plastic; very weakly cemented with limonite staining; sub horizontal fracture set with planar, smooth, limonite infilling				
									Slightly to clayey SILT, orange, slightly plastic to moderately plastic, with remnant sub horizontal bedding				
						6			- becoming clayey silt, grey, moderately plastic, alternating with thin bands of slightly clayey fine silt, grey, slightly plastic, stiff				
				SPT 10,13,16 N*=29									
						7			Borehole M8 continued as cored hole				
						8							

BOREHOLE 11786 BHS, TPS, MHS SEPT 07.GPJ COFFEY.GDT 2.10.07

Form GEO 6.3 Issue 3 Rev.2

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

water

10/1/98 water level on date shown
water inflow
water outflow

vane shear (kPa)

● remoulded
× peek

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on New Zealand Geotechnical Society Inc 2005

moisture

D	dry
M	moist
W	wet
S	saturated
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Client:	Contue Jinwan Enterprise Group (NZ) Limited	Borehole No.	M8
Principal:		Sheet	1 of 3
Project:	162 To 166 Settlement Road, Papakura	Project No:	11786
Borehole Location:		Date started:	6.9.2007
		Date completed:	6.9.2007
		Logged by:	PF
		Checked by:	PF

drill model & mounting: Pro Drill Track Rig | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Drilling fluid: Water | Northing: | bearing: | datum:

drilling information / material substance / rock mass defects

stratigraphy	method	core-lift	water	notes samples, tests, etc	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (ES VS S MS W VW EW)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular — general)
WAITEMATA GROUP				Piezometer P1 3.0-6.0m		0–7		Continued from non-cored borehole				100		- contact surface (3° to horizontal - smooth, no infilling) (at ~3.2 m)
				SPT 10,13,16 N*=29		6.0–6.5						70		
	HQ TT					7	ZZZ	Completely weathered, grey SILTSTONE, extremely weak, very weakly cemented/ Clayey SILT, grey moderately plastic, hard	CW	EW–VW				
				SPT 50 for 90 N*=R		7.6–8	ZZZ	Moderately weathered, grey SILTSTONE, very weak, very weakly cemented	MW	VW	100	90		

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
CW completely weathered
RS residual soil

strength
ES extremely strong
VS very strong
S strong
MS moderately strong
W weak
VW very weak
EW extremely weak

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **M8**
Sheet 2 of 3
Project No: **11786**

Client: ***Contue Jinwan Enterprise Group (NZ) Limited***
Date started: ***6.9.2007***

Principal:
Date completed: ***6.9.2007***

Project: ***162 To 166 Settlement Road, Papakura***
Logged by: ***PF***

Borehole Location:
Checked by: PF

drill model & mounting: Pro Drill Track Rig | Easting: | slope: -90° | R.L. Surface:
hole diameter: 100 mm Drilling fluid: Water | Northing: | bearing: | datum:

drilling information | **material substance** | **rock mass defects**

stratigraphy	method	core-lift	water	notes samples, tests, etc	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (ES VS S MS W VW EW)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular / general)
TRANSITIONAL WAITEMATA GROUP	HQ TT			SPT 50 for 60 N*=R		9		Slightly weathered, grey SILTSTONE & SANDSTONE, weak, moderately cemented	SW		100	90		
				SPT 50 for 50 N*=R		10								1FR, 20° to vertical, PL, no infilling
				SPT 50 for 50 N*=R		11								
				Piezometer P2 12.0-14.0m		12					100	100		
				SPT 50 for 50 N*=R		13								
				SPT 50 for 50 N*=R		14								
						15								
						16								

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
CW completely weathered
RS residual soil

strength
ES extremely strong
VS very strong
S strong
MS moderately strong
W weak
VW very weak
EW extremely weak

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No.	**M8**
Sheet	3 of 3
Project No:	**11786**
Client:	***Contue Jinwan Enterprise Group (NZ) Limited***
Date started:	**6.9.2007**
Principal:	
Date completed:	**6.9.2007**
Project:	***162 To 166 Settlement Road, Papakura***
Logged by:	**PF**
Borehole Location:	
Checked by:	PF

drill model & mounting: Pro Drill Track Rig | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Drilling fluid: Water | Northing: | bearing: | datum:

drilling information							material substance						rock mass defects				
stratigraphy	method	core-lift	water	notes samples, tests, etc	RL	depth metres	graphic log / core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering / alteration	estimated strength (ES VS S MS W VW EW)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
TRANSITIONAL WAITEMATA GROUP	HQ TT					17	ZZZ	Slightly weathered, grey SILTSTONE & SANDSTONE, weak, moderately cemented *(continued)*	SW	MS	100	100		
						18								
						19								
						20								
								M8 terminated at 20m						
						21								
						22								
						23								
						24								

CORED BOREHOLE 11786 BHS, TPS, MHS SEPT 07.GPJ COFFEY.GDT 2.10.07

Form GEO 5.5 Issue 3 Rev. 3

method
- DT diatube
- AS auger screwing
- AD auger drilling
- RR roller/tricone
- CB claw or blade bit
- NMLC NMLC core
- NQ, HQ, PQ wireline core

core-lift
- casing used
- barrel withdrawn

graphic log/core recovery
- core recovered - graphic symbols indicate material
- no core recovered

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss
- 25 water pressure test result (lugeons) for depth interval shown

weathering
- FR fresh
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

strength
- ES extremely strong
- VS very strong
- S strong
- MS moderately strong
- W weak
- VW very weak
- EW extremely weak

defect type
- JT joint
- PT parting
- SM seam
- SZ sheared zone
- SS sheared surface
- CS crushed seam

planarity
- PL planar
- CU curved
- UN undulating
- ST stepped
- IR irregular

roughness
- VR very rough
- RO rough
- SO smooth
- SL slickensided

coating
- CN clean
- SN stained
- VN veneer
- CO coating

Client : Contue Jinwan Enterprise Group (NZ)

Project Location : 162 to 166 Settlement Road, Papakura

Job Number: 11786

Auger Borehole No. 40

Sheet 40 of 63

Drilled By: ALM

Date: 30.9.04

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
TOPSOIL						
SLUMP DEBRIS : Firm, slightly plastic, grey/ brown slightly clayey silt, with minor rootlets			▽			
- becoming firm, moderately plastic, orange streaked clayey silt, with minor rootlets				55	6.9	
Firm, very plastic, orange streaked cream silty clay		0.5				
- becoming dark orange streaked cream				44	1.8	
		1.0				
				24	2.2	
Soft, moderately plastic, dark orange streaked cream slightly fine sandy clayey silt, with limonite staining						
- becoming firm		1.5		56	4.0	
- with minor rootlets						
		2.0		50	3.6	
NATURAL : Firm, very plastic, dark orange streaked cream slightly fine sandy silty CLAY, with limonite staining						
- becoming orange streaked light grey						
- with dark grey siltstone clasts						
Stiff, slightly plastic, grey slightly clayey SILT, friable with dark grey siltstone clasts, with minor limonite staining				140+		
- with green siltstone clasts		2.5				
- becoming very stiff				140++		
		3.0		140++		
		3.5		124	10	
- becoming stiff, fine sandy slightly clayey silt						
		4.0		140+		
E.O.B. at 4.0 metres.		4.5				
		5.0				
		5.5				

FOUNDATION ENGINEERING

Comments: Groundwater encountered at 0.5 metres

Borehole Diameter: 50mm

Checked: BS

Topsoil	Sand	Sandstone	Plutonic		
Fill	Gravel	Siltstone	No Core		
Clay	Organic	Limestone			
Silt	Pumice	Volcanic			

Client : Contue Jinwan Enterprise Group (NZ)

Project Location : 162 to 166 Settlement Road, Papakura

Job Number: 11786

Auger Borehole No. 52

Sheet 52 of 63

Drilled By: RS

Date: 1.10.04

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Depth (m)	Standing Water Level	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
TOPSOIL with gravel inclusions					
NATURAL : Stiff moderately plastic, cream streaked orange clayey SILT	0.5		80	2.2	
- becoming firm			54	2.5	
- becoming orange streaked cream	1.0		60	3.0	
- becoming moist					
- becoming stiff, orange mottled cream slightly clayey silt	1.5		80	3.3	
	2.0		78	3.0	
	2.5		70	3.5	
	3.0		82	4.1	
- becoming firm			48	2.4	
	3.5		64	2.9	
E.O.B. at 4.0 metres.	4.0		42	2.1	
	4.5				
	5.0				
	5.5				

FOUNDATION ENGINEERING

Comments: Groundwater not encountered

Borehole Diameter: 50mm

Checked:

Topsoil	Sand	Sandstone	Plutonic		
Fill	Gravel	Siltstone	No Core		
Clay	Organic	Limestone			
Silt	Pumice	Volcanic			

Client : Contue Jinwan Enterprise Group (NZ)

Project Location : 162 to 166 Settlement Road, Papakura

Job Number: 11786

Auger Borehole No. 61

Sheet 61 of 63

Drilled By: RAC

Date: 1.10.04

Borehole Location:	mN	mE	Ground R.L.
	Description:	Refer to site plan	

SOIL DESCRIPTION	Depth (m)	Vane Dial Reading	Soil Sensitivity
TOPSOIL			
NATURAL : Stiff, moderately plastic, orange streaked light brown clayey SILT		88	2.7
Stiff, very plastic, orange light grey silty CLAY	0.5	92	1.8
	1.0	96	1.9
Stiff, moderately plastic, orange mottled light grey clayey SILT, with slight limonite staining	1.5	98	2.0
- becoming firm, pink orange streaked light grey	2.0	78	1.7
- with moderate limonite staining	2.5	74	1.7
- becoming orange mottled white, moist	3.0	53	1.7
- becoming slightly plastic, orange mottled light grey fine sandy slightly clayey silt	3.5	56	1.9
- becoming stiff, with major limonite staining	4.0	64	2.5
E.O.B. at 4.0 metres.		140+	
	4.5		
	5.0		
	5.5		

Sample and Laboratory Test Details

FOUNDATION ENGINEERING

Comments: Groundwater not encountered

Borehole Diameter: 50mm

Checked: BS

Topsoil	Sand	Sandstone	Plutonic		
Fill	Gravel	Siltstone	No Core		
Clay	Organic	Limestone			
Silt	Pumice	Volcanic			

Client : Contue Jinwan Enterprise Group (NZ)

Project Location : 162 to 166 Settlement Road, Papakura

Job Number: 11786

Auger Borehole No. 62

Sheet 62 of 63

Drilled By: DBC

Date: 1.10.04

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
TOPSOIL						
				120	2.3	
NATURAL : Stiff, very plastic, orange silty CLAY		0.5				
				104	2.3	
		1.0				
- becoming light grey streaked orange				80	1.9	
		1.5				
				94	2.8	
		2.0				
				84	3.8	
		2.5				
				80	2.2	
Firm, moderately plastic, light grey and orange clayey SILT, moist				66	3.3	
		3.0				
- becoming slightly plastic, orange streaked light grey slightly clayey silt				68	1.6	
		3.5				
- becoming wet				60	5.0	
		4.0		70	5.0	
E.O.B. at 4.0 metres.						
		4.5				
		5.0				
		5.5				

FOUNDATION ENGINEERING

Comments: Groundwater not encountered

Borehole Diameter: 50mm

Checked: DS

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : Contue Jinwan Enterprise Group (NZ)

Project Location : 162 to 166 Settlement Road, Papakura

Job Number: 11786

Auger Borehole No. 63

Sheet 63 of 63

Drilled By: RAC

Date: 1.10.04

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Depth (m)	Standing Water Level	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
TOPSOIL					
NATURAL : Stiff, moderately plastic, orange mottled light brown clayey SILT	0.5		104	2.3	
			82	2.1	
- becoming light grey/ light brown mottled orange slightly clayey silt - becoming firm	1.0		70	1.8	
- with moderate limonite staining	1.5		72	2.7	
- becoming stiff	2.0		100	4.5	
- becoming firm, with moderate limonite gravel inclusions and a white thin clay seam	2.5		50	3.1	
Firm, non-plastic, orange mottled light grey fine sandy SILT, wet					
- becoming stiff	3.0	▽	130	5.4	
			140+		
- becoming firm	3.5		74	3.7	
- becoming stiff	4.0		140+		
E.O.B. at 4.0 metres.	4.5				
	5.0				
	5.5				

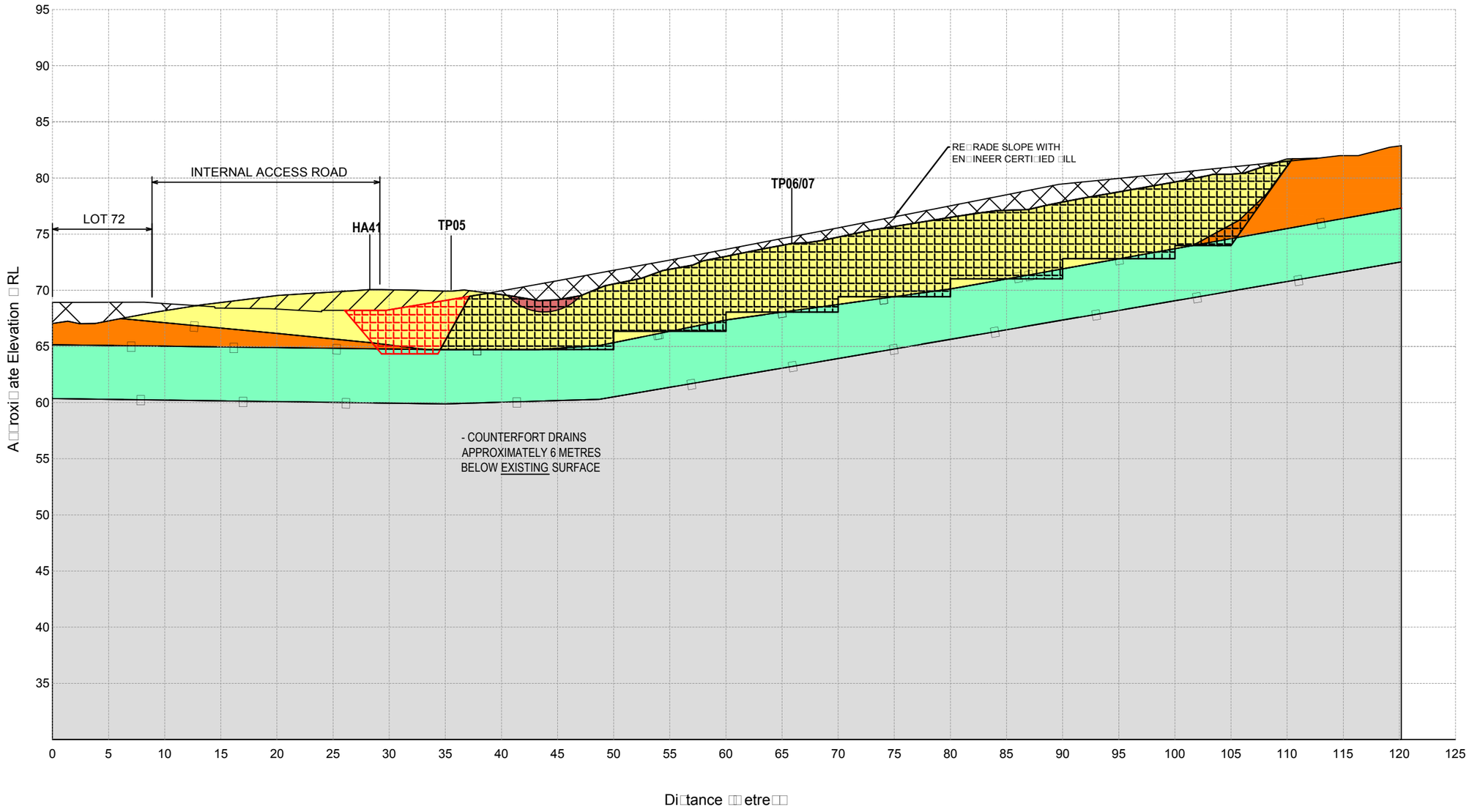
FOUNDATION ENGINEERING

Comments: Groundwater encountered at 3.0 metres

Borehole Diameter: 50mm

Checked: BS

Topsoil	Sand	Sandstone	Plutonic		
Fill	Gravel	Siltstone	No Core		
Clay	Organic	Limestone			
Silt	Pumice	Volcanic			



LE□END

- PROPOSED CUT
- PROPOSED □ILL
- E□ISTIN□ □ILL
- ALLUVIUM
- COLLUVIUM
- RESIDUAL SOILS
- TRANSITIONAL EAST COAST BAYS □ORMATION
- EAST COAST BAYS □ORMATION BEDROCK
- SHEAR KEY □SHEAR KEY DIMENSIONS STILL TO BE SPECI□ICALLY DESI□NED□
- E□CAVATE AND REPLACE WITH EN□INEER CERTI□IED □ILL WITH BENCH DRAINS AND COUNTER□ORT DRAINS

PROPOSED EARTHWORKS SOURCE□CRAN□ CIVIL LIMITED, EARTHWORKS PLAN, PRO□ECT NUMBER 1152, DRAWIN□ NUMBER C200 REVISION 2

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client□ RDL TRUSTEE LIMITED

□ro□ect□ 162-166 SETTLEMENT ROAD, PAPAKURA AUCKLAND

title□ CROSS SECTION H - REMEDIATION

□ro□ect no□ □ENZAUCK11786AC | □igure no□ C-8 | rev□ A

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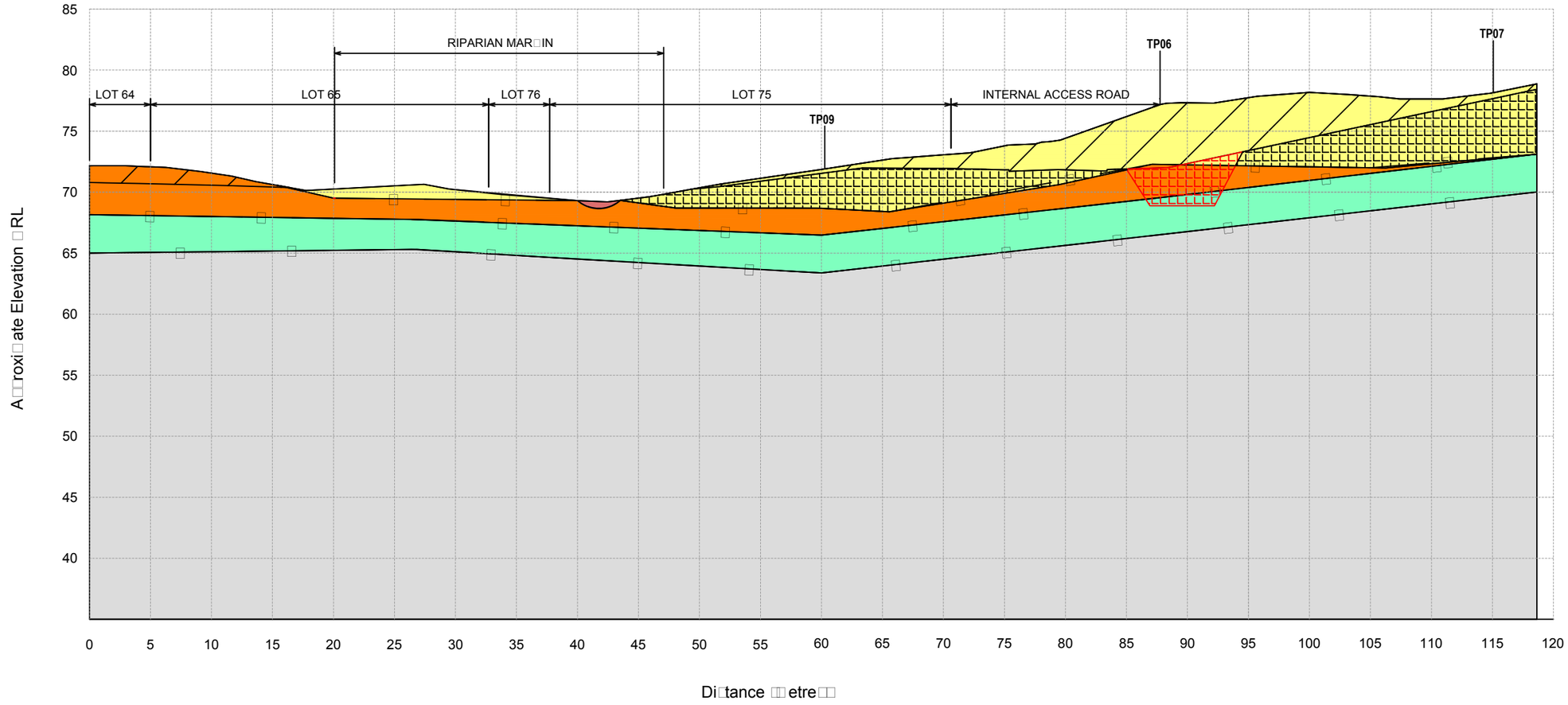

LE□END

- PROPOSED CUT
- PROPOSED □ILL
- E□ISTIN□ □ILL
- ALLUVIUM
- COLLUVIUM
- RESIDUAL SOILS
- TRANSITIONAL EAST COAST BAYS □ORMATION
- EAST COAST BAYS □ORMATION BEDROCK
- SHEAR KEY □SHEAR KEY DIMENSIONS STILL TO BE SPECI□ICALLY DESI□NED□
- E□CAVATE AND REPLACE WITH EN□INEER CERTI□IED □ILL WITH BENCH DRAINS AND COUNTER□ORT DRAINS

PROPOSED EARTHWORKS SOURCE□CRAN□ CIVIL LIMITED, EARTHWORKS PLAN, PRO□ECT NUMBER 1152, DRAWIN□ NUMBER C200 REVISION 2

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client□ RDL TRUSTEE LIMITED

□ro□ect□ 162-166 SETTLEMENT ROAD, PAPAKURA AUCKLAND

title□ CROSS SECTION I - REMEDIATION

□ro□ect no□ □ENZAUCK11786AC | □igure no□ C-9 | rev□ A

PLOT DATE: 26/05/2016 4:40:40 □□ DW□ ILE: □□ENZ:9 PRO□ECTS:11000-11999:11786:162-166 SETTLEMENT RD PAPAKURA:11786AC-5 ANALYSIS, DESI□N □ DRAWIN□ S:4.3 DRAWIN□ S:03-OUT □OIN□ 140316 CAD □OR ZIP LEVEL □SECTIONS:11786AC □SA TO □SL REMEDIATION.DW□

APPENDIX 4:

Investigation Location Plan

Legend

- Atterberg sample Locations
- Machine Boreholes
- Hand Auger Borehole
- Engineering Plan

0 25 m 50 m

ENGEO

Produced by **Datanest.earth**

Title: Stage 4 Finalised Investigation Plan		
Client: Harbour View Heights LP		
Project: 162 - 166 Settlement Road Subdivision	Drawn: AK	Figure No.: 1 Size: A4
Date: 07-07-2023	Checked: BF	
Proj No.: 13230.001.002	Scale: 1:2500	Version: 2.0

APPENDIX 5:

ENGEO Machine Borehole Data

BOREHOLE LOG MBH01

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 13-07-2023
Hole Depth : 22.565 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.0613229
Longitude : 174.9765254

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%)	RQD (%)	Defect Description	Moisture	Water Level	Piezometer Construction
TOPSOIL & FILL INTERMIXED	[FILL] Clayey SILT with some fibrous organics, trace fine sand and fine to medium gravels; dark brown with beds of yellowish brown and dark grey. Low plasticity.		VSt - H			UTP kPa		25 50 75	25 50 75				
				1	79	101/14 kPa							
						119/33 kPa							
SITE WON ENGINEERED FILL	[FILL] Silty CLAY; yellow with light grey streaks. High plasticity.					1.1/0.1.1.1 N=3					M		
				2	78								
	2.3 m: Becomes yellow with white mottling. 2.5 m: Becomes light grey with pink and yellow mottling. 2.7 m: Becomes yellow with light grey and orange streaks.		St - VSt			96/43 kPa							
				3	77	116/66 kPa							
						0.1/1.1.1.1 N=4							
	[FILL] Clayey SILT with trace fine sand; light grey and yellow intermixed with pinkish orange mottling. Low plasticity.		St										
	CORELOSS	NR	NA	4	76						NA		
	[FILL] Silty CLAY; yellow and white intermixed with orange and brown mottling. High plasticity.		VSt			115/56 kPa					M		
	[FILL] Clayey SILT with trace fine sand and hard silt inclusions; white with pink and yellow streaks. Low plasticity.		VSt			0.1/0.1.1.1 N=3							
	CORELOSS	NR	NA	5	75						NA		

Borehole met target depth at 22.565m.
Piezometer showed standing water at 9.91 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

BOREHOLE LOG MBH01

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 13-07-2023
Hole Depth : 22.565 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.0613229
Longitude : 174.9765254

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%)	RQD (%)	Defect Description	Moisture	Water Level	Piezometer Construction
		NR									NA		
SITE WON ENGINEERED FILL	[FILL] Clayey SILT with trace fine sand; white with yellow mottling. Low plasticity.		VSt										
	[FILL] Silty CLAY; yellowish brown with orange and light grey streaks. High plasticity.		VSt										
	[FILL] Clayey SILT with minor fine sand; dark yellowish brown with black and orange mottling. Low plasticity. 6.0 m: Encountered standing water at 6.0 m depth on 17/7/23 at 8:00am. 6.45 m: Becomes yellow with orange and white streaks with small black specks.		St - VSt	6	74	119/32 kPa 1.1/1.2.2.2 N=7							
	6.9 m: Becomes light grey with orange mottling and faint limonite staining.			7	73	123/57 kPa							
ALLUVIUM	Clayey SILT with minor fine sand; light grey with orange mottling and faint limonite staining. Low plasticity.					76/33 kPa 0.1/1.1.1.2 N=5							
	8.0 m: Becomes light grey with black specks.		St - VSt	8	72						M		
	SILT with some clay and trace fine sand; light greenish grey with orange limonite staining. Low plasticity. Encountered hard silt granules and limonite vein encased in green staining throughout unit.		VSt	9	71	135/36 kPa 1.1/0.1.2.2 N=5							
	Clayey SILT with some fine to medium sand and trace fine to medium gravels; light grey with yellowish brown mottling. Low plasticity. Gravels are scoria, subrounded, vesicular and pale purplish grey. 9.91 m: Encountered standing groundwater. 10.0 m: Becomes yellow with white streaks. 10.3 m: Becomes light grey with yellow mottling.		VSt - H	10	70	UTP kPa							

Borehole met target depth at 22.565m.
Piezometer showed standing water at 9.91 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

GEOTECH MACHINE BOREHOLE - AUCKLAND PBH01-03.GPJ NZ DATA TEMPLATE 2.GDT 8/8/23

BOREHOLE LOG MBH01

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 13-07-2023
Hole Depth : 22.565 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.0613229
Longitude : 174.9765254

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%)	RQD (%)	Defect Description	Moisture	Water Level	Piezometer Construction
			VSt - H			22.17/19.24.7 for 10mm N=50+					M		
ALLUVIUM	Slightly weathered, bluish dark grey MUDSTONE. Moderately strong. Highly fractured greywacke.		MS								NA		
			VSt - H	11	69						M		
		NR	NA								NA		
	Clayey SILT with some fine sand; light grey. Low plasticity.		L								M		
	CORELOSS												
	Silty fine SAND; whitish light grey.	NR	NA								NA		
	CORELOSS												
P.GRIT	Highly weathered, dark brown fine to coarse SANDSTONE. Weak.		W								NA		
	Silty fine to coarse SAND; brown. Sand is well graded.		L	12	68	3.4/2.2.2.2 N=8	NR				M		
	Silty fine to coarse SAND with trace coarse gravels; light brown. Sand is well graded. Gravels are angular, fractured moderately strong siltstone.		L	13	67						S		
EAST COAST BAYS FORMATION	Clayey SILT with some fine sand; light grey with orange mottling. Low plasticity. 13.5 m: Encountered hard dark brown silt granules and minor limonite staining.		H			UTP kPa 4.4/2.2.3.4 N=11					M		
	CORELOSS	NR	NA	14	66						NA		
	Clayey SILT with some fine to medium sand; light grey with dark orange brown and black streaks. Low plasticity. Significant limonite staining.		H								M		
	Fine to medium SAND with minor silt; light grey interbedded with dark grey. Sand is gap graded and has gently inclined laminated bedding. 15.3 m: Encountered orange yellow stain.		MD - D	15	65	3.3/6.8.8.8 N=30							
	CORELOSS	NR	NA								NA		

Borehole met target depth at 22.565m.
Piezometer showed standing water at 9.91 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

GEOTECH MACHINE BOREHOLE - AUCKLAND PBH01-03.GPJ NZ DATA TEMPLATE 2.GDT 8/8/23

BOREHOLE LOG MBH01

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 13-07-2023
Hole Depth : 22.565 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.0613229
Longitude : 174.9765254

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%)	RQD (%)	Defect Description	Moisture	Water Level	Piezometer Construction
		NR						25 50 75	25 50 75		NA		
EAST COAST BAYS FORMATION	Fine to medium SAND with minor silt; light grey. Sand is gap graded. 16.2 m: Encountered trace hard dark orange limonite nodules. Becomes light grey and light orange brown intermixed.		L	16	64	1.0/1.1.1.2.2 N=6					M		
	Fine to coarse sandy SILT with trace clay; dark bluish grey. Low plasticity.		H	17	63								
	Silty CLAY; dark bluish grey. High plasticity. [Highly weathered MUDSTONE, extremely weak, laminated defects].		H	18	62					17.9-18 m: Bedding fractures, laminated, sub-horizontal.			
	CORELOSS	NR	NA			13.8/5.6.8.8 N=27	NR				NA		
	Clayey SILT with minor fine sand; grey. Low plasticity. [Highly weathered SILTSTONE, extremely weak].		H	19	61						M		
	Unweathered to slightly weathered, grey with dark greyish black streaks, SILTSTONE. Very weak to weak, closely spaced to widely spaced defects.		VW - W	20	60	32.18 for 10mm N=50+				19.76-19.86 m: Joints: Sub-horizontal to steeply inclined, very to moderately narrow (<2mm to 7mm) smooth and rough undulating.	NA		
				21	59	50 for 75mm N=50+	NR						

Borehole met target depth at 22.565m.
Piezometer showed standing water at 9.91 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

GEOTECH MACHINE BOREHOLE - AUCKLAND PBH01-03.GPJ NZ DATA TEMPLATE 2.GDT 8/8/23

BOREHOLE LOG MBH01

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 13-07-2023
Hole Depth : 22.565 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.0613229
Longitude : 174.9765254

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%) 25 50 75	RQD (%) 25 50 75	Defect Description	Moisture	Water Level	Piezometer Construction
EAST COAST BAYS FORMATION	Unweathered to slightly weathered, grey with dark greyish black streaks, SILTSTONE. Very weak to weak, closely spaced to widely spaced defects.		VW - W	22	58	50 for 65mm N=50+	NR			21.075-22.5 m: Joints: Closely to moderately widely spaced (180 to 350mm), tight to narrow (Nil to 5mm), sub-horizontal to steeply inclined (0-45 deg), rough and smooth stepped.	NA		

End of Hole Depth: 22.565 m
Termination: Target depth

Borehole met target depth at 22.565m.
Piezometer showed standing water at 9.91 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

BOREHOLE LOG MBH02

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 12-07-2023
Hole Depth : 15.07 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.062144
Longitude : 174.9756059

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%) 25 50 75	RQD (%) 25 50 75	Defect Description	Moisture	Water Level	Piezometer Construction
TS	TOPSOIL		NA										
EAST COAST BAYS FORMATION [FAULTED]	Silty CLAY with trace fine sand; white with yellow and pink streaks. High plasticity. 0.4 m: Becomes yellow with red and white mottling. 0.6 m: Becomes light grey with pink streaks. 0.9 m: becomes white with orange brown and dark pink mottling.		St	1	75	75/32 kPa 62/29 kPa							
	Clayey SILT with minor fine sand; white with orange brown mottling. Low plasticity. 1.4 m: Becomes brown, red and grey intermixed. 1.5m: Becomes Clayey SILT with some fine sand; greyish brown. 2.3 m: Encountered 50mm thick silty CLAY layers with a very stiff consistency at 250 mm spacing.		St	2	74	55/22 kPa 0.1/0.1.0.1 N=2					M		
	Silty CLAY; light grey. High plasticity.		VSt	3	73	145/46 kPa							
	Clayey SILT with some fine to coarse sand; light grey. Low plasticity. 3.45 m: Becomes light grey, orange and pink intermixed. 3.6 m: Becomes greyish brown with orange mottling. 4.2 m: Encountered 50mm thick hard dark brown silt vein. 4.3 m: Encountered higher coarse sand content. Becomes yellowish brown and dark brown intermixed. 4.7 m: Encountered less coarse sand and more fine sand. Becomes light grey with orange brown mottling.		St - VSt	4	72	0.0/0.0.1.1 N=2 0.0/1.2.1.1 N=5							
	Clayey SILT with minor fine sand; light grey. Low plasticity.		F	5	71								

Borehole met target depth at 15.07m.
Piezometer showed standing water at 6.22 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.
TS = Topsoil.

GEOTECH MACHINE BOREHOLE - AUCKLAND PBH01-03.GPJ NZ DATA TEMPLATE 2.GDT 8/8/23

BOREHOLE LOG MBH02

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 12-07-2023
Hole Depth : 15.07 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.062144
Longitude : 174.9756059

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%) 25 50 75	RQD (%) 25 50 75	Defect Description	Moisture	Water Level	Piezometer Construction
EAST COAST BAYS FORMATION [FAULTED]	Clayey SILT with minor fine sand; light grey. Low plasticity.		F										
	Clayey SILT with some fine to medium sand; light grey. Low plasticity.		F	6	70	39/7 kPa 0.0/0.1.2.1 N=4						▼	
	6.22 m: Encountered standing groundwater.												
	6.9 m: Encountered hard dark brown silt bed.			7	69								
	7.3 m: Encountered yellowish brown staining.												
	Fine to coarse sandy SILT with some clay; light grey with hard dark brown silt inclusions. Low plasticity.		F			40/7 kPa 1.0/1.0.1.0 N=2							
	8.0 m: Becomes light yellowish brown with black specks and faint orange mottling.			8	68						M		
						33/7 kPa 1.1/2.2.3.2 N=9							
	Silty CLAY; yellowish brown and dark brown intermixed. High plasticity. Relict fracture zone with dark orange limonite staining.		H	9	67					9.45-9.65 m: Relict fracture zone with dark orange limonite staining.			
			H										
	Fine to coarse sandy SILT with minor clay; greyish white with black specks. Low plasticity.		VSt										
	CLAY with some silt; dark grey. High plasticity.		H	10	66	UTP kPa							
	Fine sandy SILT with minor clay; grey with faint yellow streaks. Low plasticity.		L - MD			2.2/2.2.2.4							

Borehole met target depth at 15.07m.
Piezometer showed standing water at 6.22 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.
TS = Topsoil.

GEOTECH MACHINE BOREHOLE - AUCKLAND PBH01-03.GPJ NZ DATA TEMPLATE 2.GDT 8/8/23

BOREHOLE LOG MBH02

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 12-07-2023
Hole Depth : 15.07 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : LM / NM
Latitude : -37.062144
Longitude : 174.9756059

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%)	RQD (%)	Defect Description	Moisture	Water Level	Piezometer Construction
	Fine SAND with trace silt; brown with orange brown streaks. Horizontal bedding.		L - MD			N=10 2.2/2.2.2.4 N=10					M		
	10.5 m: Encountered fine to medium sands. Becomes light yellowish brown.			11	65								
	10.9 m: Encountered coarse black sand grains.	NR	NA								NA		
	CORELOSS		H								M		
	Clayey SILT with minor fine to coarse sand; grey with brown and yellow grains. Low plasticity.												
	Slightly weathered, grey SILTSTONE. Very weak. No defects.		VW								NA		
EAST COAST BAYS FORMATION [FAULTED]	Slightly weathered, grey with black staining SILTSTONE. Very weak to weak. Defects closely to moderately widely spaced.			12	64	13.37 for 50mm N=50+	NR			12.45-12.55 m: Joints: closely spaced. moderately narrow to moderately wide, gently inclined to sub-vertical, rough stepped.			
	13.05 m: Defects become very widely spaced.			13	63					13.05 m: Joint: very narrow (<2mm), sub-horizontal, rough stepped			
			VW - W			18.32 for 25mm N=50+	NR				NA		
				14	62								
				15	61	50 for 70mm N=50+	NR						

End of Hole Depth: 15.07 m
Termination: Target depth

Borehole met target depth at 15.07m.
Piezometer showed standing water at 6.22 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.
TS = Topsoil.

BOREHOLE LOG MBH03

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 17-07-2023
Hole Depth : 12.125 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd

Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : KB / NM
Latitude : -37.062144
Longitude : 174.9756059

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%) 25 50 75	RQD (%) 25 50 75	Defect Description	Moisture	Water Level	Piezometer Construction
FILL	[FILL] Silty CLAY with trace fine sand, fine to medium gravels and rootlets; brownish grey. High plasticity.		VSt			141/84 kPa							
EAST COAST BAYS FORMATION [FAULTED]	Silty CLAY with trace fine sand; orange with light grey mottling. High plasticity.		VSt	1	75	101/62 kPa							
	Clayey SILT with minor fine sand; orange with light grey mottling. Low plasticity.		St - VSt			101/48 kPa 0.1/0.1.1.1 N=3							
	Fine sandy SILT with some clay; light brownish orange with brown and red streaks. Low plasticity.		VSt	2	74								
	Silty fine SAND; light orange brown with brown and red streaks. Well sorted.		L										
	Clayey SILT with some fine sand; orange brown with light grey and brown streaks. Low plasticity.		St			62/17 kPa					M		
	SILT with minor clay and fine sand; grey. Low plasticity. 2.8 m: Encountered 50mm thick beds of silty fine sand at 100 to 500mm spacing; beds are grey or dark reddish brown.		VSt - H	3	73	197+ kPa 1.2/2.2.1.2 N=7							
				4	72	UTP kPa 2.1/1.1.1.1 N=4							
				5	71								
	Silty CLAY; grey. High plasticity.		H										

Borehole met target depth at 12.125m.
Piezometer showed standing water at 8.99 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

BOREHOLE LOG MBH03

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 17-07-2023
Hole Depth : 12.125 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : KB / NM
Latitude : -37.062144
Longitude : 174.9756059

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%)	RQD (%)	Defect Description	Moisture	Water Level	Piezometer Construction
EAST COAST BAYS FORMATION [FAULTED]	Silty CLAY; grey. High plasticity.		H	6	70	UTP kPa					M		
						1.2/2.2.3.4 N=11							
	Clayey SILT with some fine sand; grey with black specks. Low plasticity. [Highly weathered SILTSTONE. Extremely weak. Very closely to closely spaced defects.]		H	7	69					6.72 m: Fracture: undulating rough, 10 degrees, orange brown clay infill. 6.78 m: Fracture: planar smooth, 10 degrees, orange brown clay infill. 6.65-7.1 m: Shear zone. 6.9 m: Fracture: stepped rough, 90 degrees, orange brown clay infill. 7.08 m: Fracture: planar rough, 20 degrees. Black red gravel infill. 7.23 m: Fracture: planar smooth, 45 degrees. 7.3-7.4 m: Fractured zone.			
	7.08 to 7.28 m: Encountered crushed zone.												
	Moderately weathered, grey SILTSTONE. Very weak. Defects closely to moderately widely spaced.					6.8/10.10.8.8 N=36							
				8	68					8.45 m: Fracture: stepped smooth, 10 degrees.			
	8.99 m: Encountered standing groundwater.		VW	9	67	15.35 for 45mm N=50+	NR			9.27 m: Fracture: undulating smooth clean, 30 degrees. 9.35-9.5 m: Joints: closely spaced, planar rough 45 degrees with brown staining. 9.75 m: Joint: planar slickensided 40 degrees with flakes of rock and no clay.	NA		
	9.75 to 10.5 m: Encountered fault zone.			10	66					10.3 m: Joint: undulating slickensided 55 degrees with flakes of rock and no clay.			
						12.38 for	NR						

Borehole met target depth at 12.125m.
Piezometer showed standing water at 8.99 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

GEOTECH MACHINE BOREHOLE - AUCKLAND PBH01-03.GPJ NZ DATA TEMPLATE 2.GDT 8/8/23

BOREHOLE LOG MBH03

Geotechnical Investigation
162 - 166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Date : 17-07-2023
Hole Depth : 12.125 m
Drilling Method : Borehole
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio :
Logged By/Reviewed By : KB / NM
Latitude : -37.062144
Longitude : 174.9756059

Material	DESCRIPTION	Log Symbol	Strength	Depth (m BGL)	Elevation (mRL)	SPT N-Value / Vane Shear Strength	Sample Type	TCR (%) 25 50 75	RQD (%) 25 50 75	Defect Description	Moisture	Water Level	Piezometer Construction
	Moderately weathered, grey SILTSTONE. Very weak. Defects closely to moderately widely spaced.					65mm N=50+	NR			10.72 m: Fracture: undulating rough 30 degrees with brown sand.			
11	11.0 m: Defects become widely spaced.		VW	11	65					11.02 m: Joint: undulating rough 5 degrees.			
										11.43 m: Joint: Stepped rough 5 degrees clean.	NA		
										11.8 m: Joint: Undulating rough 10 degrees.			
12				12	64	20.30 for 50mm N=50+	NR						

End of Hole Depth: 12.125 m
Termination: Target depth

Borehole met target depth at 12.125m.
Piezometer showed standing water at 8.99 m depth on 24/7/23.
Coordinates obtained using handheld GPS.

Elevations obtained using Auckland Council GIS.
UTP = Unable To Penetrate; NA = Not Assessed.

APPENDIX 6:

ENGEO Hand Auger Logs

LOG OF AUGER HA01

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0613478
Longitude : 174.9768666

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]					N/A		
	FILL	ML	[FILL] Clayey SILT with minor fine to medium sand and trace fine gravel; greyish brown with occasional orange mottles. Low plasticity.		81		D	VSt-H	119/65	
0.5									188/72	
1.0									200+	
									181/68	
1.5					80				200+	
									102/75	
2.0		CH	[FILL] Silty CLAY with trace fine sand, trace rootlets and trace fine gravel; light brownish grey with orange streaks. High plasticity.						160/97	
									157/82	
2.5			2.5 m - Becomes white and orange intermixed.		79				136/78	
									113/82	
3.0			2.9 m - Becomes light brownish orange, grey, dark grey and orange intermixed.						171/102	
							M	VSt-H		
3.5			3.5 m - Becomes white, orange, pink and yellow intermixed.		78				82/48	
									200+	
4.0			4.1 m - Becomes brownish orange with red mottles.						177/119	
4.5			4.5 m - Encountered 50 mm of grey fine to medium sandy silt.		77				172/113	
									177/102	
5.0			4.9 m - Becomes greyish brown (possible buried topsoil).							
			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

LOG OF AUGER HA02

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0615293
Longitude : 174.9766548

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]					N/A		
	FILL	CH	[FILL] Silty CLAY with minor fine to medium sand, trace rootlets and trace fine to medium gravel; greyish brown with occasional orange streaks and mottles. High plasticity.		79				160/78	
0.5									140/75	
1.0					78			VSt-H	142/109	
									119/78	
1.5									124/65	
									200+	
2.0		CH	[FILL] Silty CLAY with trace fine sand and rootlets; light orange with light brown and light grey and occasional white streaks. High plasticity.		77		M		128/78	
									188/94	
2.5									136/89	
3.0								VSt-H	200+	
					76				177/94	
3.5									140/106	
	EAST COAST BAYS FORMATION	CH	Silty CLAY with trace fine sand; light orange with light grey streaks. High plasticity.						147/109	
4.0			4.05 m - Becomes white with orange streaks. 4.15 m - Becomes white, orange, pink and dark orange intermixed.		75				153/89	
								VSt-H		
4.5			4.5 m - Encountered 50 mm layer orange brown fine to coarse sandy silt. 4.55 m - Becomes light orange brown.						189/136	
									200+	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA03

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 2853
Logged By : LM
Reviewed By : NM
Latitude : -37.0618588
Longitude : 174.9764626

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]					N/A		
0.0	FILL	ML	[FILL] Clayey SILT with trace fine sand and fine to medium gravel; dark brown with yellow and grey mottling. Low plasticity.						98/34	
0.5					80				175/47	
1.0			0.9 m - Becomes dark grey with yellow mottling.					St-VSt	149/65	
1.5									136/26	
2.0			1.95 m - Becomes very stiff to hard.		79				108/62	
2.5			2.3 m - Becomes brownish yellow with brown and grey mottling.		78		M	VSt-H	57/26	
3.0	EAST COAST BAYS FORMATION	CH	Silty CLAY; orange yellow with light grey streaks. High plasticity.						119/55	
3.5			3.5 m - Becomes light grey with yellow streaks.		77			VSt	177/98	
4.0			4.05 m - Becomes stiff.						200+	
4.5					76			St	152/93	
5.0			4.8 m - Becomes white.						134/57	
			End of Hole Depth: 5 m Termination Condition: Target depth						113/59	
									106/46	
									76/59	
									85/43	
									59/36	

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA04

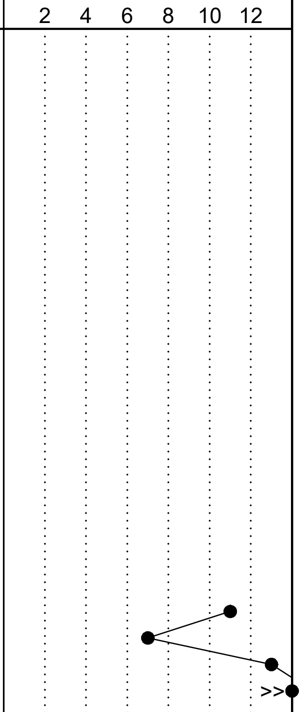
Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 2.2 m
Hole Diameter : 50 mm
Shear Vane No : 2853
Logged By : LM
Reviewed By : NM
Latitude : -37.0620522
Longitude : 174.9762262

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0–0.2	T	OL	[TOPSOIL]					N/A	
0.2–2.2	FILL	ML	[FILL] Clayey SILT with minor fine sand; dark grey with yellow and orange mottling. Low plasticity.		79		M	St-VSt	152/60
0.5			0.5 m - Becomes yellowish brown intermixed with dark grey and brownish orange.						96/55
0.8									126/49
1.1									102/33
1.4					78				122/60
1.7			1.7 m - Encountered black streaks.						138/67
2.0									UTP
2.1			2.1 m - Encountered 50 mm thick bed of organic silt bed.						
2.15			2.15 m - Becomes orange brown and hard.						

End of Hole Depth: 2.2 m
Termination Condition: Practical refusal

Scala Penetrometer
Blows per 100mm



Hand auger met practical refusal on hard material at 2.2 m depth.
Scala Penetrometer met practical refusal at 2.5 m depth.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA05

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 2853
Logged By : LM
Reviewed By : NM
Latitude : -37.0623011
Longitude : 174.9759332

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer (Blows per 100mm)
0.0	T	OL	[TOPSOIL]					N/A		
0.5	FILL	ML	[FILL] Clayey SILT with trace fine sand and fine gravel; brown intermixed with white, orange, grey and red. Low plasticity. Gravel is sub-rounded greywacke and scoria.		76			St-VSt	82/22 76/47 149/47 65/22	
1.5					75				146/83	
2.0	EAST COAST BAYS FORMATION	CH	Silty CLAY; light grey with yellow mottling. High plasticity.				M	VSt	122/69 101/65 101/49	
2.5					74					
3.0		ML	Clayey SILT with trace fine sand; white with red and yellow mottling. Low plasticity.					VSt	149/65 99/39 128/63 121/53	
3.5					73					
4.0		SM	Silty fine to medium SAND with trace coarse shell fragments; brownish grey with pink mottling. Poorly graded.					L		
4.5		ML	Fine to coarse sandy SILT; greyish brown. Low plasticity.		72			F	46/43	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Scala Penetrometer met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA06

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 2853
Logged By : LM
Reviewed By : NM
Latitude : -37.0622971
Longitude : 174.9756079

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer (Blows per 100mm)
0.0	T	OL	[TOPSOIL]		76			N/A		
	FILL	CH	[FILL] Silty CLAY with minor fine sand; dark brown with yellow and grey mottling. High plasticity.						92/30	
0.5									158/93	
			0.8 m - Encountered minor greywacke medium gravel. Sub-rounded.					St-VSt	180/89	
1.0					75					
			1.3 m - Becomes dark brown and yellow intermixed.							
1.5									175/98	
	EAST COAST BAYS FORMATION.	CH	Silty CLAY; yellow and light grey streaked. High plasticity.						175/86	
2.0					74			VSt	142/66	
		ML	Clayey SILT with trace fine sand; white with black streaks and pink mottling. Low plasticity.				M		123/59	
2.5										
								VSt	151/50	
3.0									157/53	
		SP	Medium SAND with some silt; pinkish brown. Sand is poorly graded and well sorted.		73					
3.5								L-MD		
		ML	Fine to coarse sandy SILT; reddish brown with black and white mottling. Low plasticity.					F	43/36	
4.0					72					
									129/43	
4.5			4.6 m - Becomes yellowish brown. Encountered some coarse shell fragments.					VSt	144/45	
									152/36	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Scala Penetrometer met target depth at 4 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA07

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 2853
Logged By : LM
Reviewed By : NM
Latitude : -37.0622131
Longitude : 174.9753422

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
	T	OL	[TOPSOIL]					N/A	157/11	
0.5	SOUTH AUCKLAND VOLCANIC FIELD	ML	Clayey SILT with some fine sand; orange pink with light grey streaks. Low plasticity.		74			VSt-H	200+	
1.0									101/29	
									106/36	
1.5			1.3 m - Becomes light grey with orange pink mottling.						113/43	
			1.65 m - Becomes stiff.		73			St	57/26	
2.0			1.95 m - Becomes very stiff.					VSt	131/47	
									182/56	
2.5			2.5 m - Encountered bed of orange and yellow streaked with fibrous black organics.				M		144/40	
3.0					72				159/42	
		ML	Fine to coarse sandy SILT with minor clay; yellowish brown. Low plasticity. Limonite staining at top of unit.					St-VSt	57/32	
3.5									80/34	
4.0					71				80/45	
									102/36	
4.5			4.6 m - Encountered white clay and black organic granules.						171/49	
		ML	Clayey SILT with some fine sand; orange brown with white streaks. Low plasticity.		70			St	92/32	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA08

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 4.6 m
Hole Diameter : 50 mm

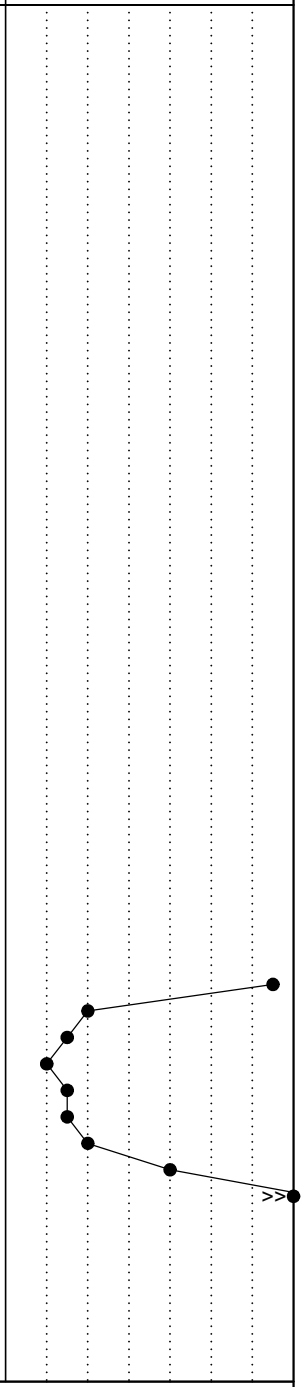
Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0619256
Longitude : 174.9755948

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	T	OL	[TOPSOIL]					N/A	
0.5	FILL	ML	[FILL] Clayey SILT with minor sand, trace fine gravel and trace organics; orange, light grey and brown intermixed. Low plasticity. Organics comprise rootlets and partially decomposed bark fragments.		72			VSt-H	171/78 UTP UTP 153/99 184/109
1.5	FILL	CH	[FILL] Silty CLAY with trace fine sand, fine gravel and rootlets; greyish brown with orange mottles. High plasticity. 2.1 m - Becomes orange and brown intermixed with light grey and white streaks and mottles. 2.8 m - Encountered 150 mm of light pinkish white with orange streaks.		71 70		M	VSt-H	UTP 171/95 142/78 145/85 136/60 138/63 188/109
3.5	ECBF	SM	Silty fine to coarse SAND with trace clay; brown, orange and grey intermixed. Well graded.		69			MD-D	
4.0	ECBF	ML	Fine to coarse sandy SILT with some clay; brownish grey. Low plasticity.				W	St-H	
4.5			End of Hole Depth: 4.6 m Termination Condition: Practical refusal						
5.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12



Hand auger met practical refusal on hard material at 4.6 m depth.
Scala Penetrometer met practical refusal at 4.6 m depth.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA09

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0618086
Longitude : 174.9758671

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]		73			N/A		
	FILL	CH	[FILL] Silty CLAY with minor fine to medium sand, trace fine to medium gravel and organics; brown with orange, grey and dark grey streaks and mottles. High plasticity. Orgaincs comprise rootlets and decomposing bark fragments.						200+	
0.5									200+	
1.0					72				200+	
									200+	
1.5			1.65 m - Encountered 100 mm layer of fine to coarse dark grey silty sand.					VSt-H	200+	
									191/119	
2.0					71				200+	
2.5							M		200+	
									200+	
3.0									200+	
	COLLUVIUM	CH	Silty CLAY with minor fine to medium sand and trace fine gravel; light greyish brown with orange and pink mottles. High plasticity.		70			VSt	171/102	
3.5									181/106	
4.0					69				148/78	
									171/102	
4.5		ML	Clayey SILT with minor fine to medium sand and trace carbonaceous inclusions; greyish brown with orange, grey and pink mottles. Low plasticity.					H	200+	
									200+	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA10

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0616343
Longitude : 174.9760886

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
	T	OL	[TOPSOIL]					N/A		
0.5	FILL	ML	[FILL] Clayey SILT with minor fine to medium sand, trace rootlets and fine to coarse gravel; brownish orange with light grey streaks. Low plasticity.		73			VSt-H	138/58 124/51 150/60 200+	
1.0			1.1 m - Becomes brown and grey intermixed with occasional orange mottles.						200+	
1.5					72				200+	
2.0							M		200+	
2.5									199/85 UTP	
3.0	EAST COAST BAYS FORMATION	CH	Silty CLAY with trace fine sand; light grey with orange streaks. High plasticity.		71			St-VSt	UTP 75/44	
3.5					70				113/77	
4.0			3.9 m - Becomes with some fine to medium sand.						124/61 102/41	
4.5		ML	Fine to coarse sandy SILT with minor clay; light grey with orange streaks. Low plasticity. 4.4 m - Encountered standing groundwater. Encountered 50 mm of trace fine to coarse crushable silt gravel. Gravel is dark orange.		69	▽	W S	VSt-H	136/44 200+	
5.0		ML	Fine to coarse sandy SILT with minor clay; bluish grey. Low plasticity.				W	H		
			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Dip test showed standing water at 4.4 m depth during drilling.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA11

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0613141
Longitude : 174.9761883

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer (Blows per 100mm)
0.0	T	OL	[TOPSOIL]					N/A		
0.0	FILL	ML	[FILL] Clayey SILT with minor fine to medium sand, trace rootlets and fine to medium gravel; orange brown, grey and orange intermixed. Low plasticity.		74		D		200+	
									177/70	
1.0			1.1 m - Becomes grey and brown intermixed with occasional orange mottles.					VSt-H	114/78	
									200+	
1.5					73				UTP	
									181/123	
2.0		CH	[FILL] Silty CLAY with minor fine to medium sand, trace rootlets and fine to medium gravel; light grey with orange streaks. High plasticity.						200+	
			2.1 m - Becomes orange brown with grey mottles.					VSt-H	171/102	
2.5			2.5 m - Becomes light grey with orange streaks.		72				142/82	
3.0	EAST COAST BAYS FORMATION	CH	Silty CLAY with minor fine to medium sand; light grey with orange streaks. High plasticity.				M	VSt	128/72	
									114/58	
3.5		ML	Clayey SILT with minor fine to medium sand; light grey with orange streaks. Low plasticity.		71				123/51	
									126/72	
4.0								VSt	114/53	
4.5			4.6 m - Encountered some fine to medium sand. Becomes grey with occasional orange streaks.		70				116/75	
									140/75	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA12

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 07/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0610466
Longitude : 174.9767094

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T	OL	[TOPSOIL]					N/A		
	FILL		[FILL] Clayey SILT with minor fine to medium sand trace rootlets and fine gravel; grey with orange streaks and mottles. Low plasticity.						200+	
0.5									130/61	
1.0					82				171/73	
									160/72	
		ML						VSt-H		
1.5			1.5 m - Encountered some fine to medium sand. Becomes light brownish orange with light grey streaks.						199/90	
									200+	
2.0					81				UTP	
			2.2 m - Becomes intermixed reddish brown and blue and greenish grey with orange mottles.						200+	
2.5			[FILL] Silty CLAY with trace fine sand and trace rootlets; orange and light grey intermixed with occasional brown mottles. High plasticity.				M		143/92	
3.0					80				200+	
		CH						VSt-H		
			3.2 - 3.4 m - Becomes greyish brown with orange mottles.						198/126	
3.5									159/102	
	ECBF		Silty CLAY with trace fine sand; light grey with orange streaks. High plasticity.						133/84	
4.0					79					
									155/95	
		CH						VSt		
4.5									153/89	
									143/89	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth		78					

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed, ECBF = East Coast Bays Formation.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA13

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 3.7 m
Hole Diameter : 50 mm

Shear Vane No : 2853
Logged By : LM
Reviewed By : NM
Latitude : -37.0622823
Longitude : 174.9740186

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	T	OL	[TOPSOIL]					N/A	
	FILL	CH	[FILL] Silty CLAY intermixed with TOPSOIL; yellow with light grey streaks and dark brown with grey mottling. High plasticity.					VSt	148/56
0.5		ML	[FILL] Fine sandy SILT with some clay; yellowish brown with orange and grey mottling. Low plasticity.					VSt	158/39
		SM	[FILL] Silty fine to coarse SAND with trace coarse shell fragments; brownish yellow with light grey mottling and white speckles. Well graded.		64			L-MD	
1.0									
1.5		CH	[FILL] Silty CLAY; white with black streaks. High plasticity.				M	St	
		ML	[FILL] SILT with minor coarse sand; brown. Low plasticity.		63			St	
2.0		ML	[FILL] Clayey SILT with some medium sand and fibrous organics; yellowish grey with black mottling. Low plasticity.					H	
	EAST COAST BAYS FORMATION	ML	Fine sandy SILT with some clay; orange yellow. Low plasticity. 2.4 m - Becomes light grey with fibrous organic mottling. 2.6 m - Becomes streaked orange and light grey. 2.8 m - Becomes orange.		62			St	55/29 88/32
3.0		CH	Silty CLAY with trace fine sand; orange. High plasticity.					VSt	168/96
		CH	Silty CLAY; grey. High plasticity. 3.2 m - Encountered standing groundwater. Becomes saturated.			▽	S	VSt-H	200+ UTP
3.5			End of Hole Depth: 3.7 m Termination Condition: Practical refusal						
4.0									
4.5									
5.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>
>>
>>

Hand auger met practical refusal on hard material at 3.7 m depth.
Scala Penetrometer met practical refusal at 3.8 m depth.
Dip test showed standing water at 3.2 m depth during drilling.
T = Topsoil, N/A = Not Assessed.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

LOG OF AUGER HA14

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0624415
Longitude : 174.9735995

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Elevation (mRL)	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	T	OL	[TOPSOIL]			N/A	
	F	CH	[FILL] Silty CLAY with minor fine to medium sand, trace rootlets and fine gravel; brown with orange, red and grey mottles. High plasticity.			H	UTP
0.5	BTS	OL	[BURIED TOPSOIL]	59		VSt-H	171/58
	EAST COAST BAYS FORMATION	CH	Silty CLAY with trace fine sand and rootlets; light brownish orange. High plasticity.			VSt	181/65
1.0			Clayey SILT with some fine to medium sand and occasional organics; light grey mottled orange. Low plasticity. Organics comprise decomposed bark fragments				162/68
1.5				58			167/61
							200+
2.0			1.9 m - Becomes dark orange with light grey and white streaks. Organics cease.				200+
			2.1 m - Becomes light grey with orange mottles.				191/68
2.5				57	D		177/51
			2.7 m - Encountered 100 mm layer of dark orange with occasional light grey streaks.				162/34
3.0		ML				VSt-H	200+
3.5				56			200+
			3.7 m - Encountered minor fine to medium sand. Becomes grey.				200+
4.0							199/95
4.5				55			153/82
							171/87
5.0			End of Hole Depth: 5 m Termination Condition: Target depth				

Scala Penetrometer
Blows per 100mm
2 4 6 8 10 12

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed, F = Fill, BTS = Buried Topsoil.
BTS = Buried Topsoil.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

LOG OF AUGER HA15

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 1.3 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.0623353
Longitude : 174.9732686

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0.0	T	OL	[TOPSOIL]					N/A		
	F	ML	[FILL] Clayey SILT with minor fine to medium sand and trace rootlets; brown with orange and grey mottles. Low plasticity.					H	UTP	
0.5	ECBF	ML	Clayey SILT with some fine to medium sand; grey. Low plasticity.		57		M	H	UTP	
1.0									UTP	
									200+	>>
			End of Hole Depth: 1.3 m Termination Condition: Practical refusal							

Hand auger met practical refusal on hard material at 1.3 m depth.
Scala Penetrometer met practical refusal at 1.3 m depth.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed, ECBF = East Coast Bays Formation.

Coordinates obtained from handheld GPS.
Elevations obtained from Auckland Council GeoMaps.

LOG OF AUGER HA16

Geotechnical Investigation
162-166 Settlement Road
Papakura, Auckland
13230.001.004

Client : Harbour View Heights LP
Client Ref. : 13230
Date : 06/06/2023
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1413
Logged By : AK
Reviewed By : NM
Latitude : -37.062539
Longitude : 174.9730977

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0.0	T	OL	[TOPSOIL]		49			N/A		
	FILL	ML	[FILL] SILT with some fine sand and clay; yellowish brown with red, white, grey, orange, and brown mottling. Low plasticity.					St-VSt	UTP 109/38 77/20 61/15	
1.0					48					
1.5			Clayey SILT with minor fine sand and trace shell fragments and silt granules; grey with orange and yellowish brown mottling. Low plasticity.						143/61 119/44	
2.0		ML			47			St-VSt	119/55 99/41	
2.5	EAST COAST BAYS FORMATION		Clayey SILT with some fine sand; yellowish brown with orange, white and grey mottling. Low plasticity. 2.7 - 2.8 m - Encountered limonite staining. 3.0 m - Becomes white with orange streaks.				M		153/58	
3.0					46				188/85 171/73	
3.5		ML						VSt-H	181/78 136/72	
4.0					45				102/51	
4.5									150/65	
5.0			4.8 m - Becomes orange with hard silt granules. 4.9 m - Becomes grey with faint orange streaks. End of Hole Depth: 5 m Termination Condition: Target depth						200+	

Hand Auger met target depth at 5 m.
Standing groundwater was not encountered.
T = Topsoil, N/A = Not Assessed.
Coordinates obtained from handheld GPS.

Elevations obtained from Auckland Council GeoMaps.

GEOTECH HAND AUGER HA01-16.GPJ NZ DATA TEMPLATE 2.GDT 10/8/23

APPENDIX 7:

Laboratory Results

Babbage Geotechnical Laboratory
Level 4
68 Beach Road
Auckland 1010
Telephone
E-mail

P O Box 2027
New Zealand
64-9-367 4954
wec@babbage.co.nz

Please reply to: W.E. Campton

ENGEO LTD.
PO Box 33-1527
Takapuna
Auckland 0740

Attention: **BEN FLEETWOOD**

Job Number: 66273#L
BGL Registration Number: 3064
Checked by: WEC

16th June 2023

ATTERBERG LIMITS & LINEAR SHRINKAGE TESTING

Dear Sir,

Re: SETTLEMENT ROAD, PAPAKURA

Your Reference: 13230.001.004
Report Number: 66273#L/AL Settlement Rd

The following report presents the results of Atterberg Limits & Linear Shrinkage testing at BGL of soil samples delivered to this laboratory on the 8th of June 2023. Test results are summarised below, with page 3 showing where the samples plot on the Unified Soil Classification System (Casagrande) Chart. Test standards used were:

Water Content:	NZS4402:1986:Test 2.1
Liquid Limit:	NZS4402:1986:Test 2.2
Plastic Limit:	NZS4402:1986:Test 2.3
Plasticity Index:	NZS4402:1986:Test 2.4
Linear Shrinkage:	NZS4402:1986:Test 2.6

Borehole Number	Sample Number	Depth (m)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage (%)*
SS01	Sample 1	0.30 – 0.50	33.8	66	25	41	16
SS02	Sample 2	0.30 – 0.50	30.7	62	26	36	15
SS03	Sample 3	0.30 – 0.50	44.0	65	31	34	14

The amount of shrinkage of the sample as a percentage of the original sample length.

The whole soils were used for the water content tests (the soils were in a natural state), and for the liquid limit, plastic limit & linear shrinkage tests. The soils were wet up and dried where required for the liquid limit, plastic limit & linear shrinkage tests.

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. Test 2.2: liquid limit, test 2.3: plastic limit, and test 2.6: linear shrinkage are reported to the nearest whole number.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
Key Technical Person
Assistant Laboratory Manager
Babbage Geotechnical Laboratory

ACCREDITED
IANZ
TESTING LABORATORY
№ 126

Babbage Geotechnical Laboratory

Project: SETTLEMENT ROAD, PAPAKURA

DETERMINATION OF THE LIQUID LIMIT, PLASTIC LIMIT & THE PLASTICITY INDEX

Test Methods: NZS4402: 1986: Test 2.2, Test 2.3 and Test 2.4

Tested By:	TL / JW	June 2023
Compiled By:	JF	16/06/2023
Checked By:	JF	16/06/2023

SUMMARY OF TESTING

Borehole Number	Sample Number	Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification Based on USCS Chart Below
SS01	Sample 1	0.30 - 0.50	66	25	41	CH
SS02	Sample 2	0.30 - 0.50	62	26	36	CH
SS03	Sample 3	0.30 - 0.50	65	31	34	CH / MH

The chart below & soil classification terminology is taken from ASTM D2487-17^{e1} "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)", April 2020, & is based on the classification scheme developed by A. Casagrande in the 1940's (Casagrande, A., 1948: Classification and identification of soil. Transactions of the American Society of Civil Engineers, v. 113, p. 901-930). The chart below & the soil classification given in the table above are included for your information only, and are not included in the IANZ endorsement for this report.

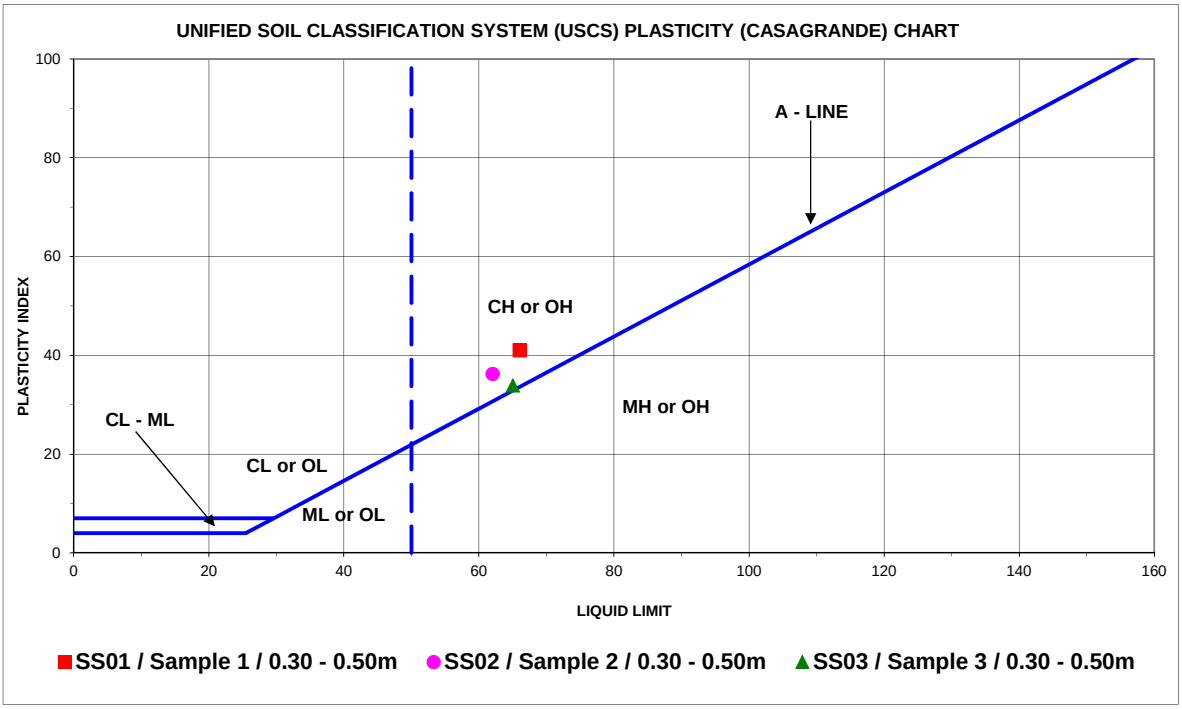


CHART LEGEND

CL = CLAY, low plasticity ('lean' clay)
CH = CLAY, high plasticity ('fat' clay)
OL = ORGANIC CLAY or ORGANIC SILT, low liquid limit
OH = ORGANIC CLAY or ORGANIC SILT, high liquid limit
ML = SILT, low liquid limit
MH = SILT, high liquid limit ('elastic silt')
CL - ML = SILTY CLAY

APPENDIX 8:

Slide Model Cross Section Locations

Legend

- Cross section 8
- Cross section 7
- Cross section 6
- Cross section 5
- Cross section 4
- CrossSection 3
- Cross section 2
- Cross Section 1
- Proposed Contours West
- Proposed contours East

0 25 m 50 m

© Nearmap

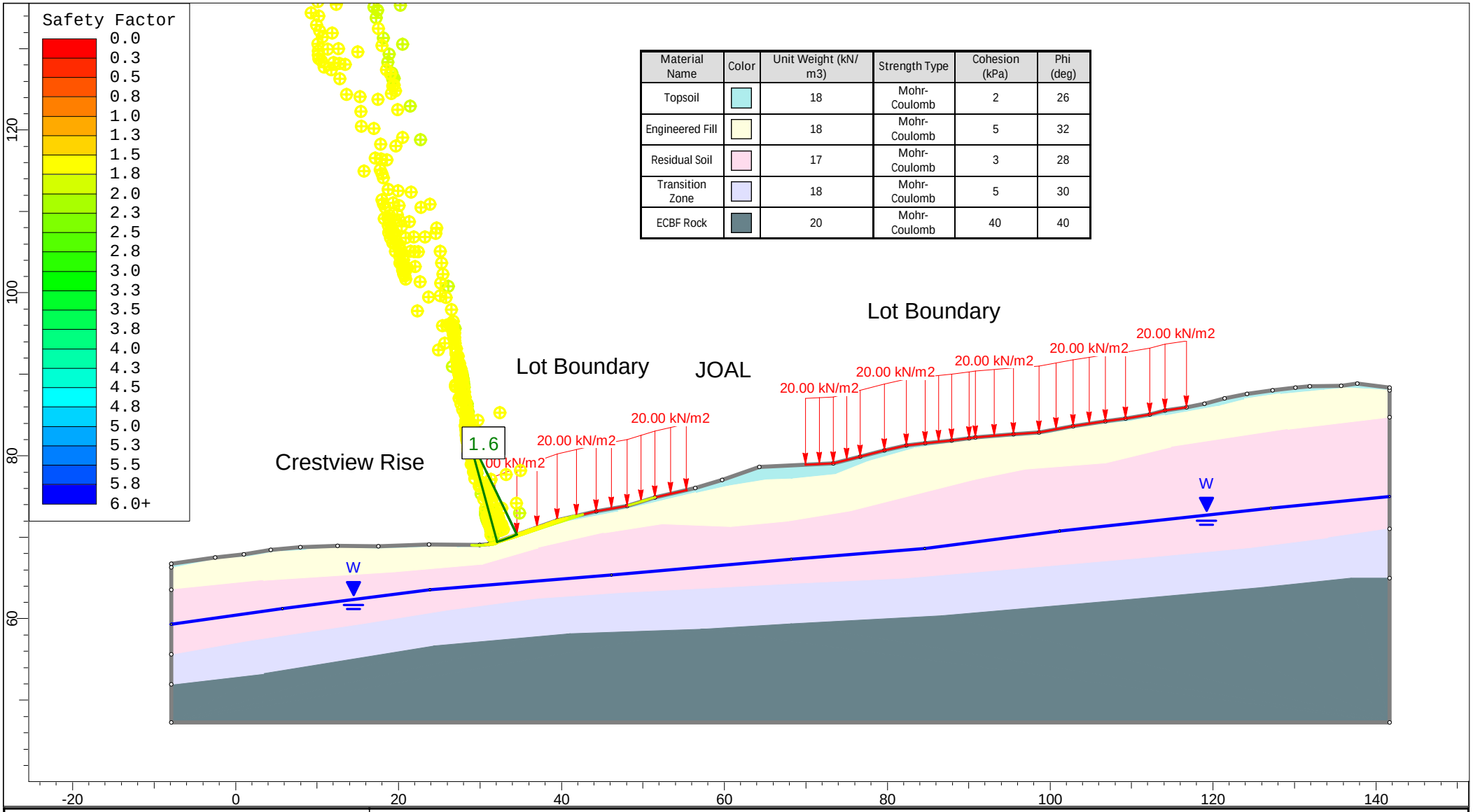
ENGEO

Produced by **Datanest.earth**

Title: Cross section Locations		
Client: Harbour View Heights LP		Size: A4
Project: 162 - 166 Settlement Road Subdivision	Drawn: BF	Figure No.: 3
Date: 16-09-2024	Checked: PF	
Proj No: 13230.001.002	Scale: 1:2000	Version: 2.0

APPENDIX 9:

Slide Outputs

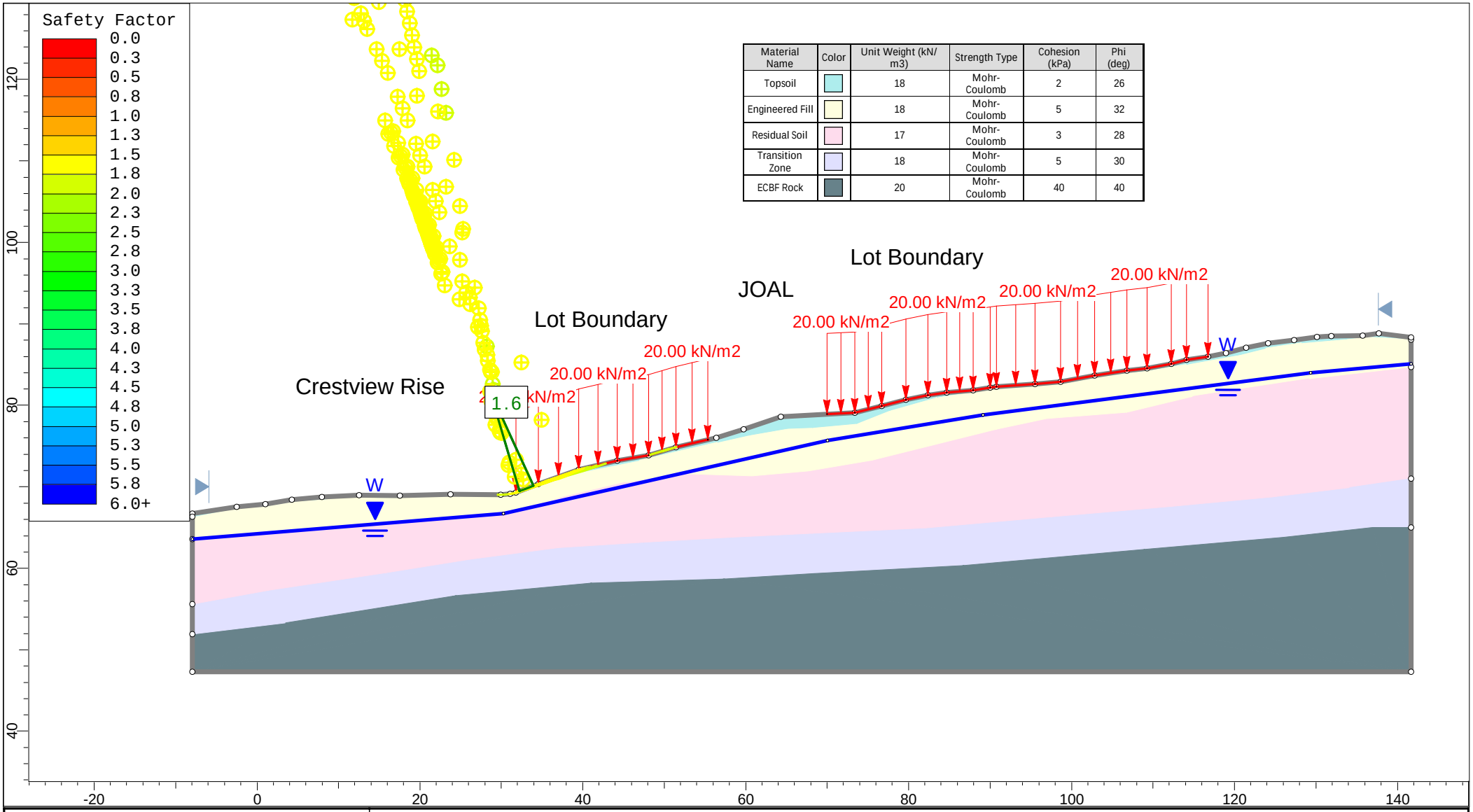


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Topsoil		18	Mohr-Coulomb	2	26
Engineered Fill		18	Mohr-Coulomb	5	32
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

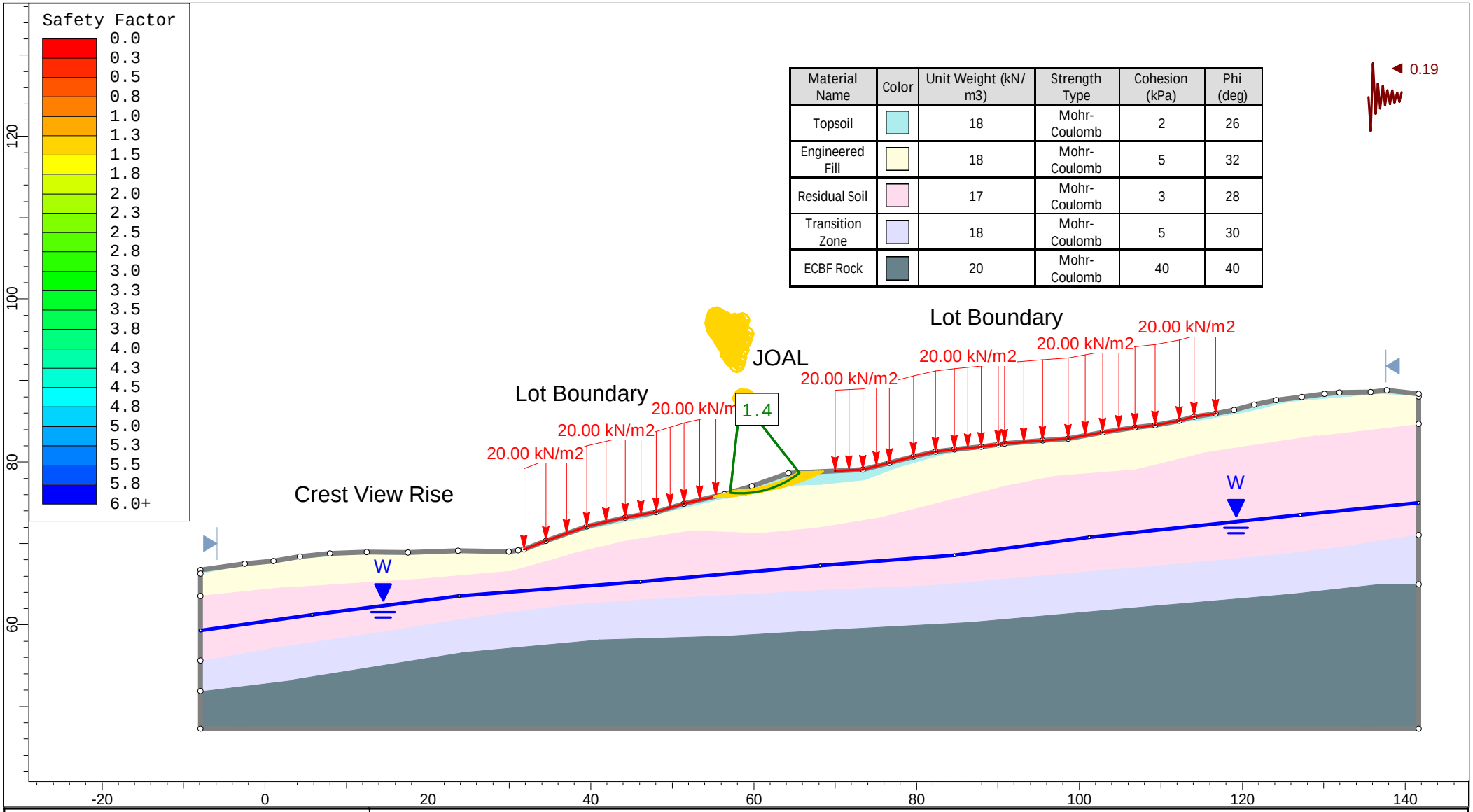
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 1 - Static Case - circles FoS <2.0		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

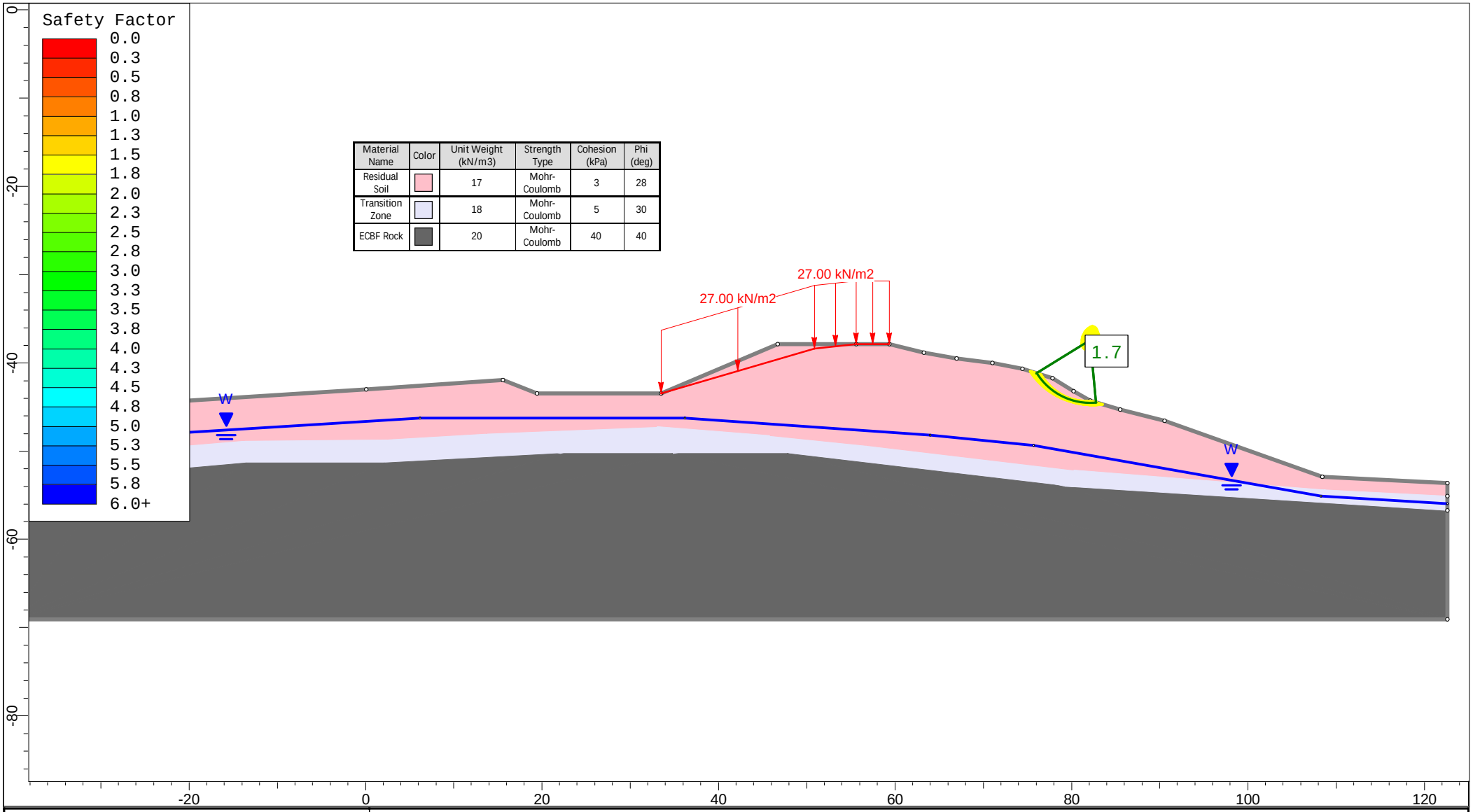
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 1 - Transient Case - circles FoS <2.0		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

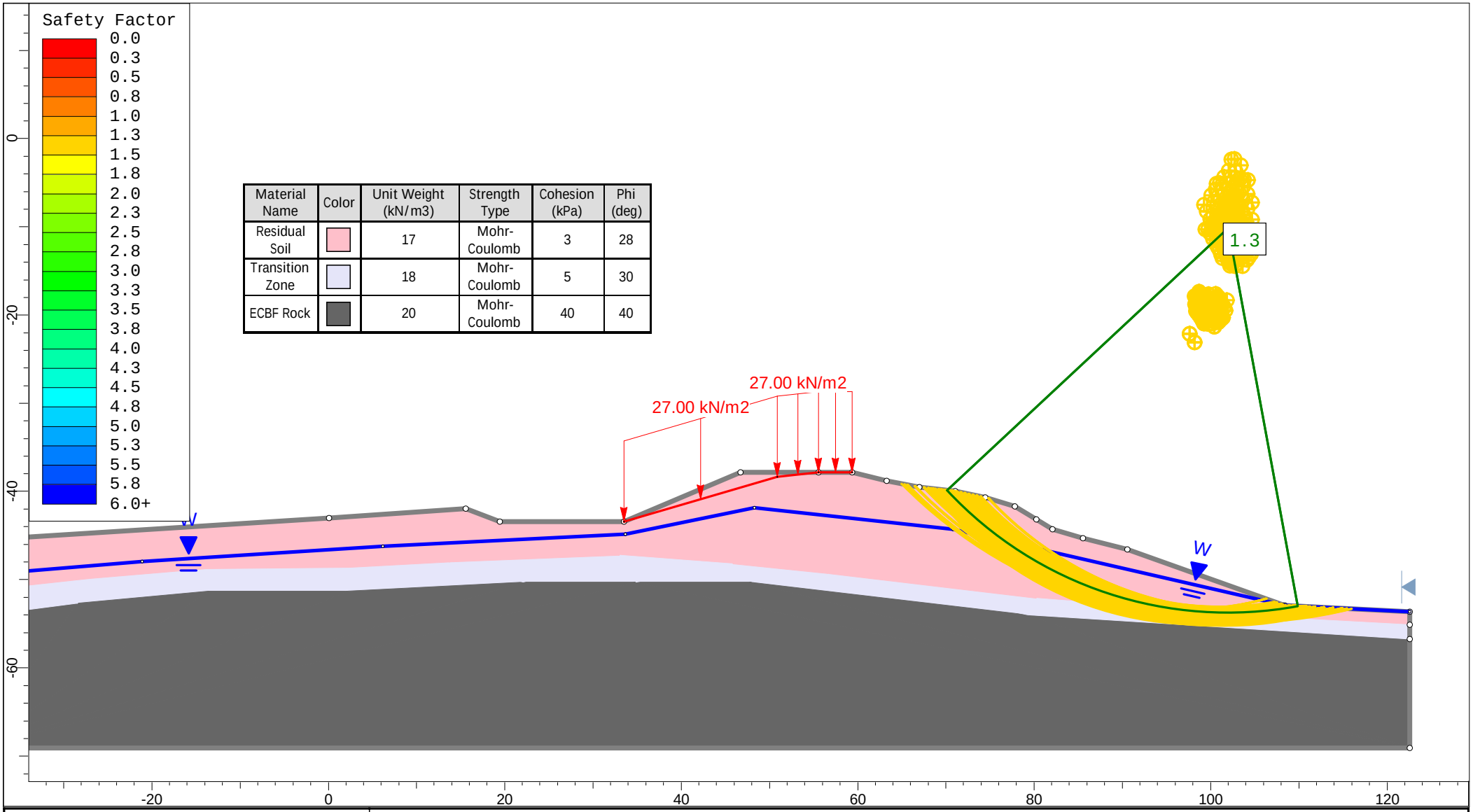
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4
Analysis Description	Cross Section 1 - Seismic Case - circles FoS <1.5
Drawn By	SJ/BF
Client	Harbour View Heights Limited
Date	17/12/2023
File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

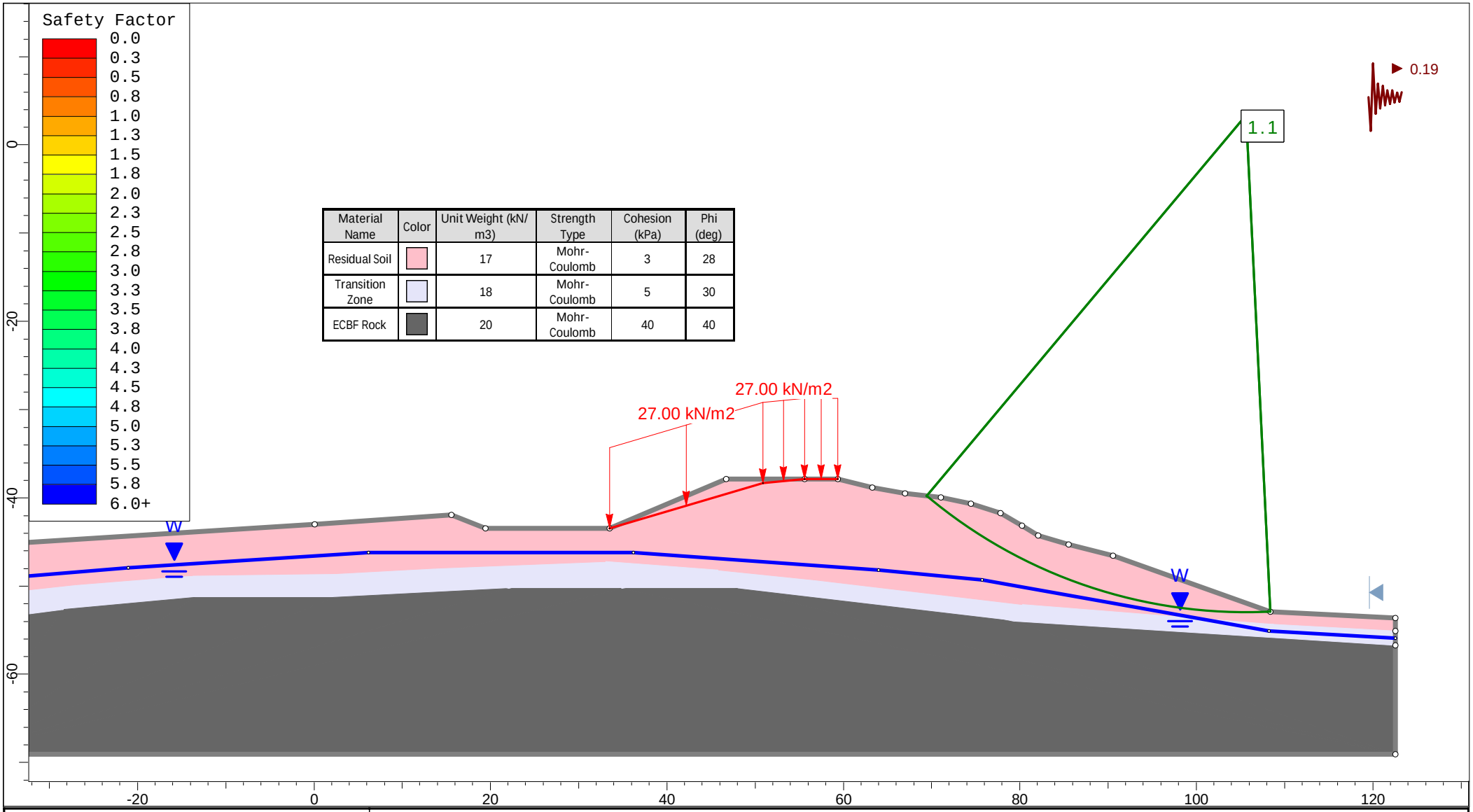
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 2 - L to R - Static Case - Circles FoS < 1.7		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 2 - L to R - Transient Case - Circles FoS < 1.3		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4

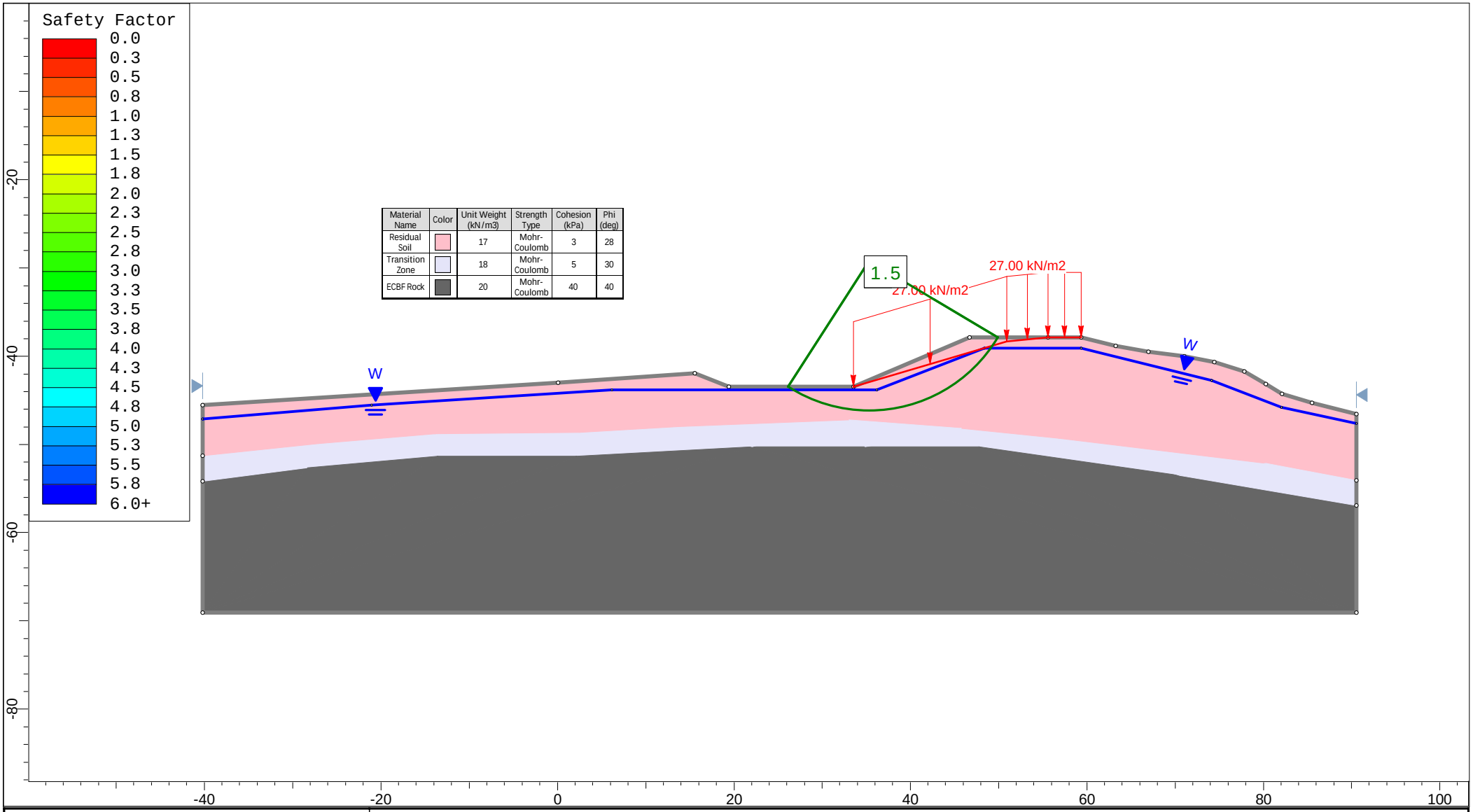


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

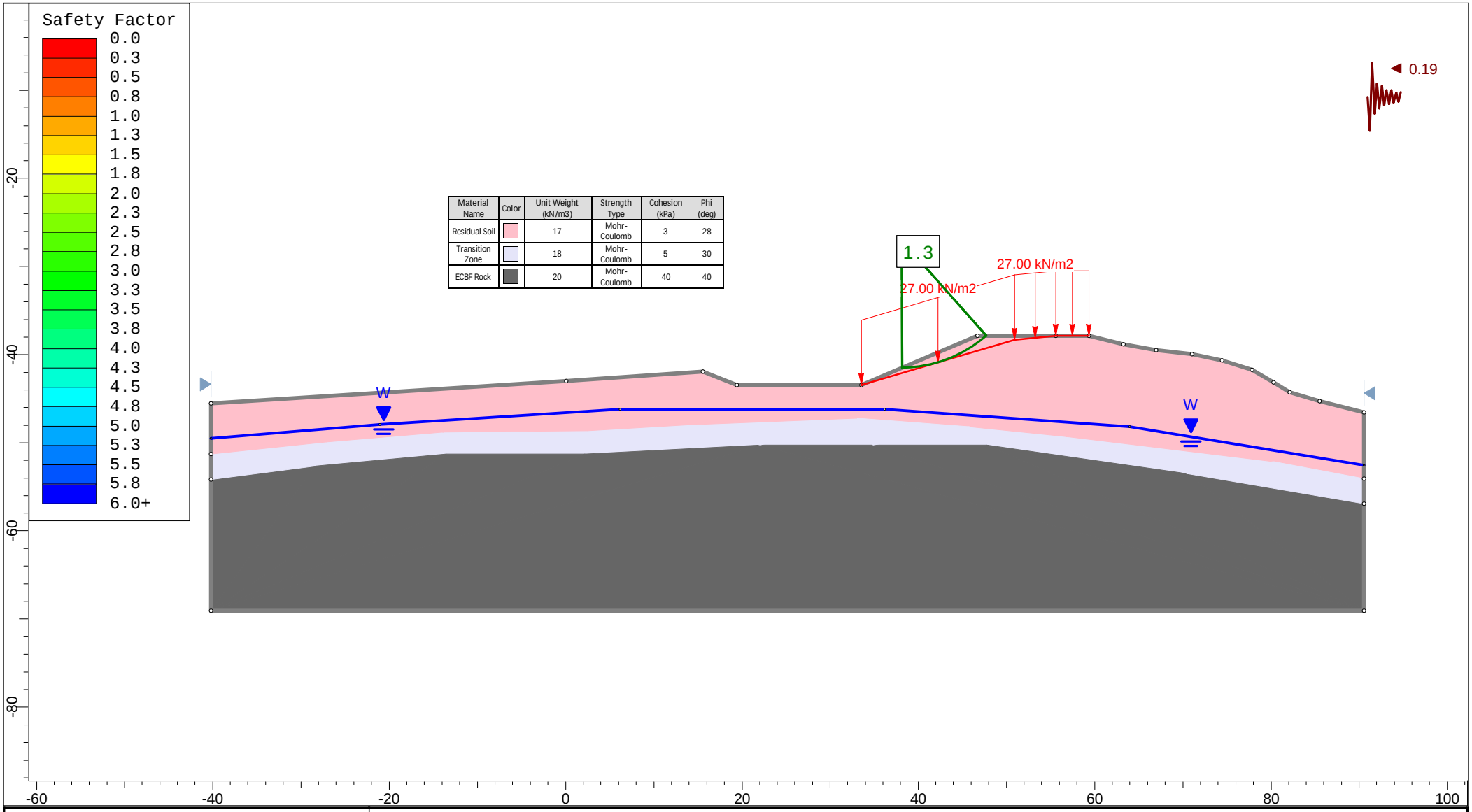
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 2 - L to R - Seismic Case - Circles FoS < 1.1		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4



ENGEO

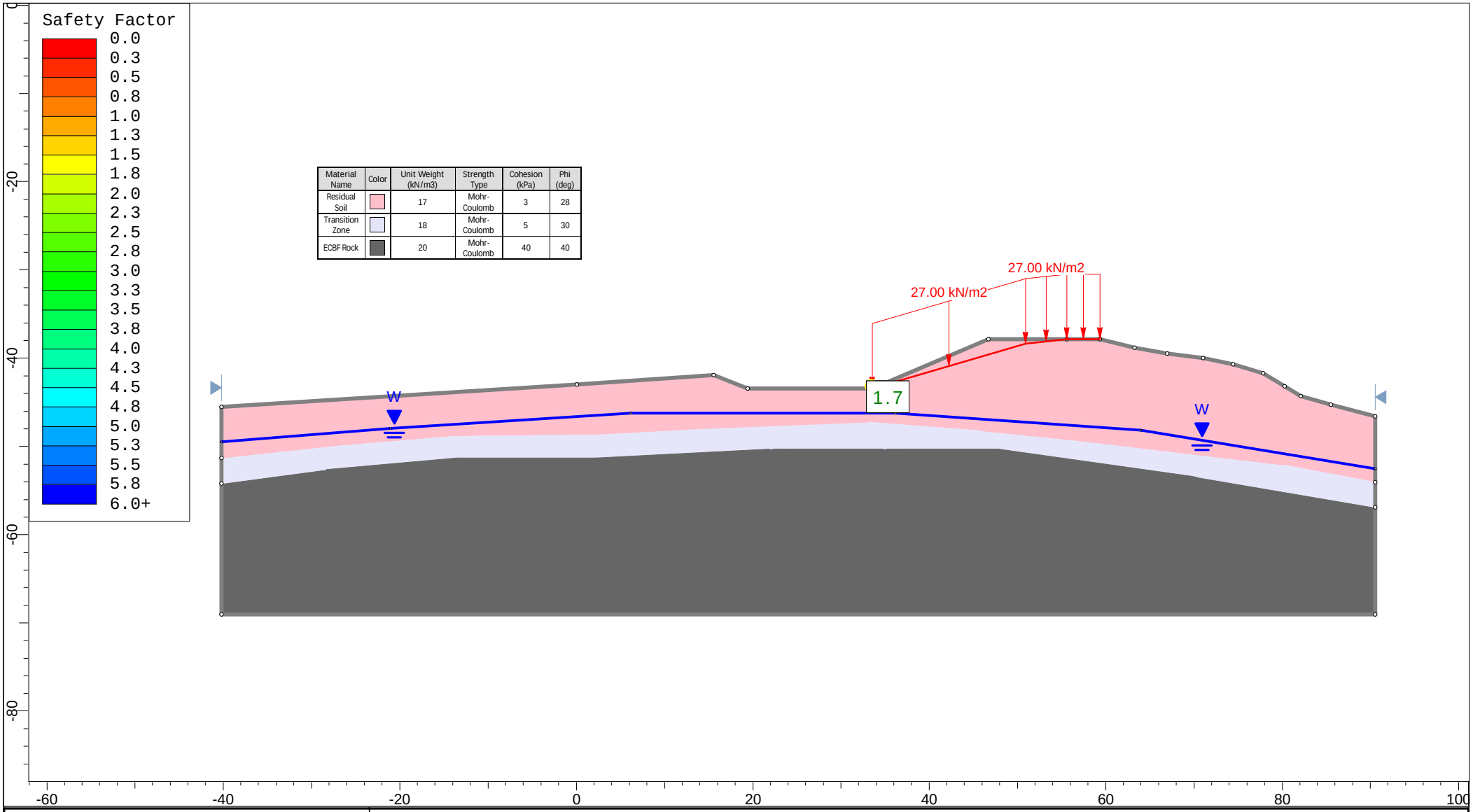
SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 2 - R to L - Transient Case - Circles FoS < 1.5		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4



ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 2 - R to L - Seismic Case - Circles FoS < 1.3	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

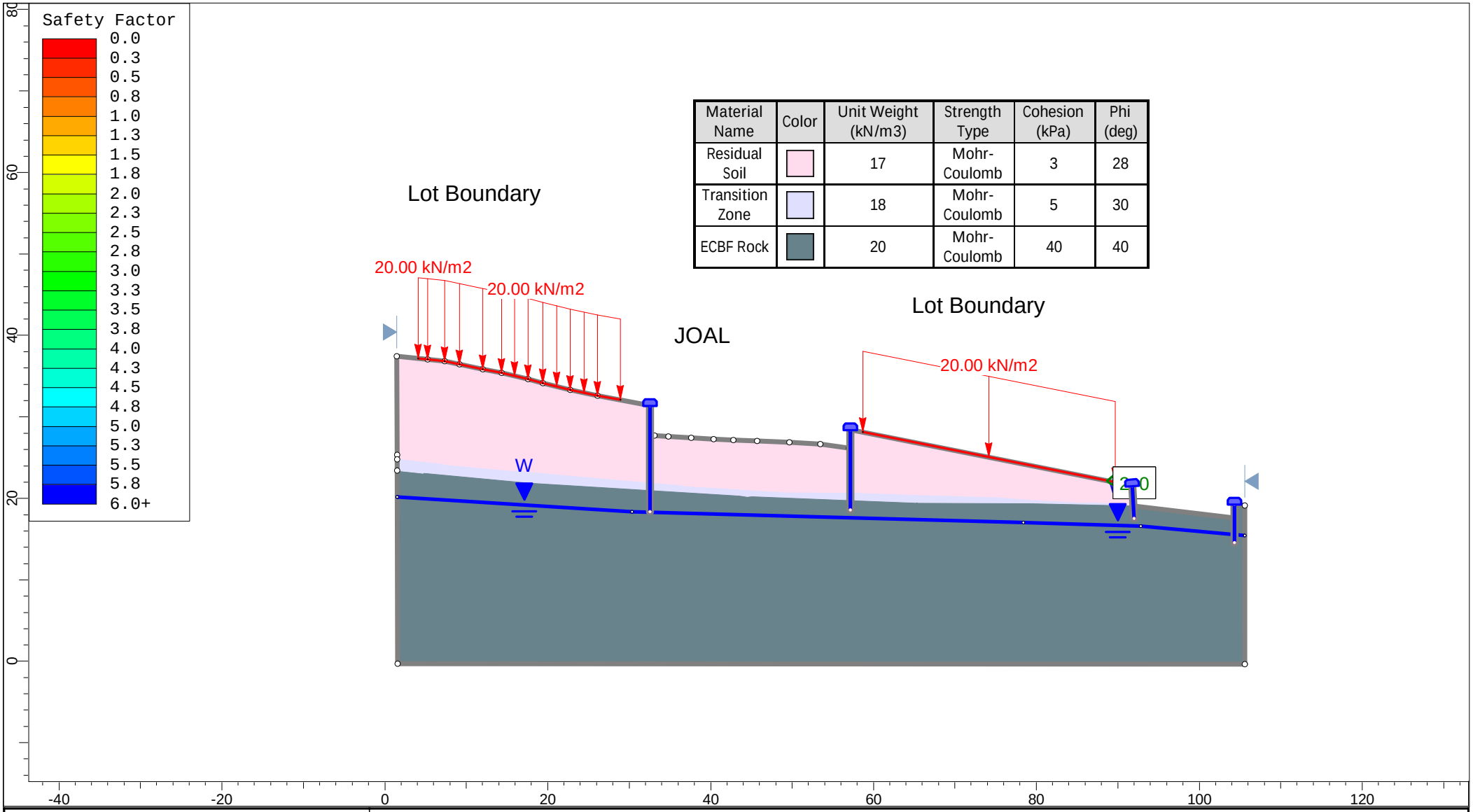
SLIDEINTERPRET 9.027



ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 2 - R to L - Static Case - Circles FoS < 1.7		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4

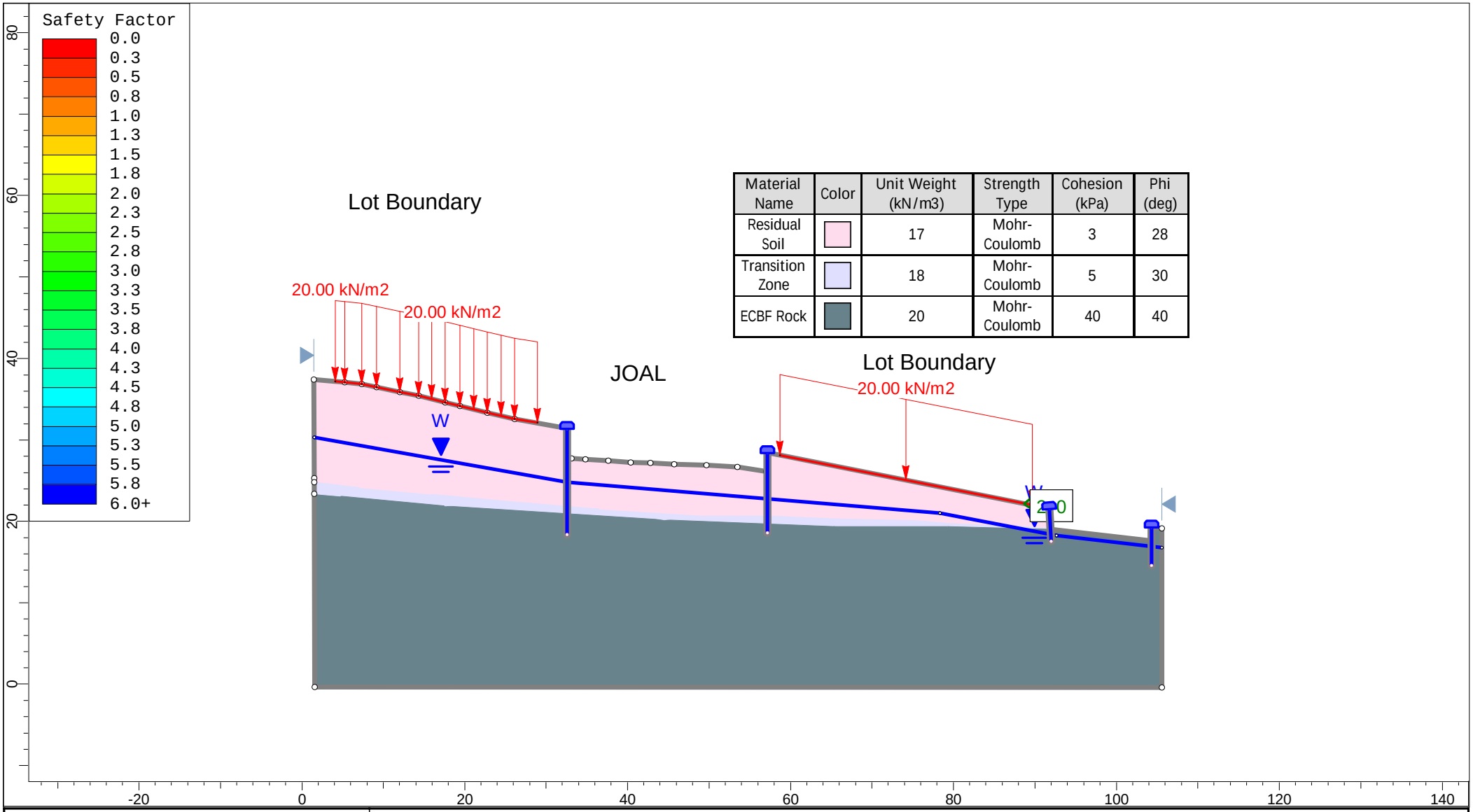


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 3 - Static Case - circles FoS <1.5		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4

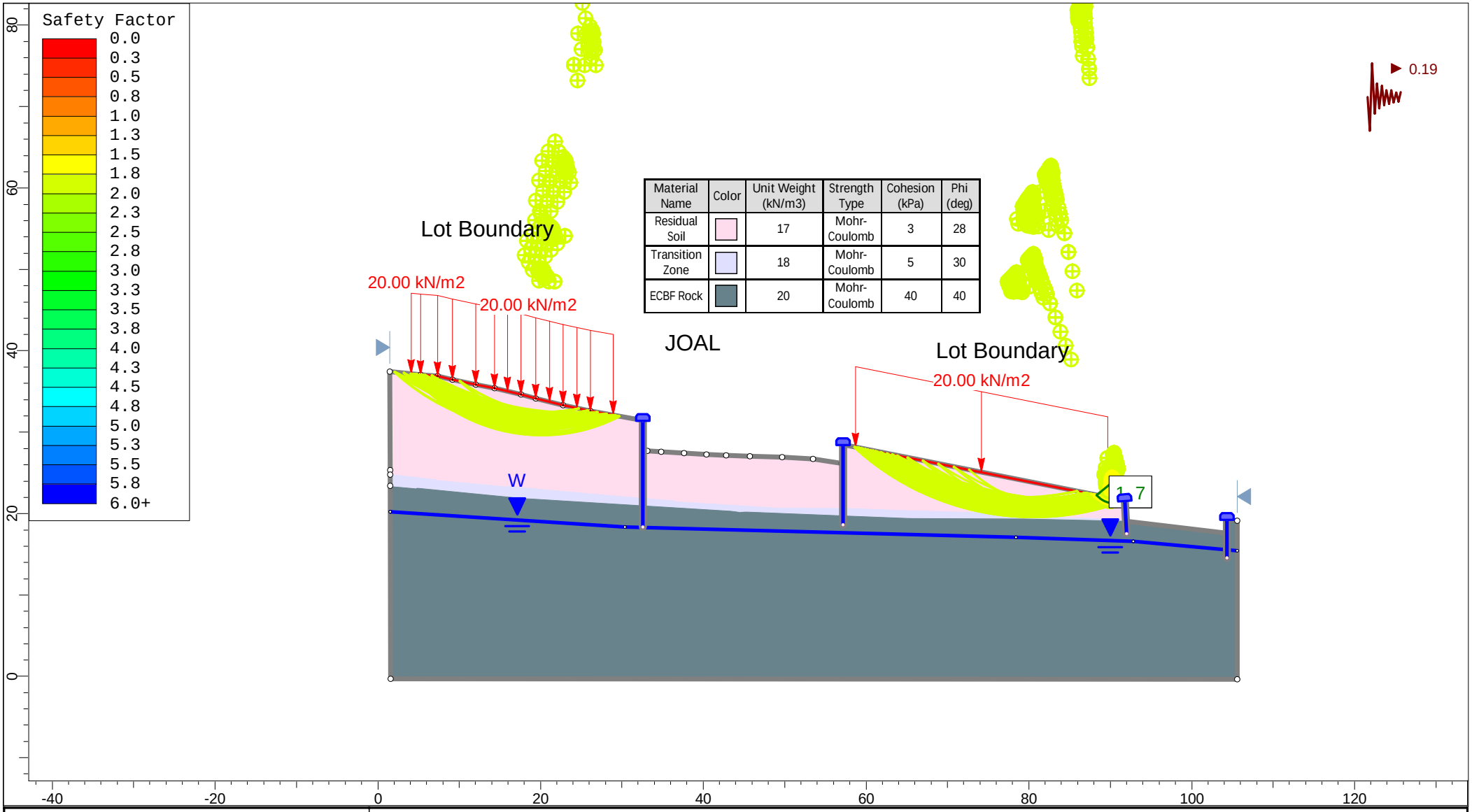


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 3 - Transient Case - circles FoS <1.5		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4

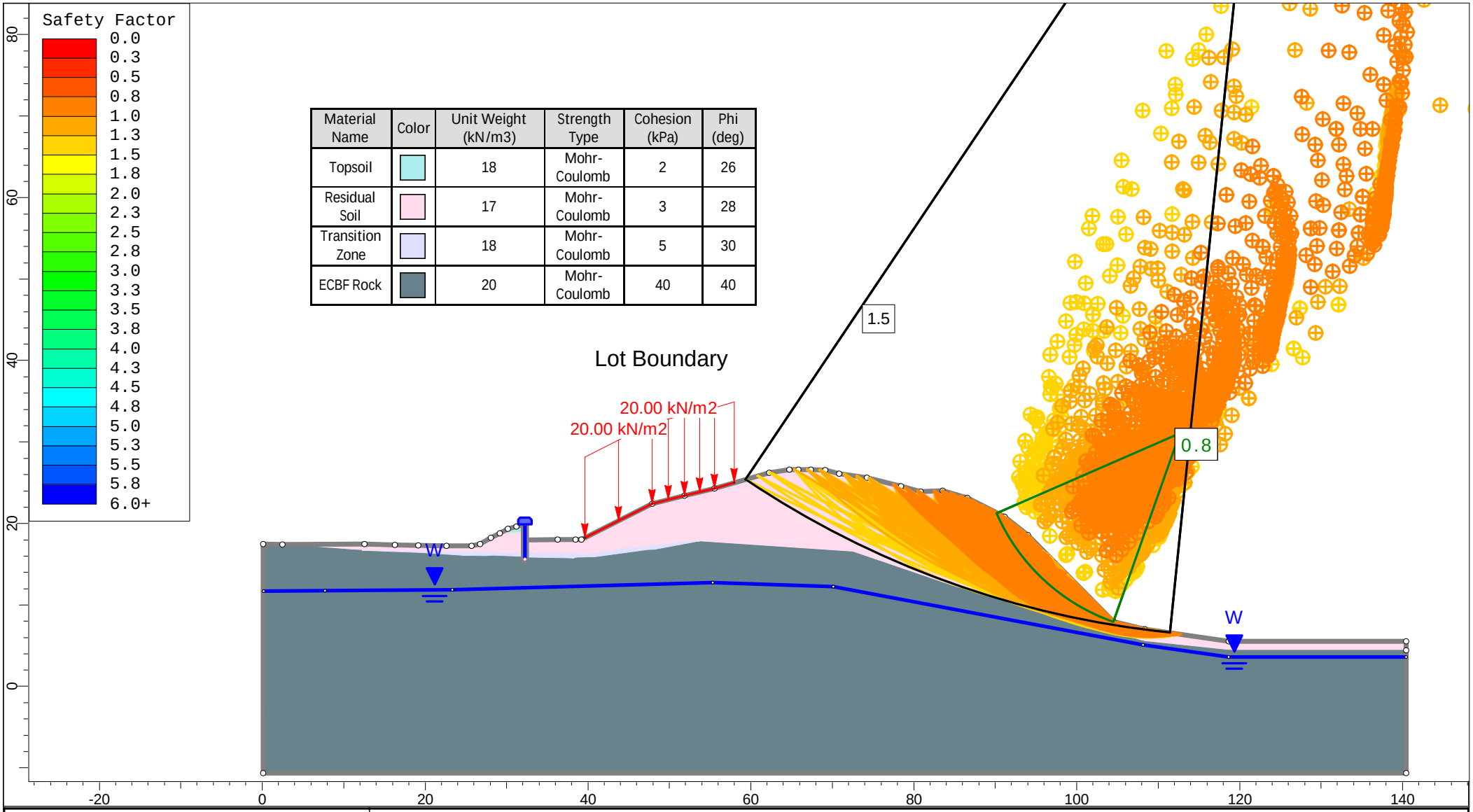


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

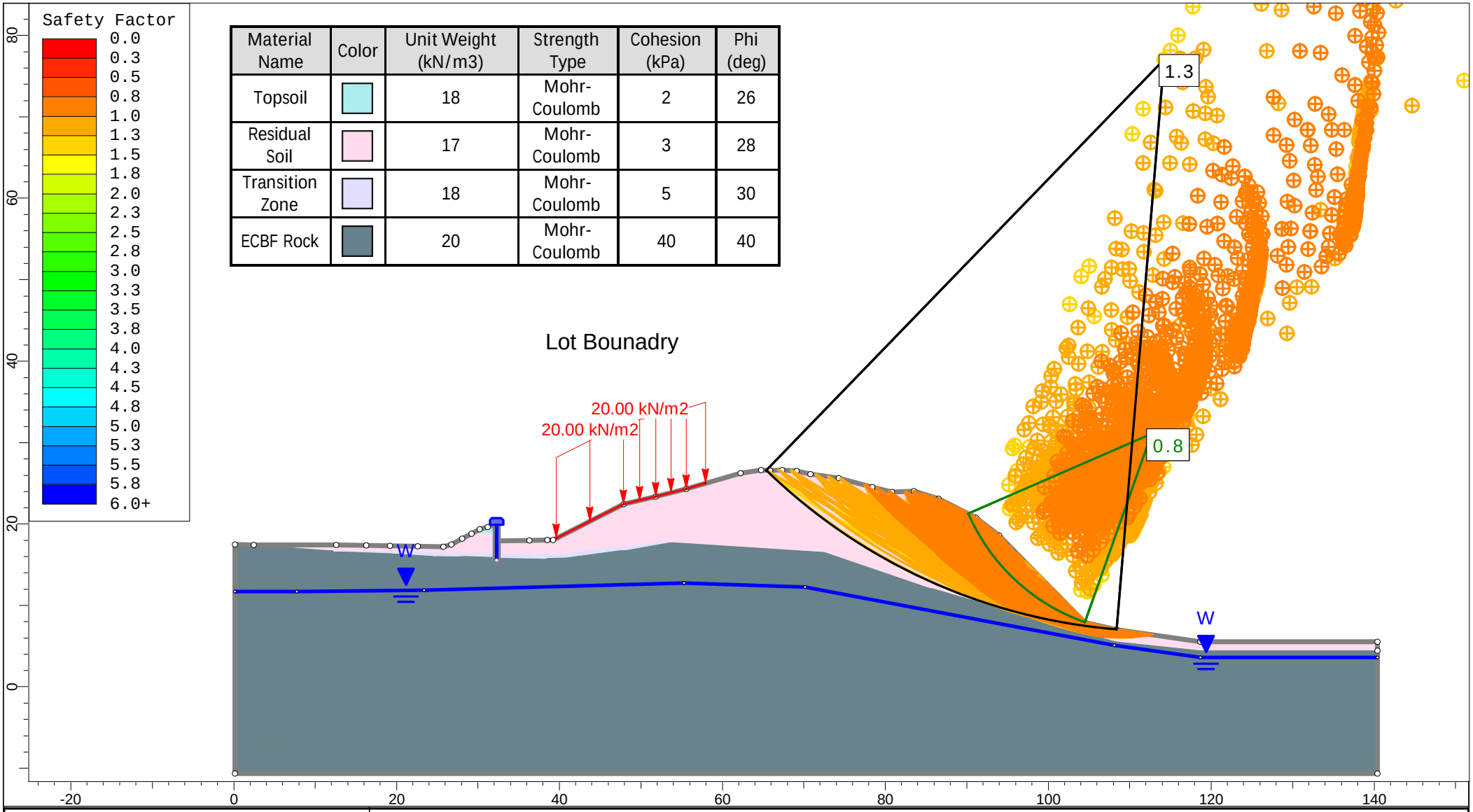
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 3 - Seismic Case - circles FoS <2.0		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 4 - Static Case - circles FoS <1.5		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4

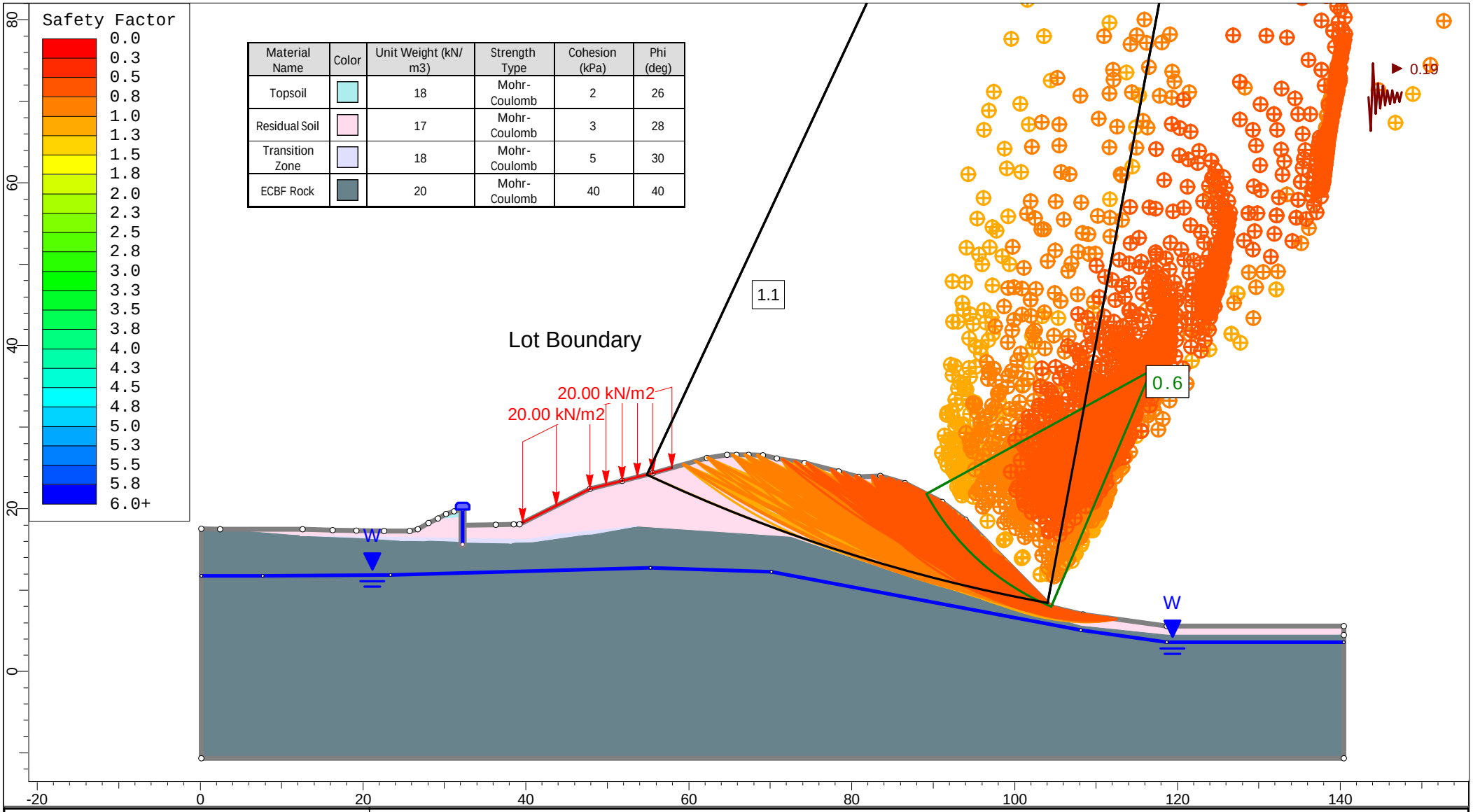


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Topsoil		18	Mohr-Coulomb	2	26
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

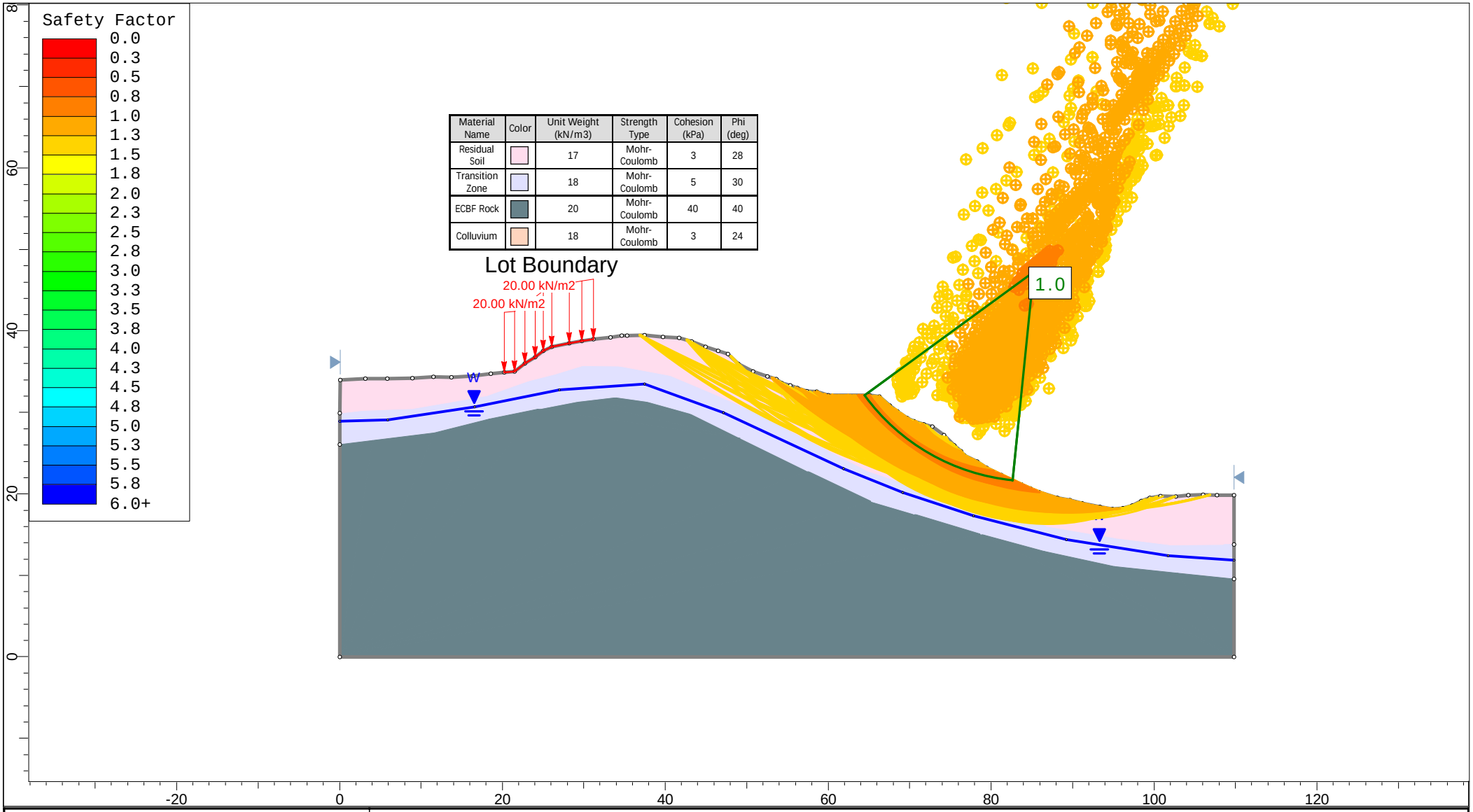
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4
Analysis Description	Cross Section 4 - Transient Case - circles FoS <1.5
Drawn By	SJ/BF
Client	Harbour View Heights Limited
Date	17/12/2023
File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

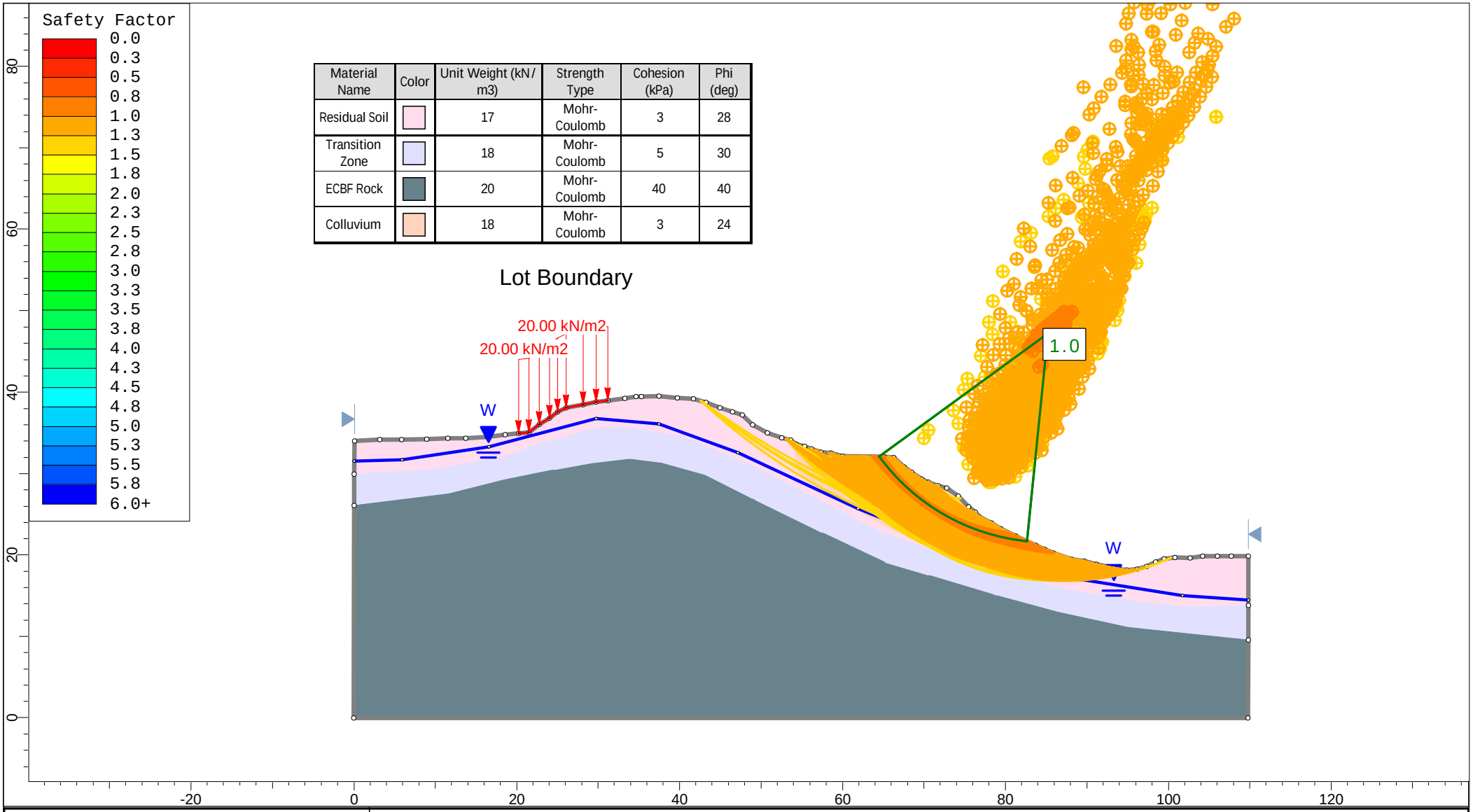
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 4 - Seismic Case - circles FoS <1.2		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 5 - Static Case - circles FoS <1.5		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4

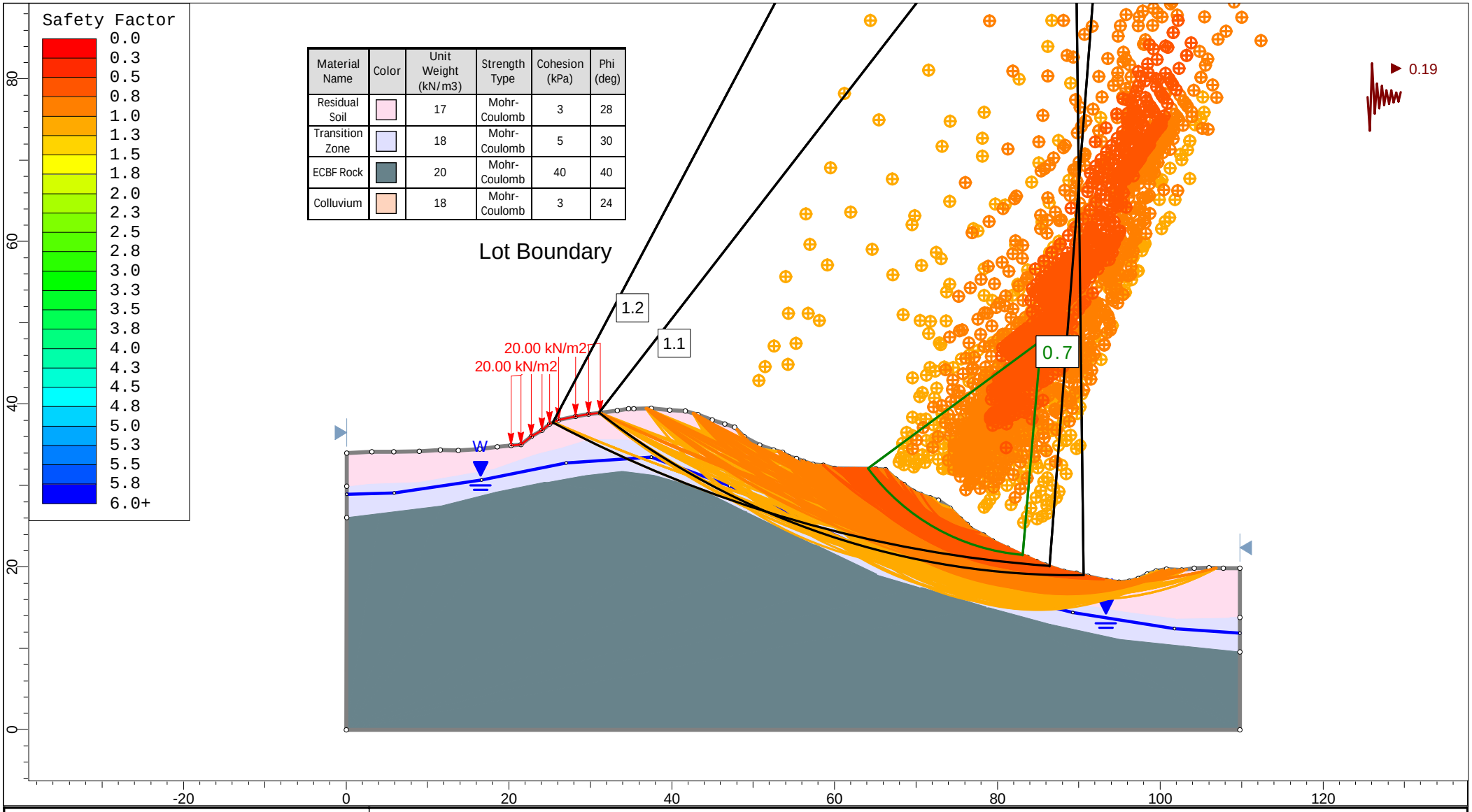


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40
Colluvium		18	Mohr-Coulomb	3	24

ENGEO

SLIDEINTERPRET 9.027

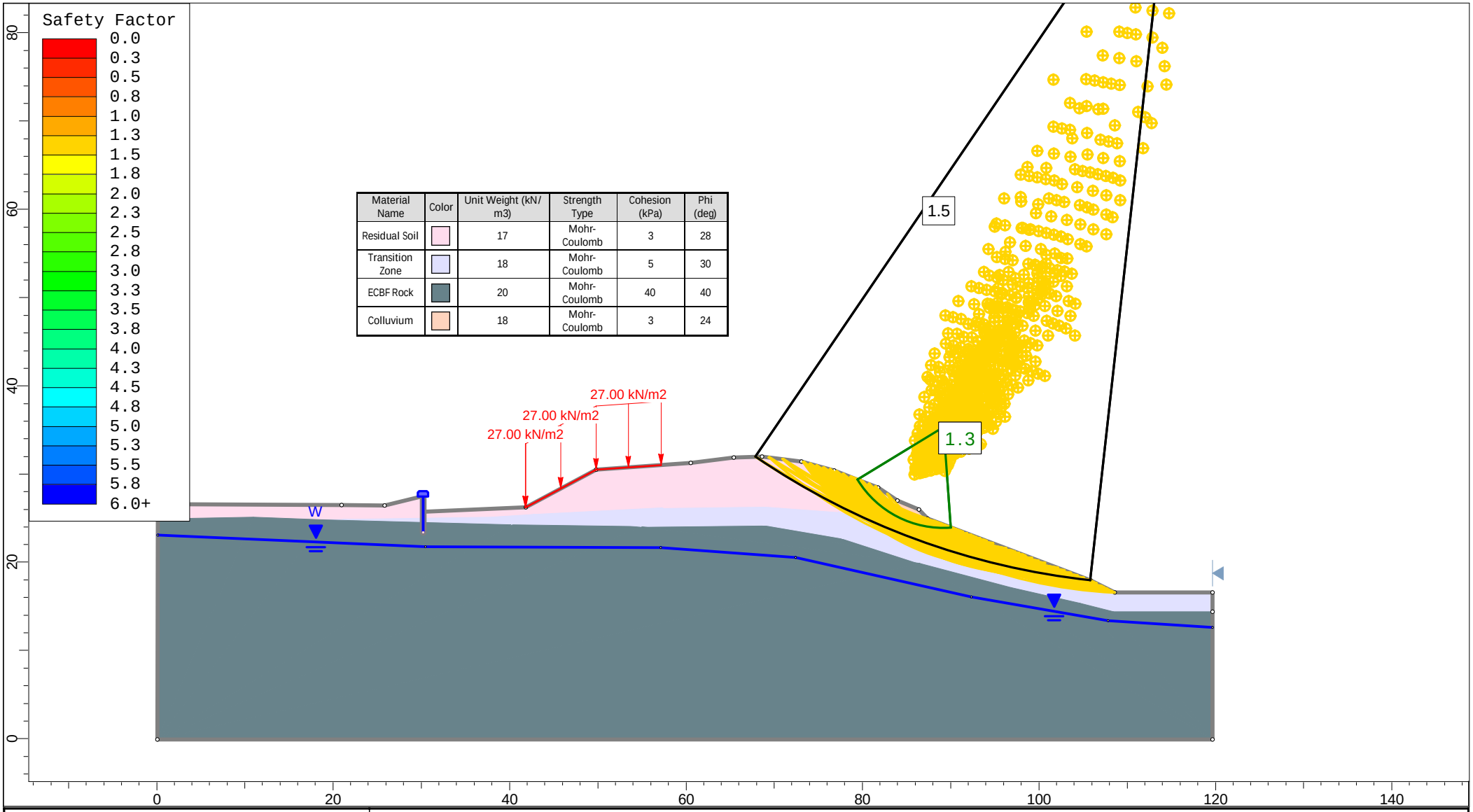
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 5 - Transient Case - circles FoS <1.3		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

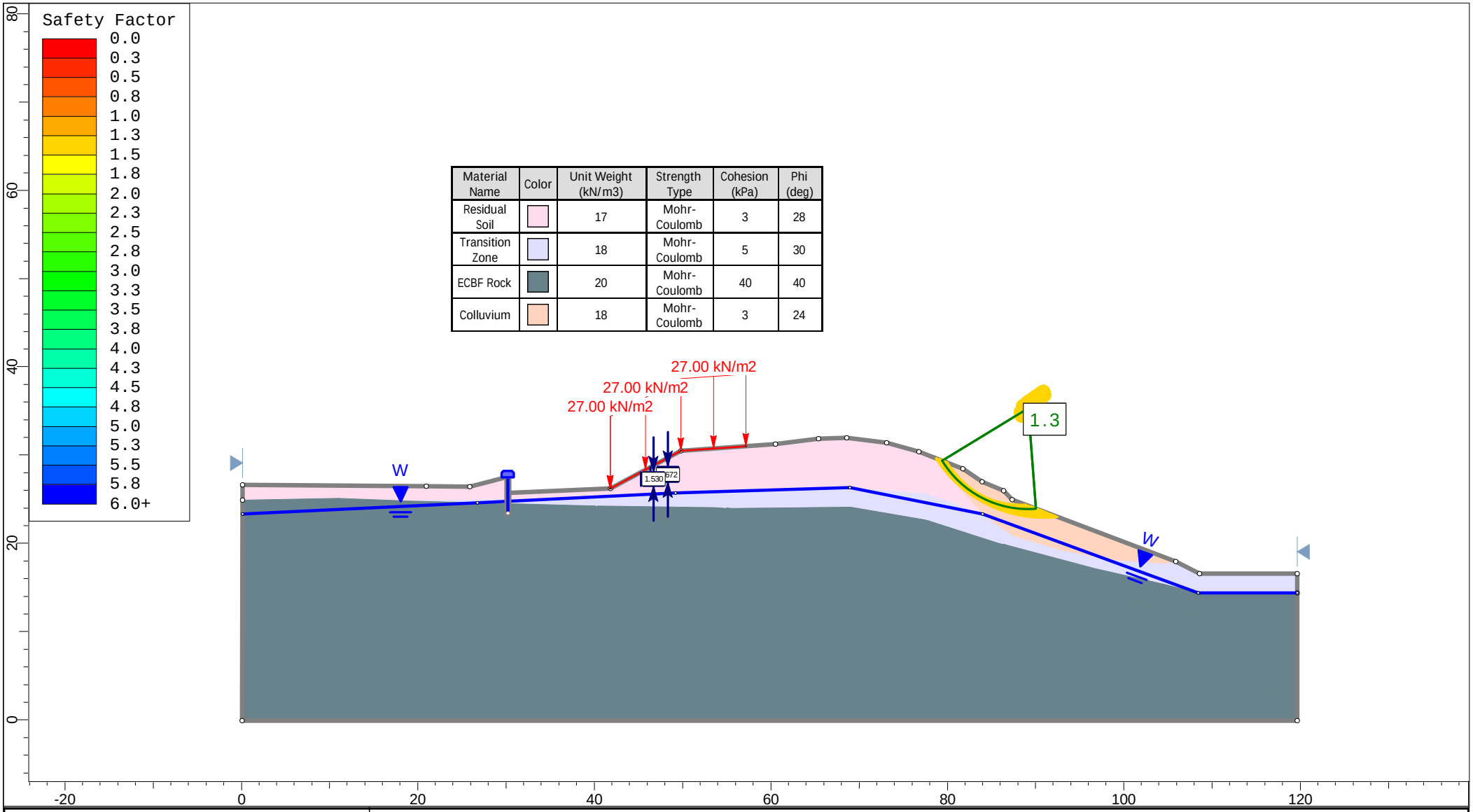
Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 5 - Seismic Case - Circles FoS <1.2		
Drawn By	SJ/BF	Client	Harbour View Heights Limited
Date	17/12/2023	File Name	Settlement Road - Stage 4



ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 6 - L to R - Static Case - Circles FoS < 1.3		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4

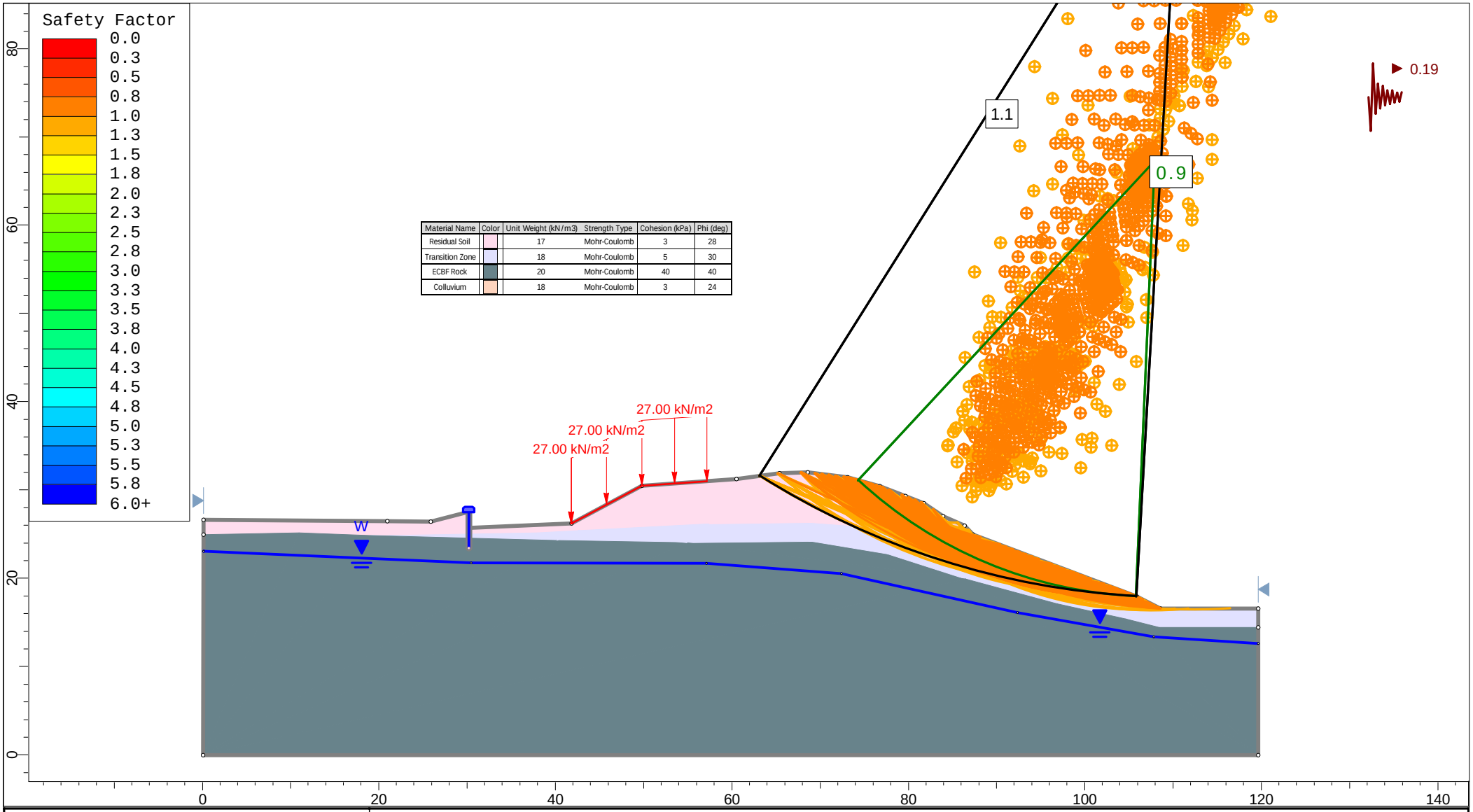


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40
Colluvium		18	Mohr-Coulomb	3	24

ENGEO

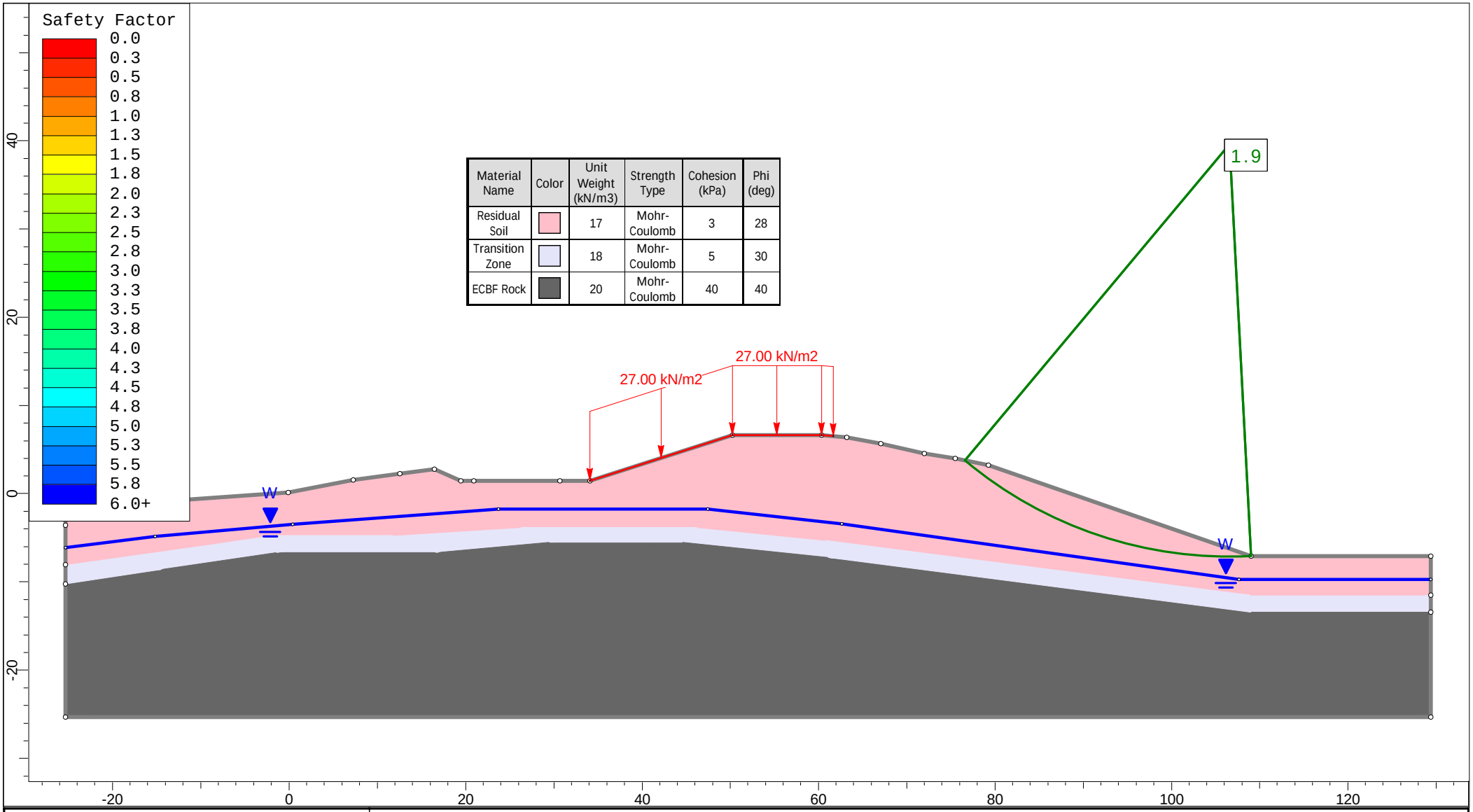
SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 6 - L to R - Transient Case - Circles FoS < 1.3		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4



ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 6 - L to R - Seismic Case - Circles FoS < 1.1	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



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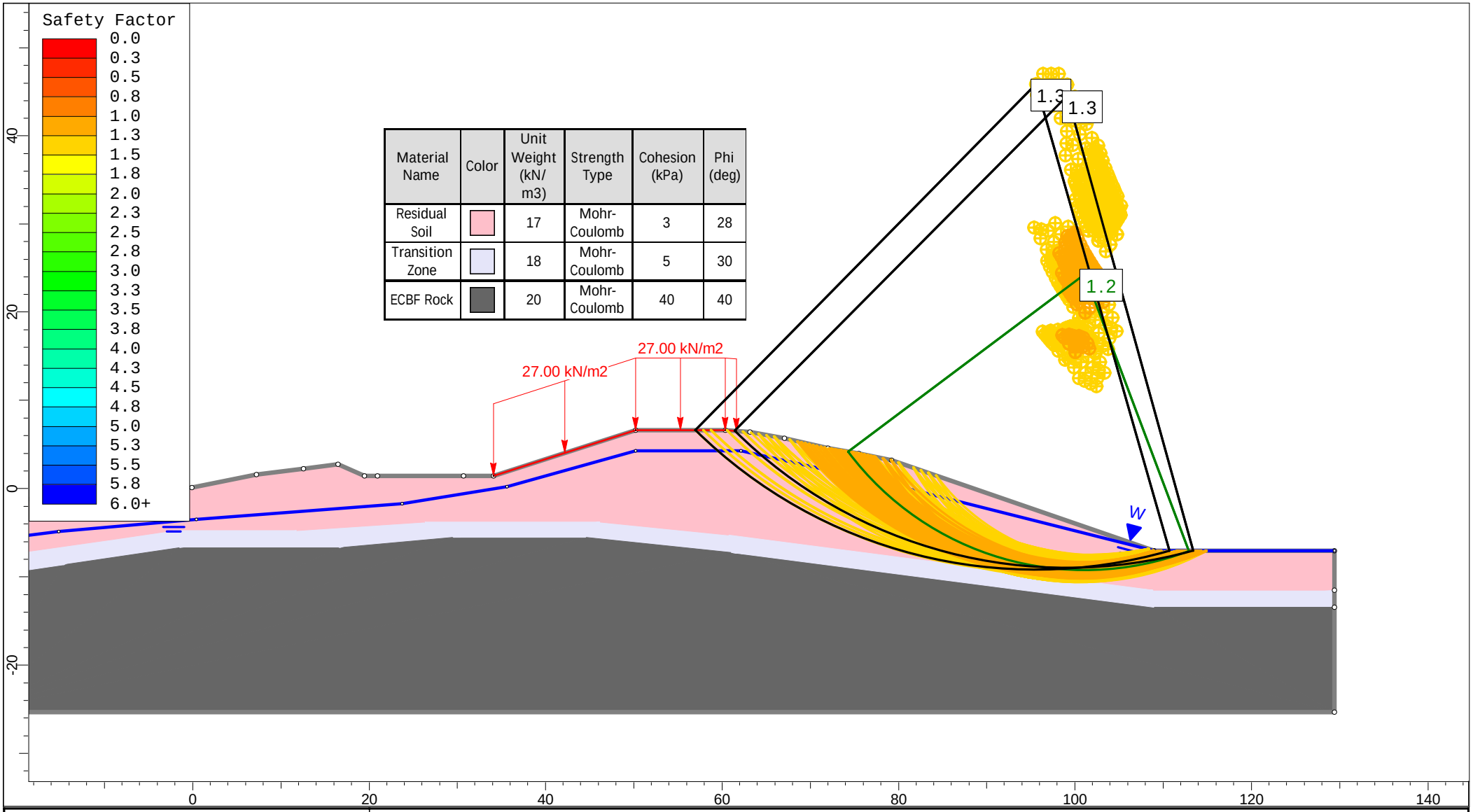
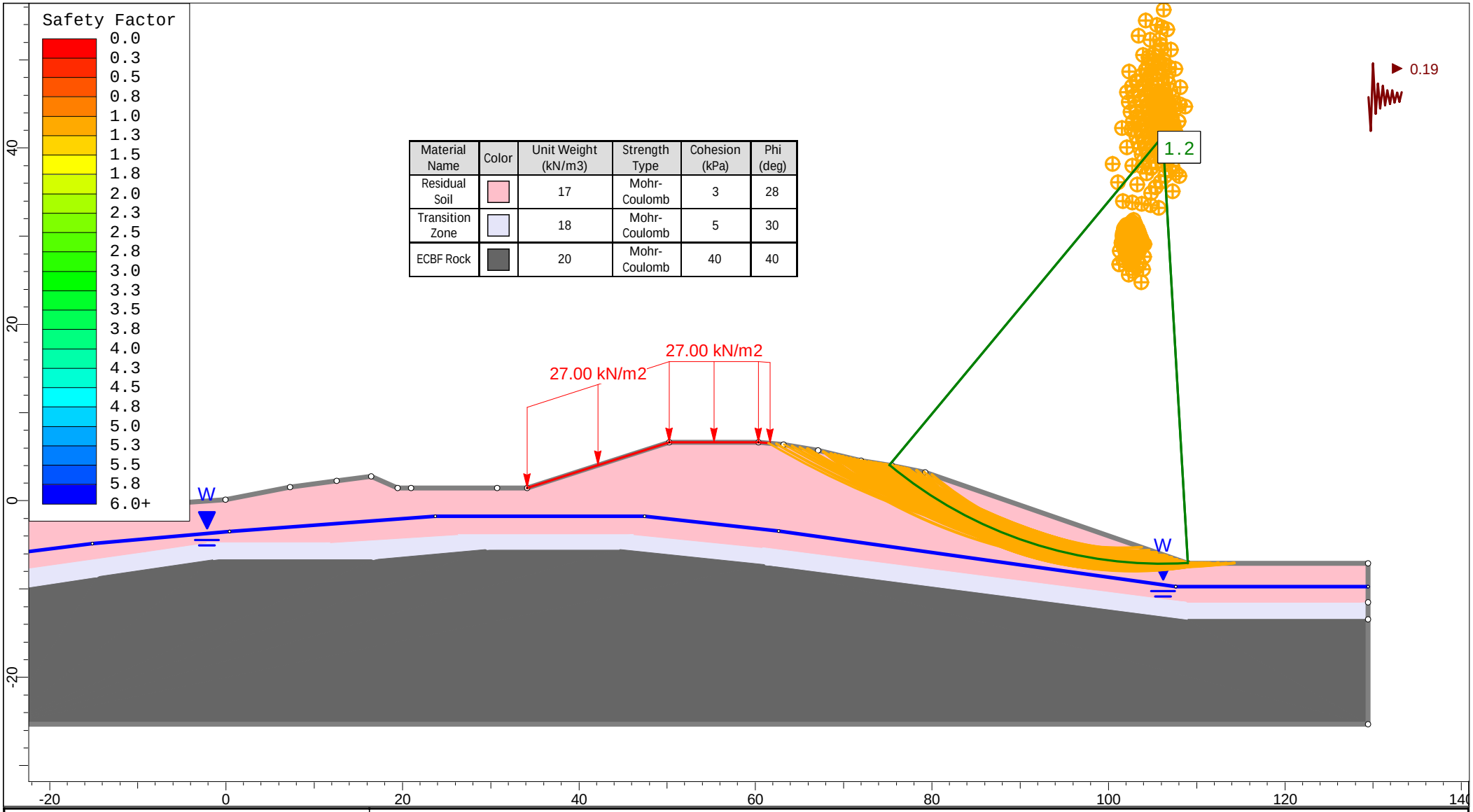
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 7 - L to R - Transient Case - Circles FoS < 1.3	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 7 - L to R - Seismic Case - Circles FoS < 1.2	
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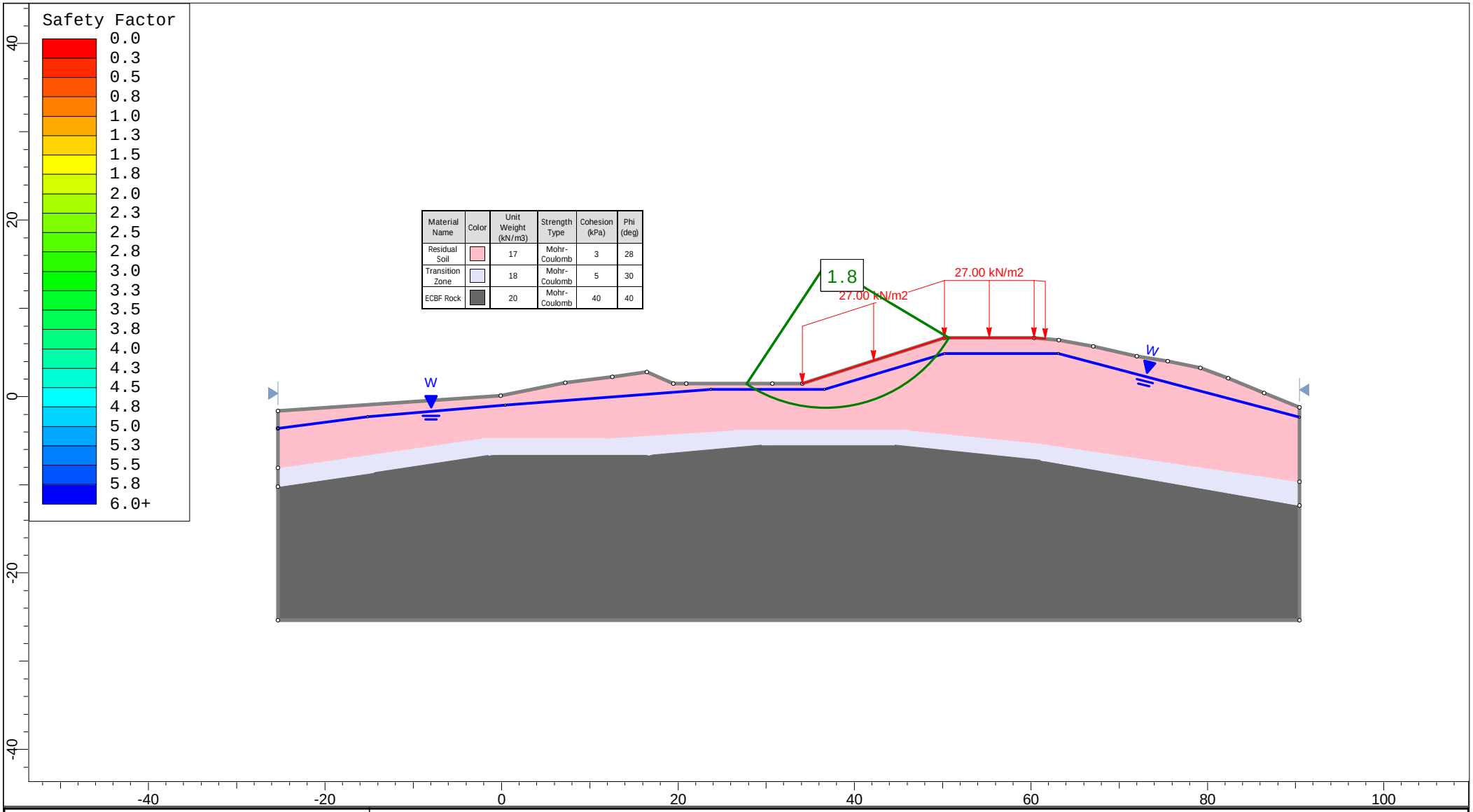
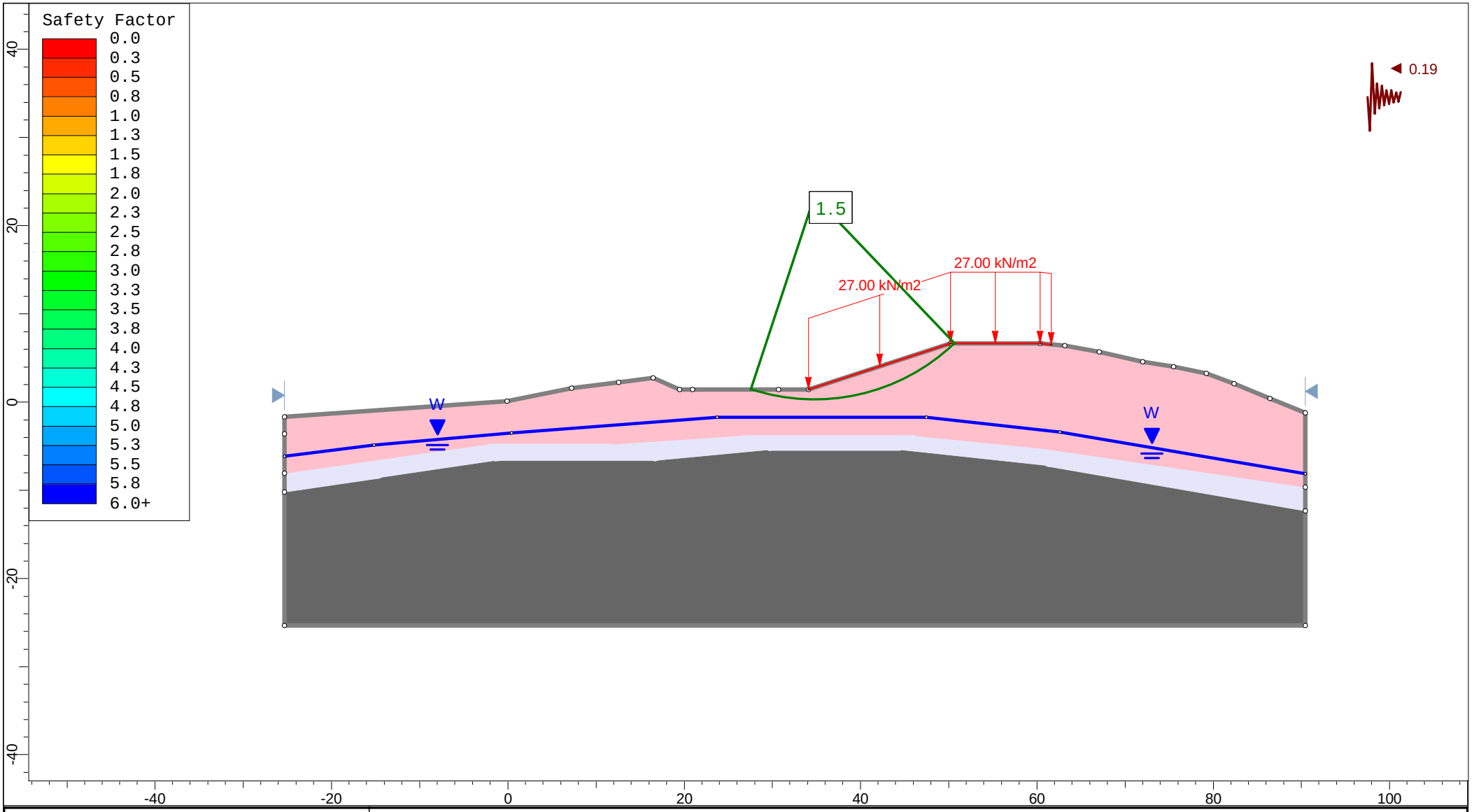
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



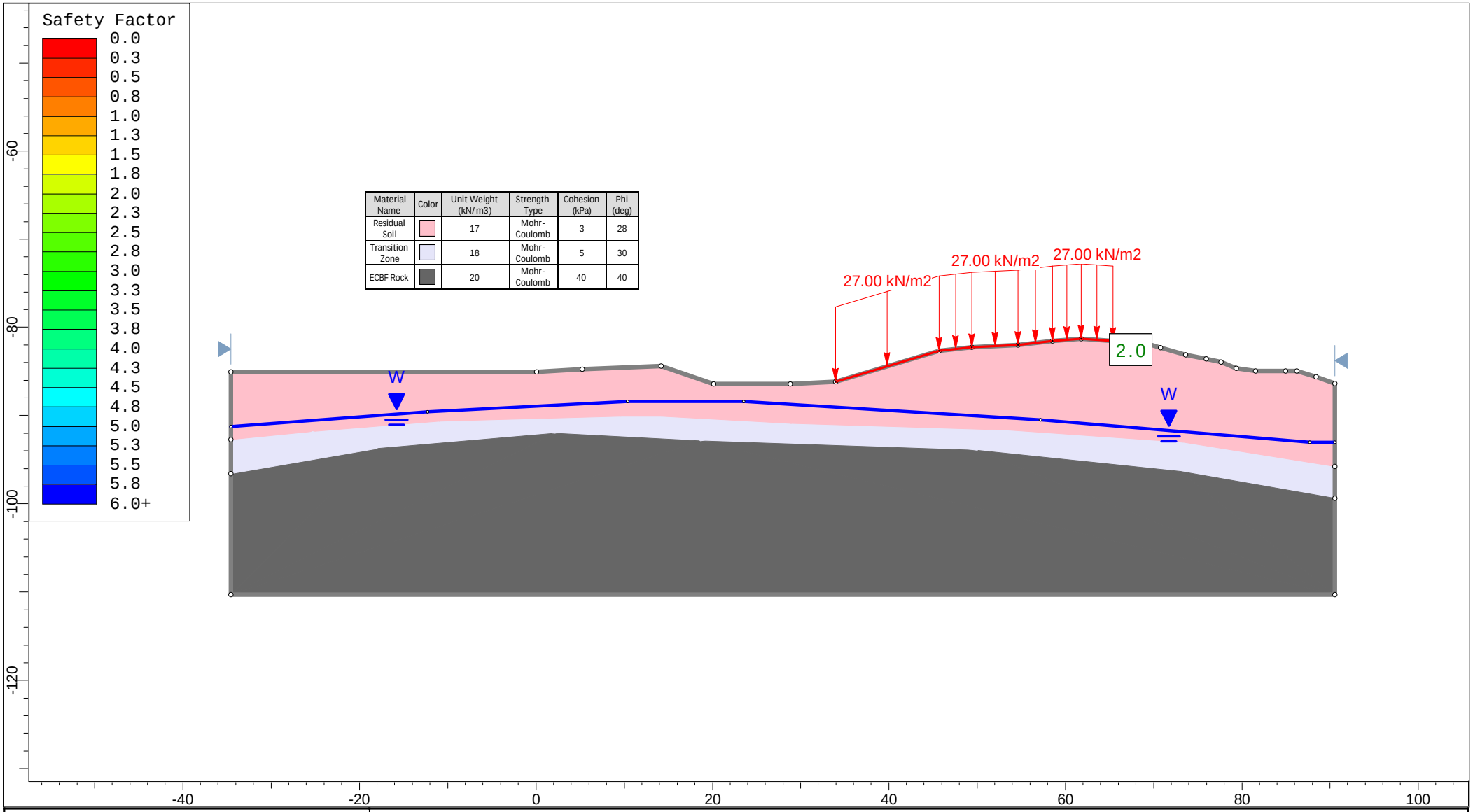
ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 7 - R to L - Transient Case - Circles FoS < 1.8	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



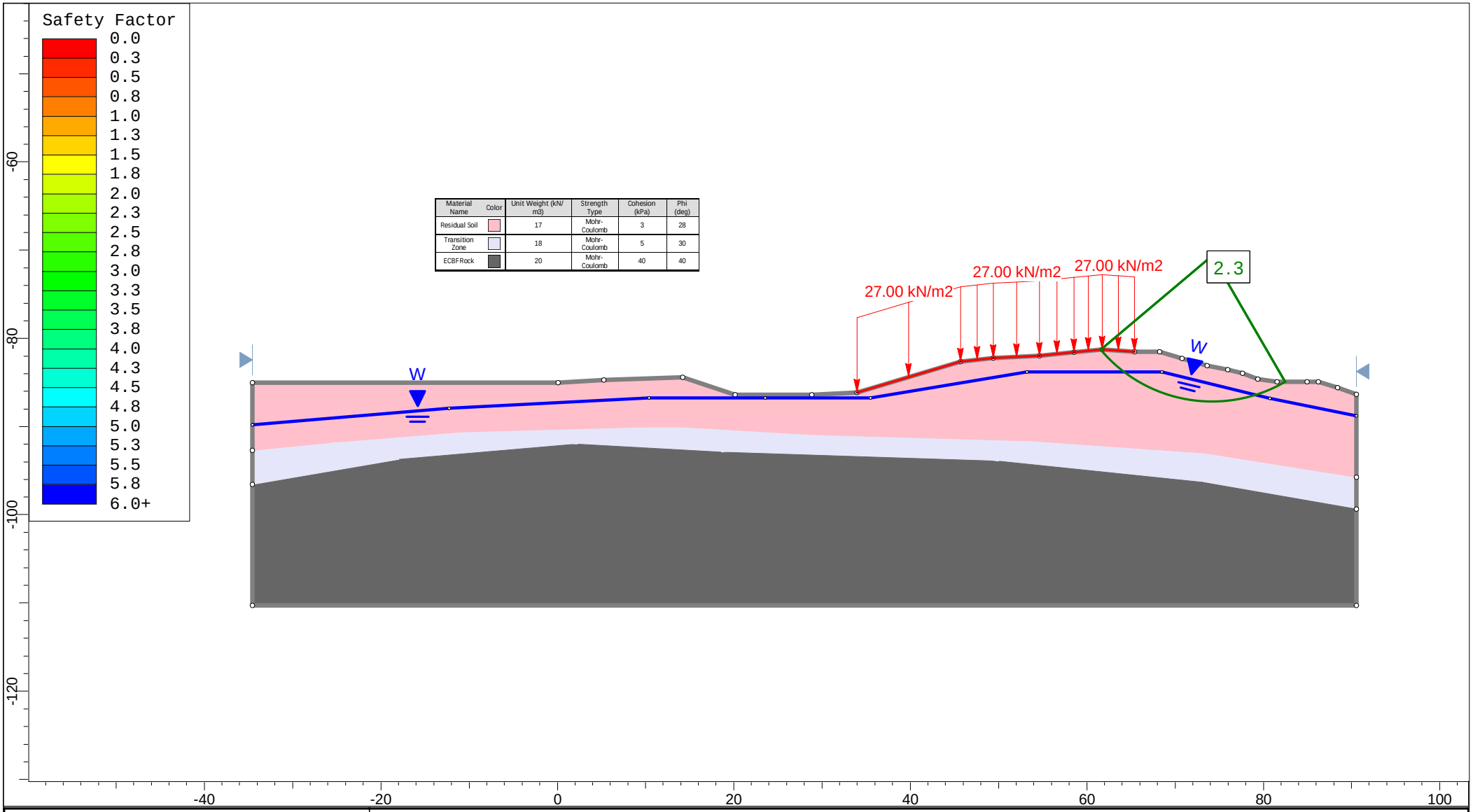
ENGEO	Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 7 - R to L - Seismic Case - Circles FoS < 1.5	
	Drawn By	SJ/BF	Client: Harbour View Heights Limited
	Date	5/09/2024	File Name: Settlement Road - Stage 4

SLIDEINTERPRET 9.027



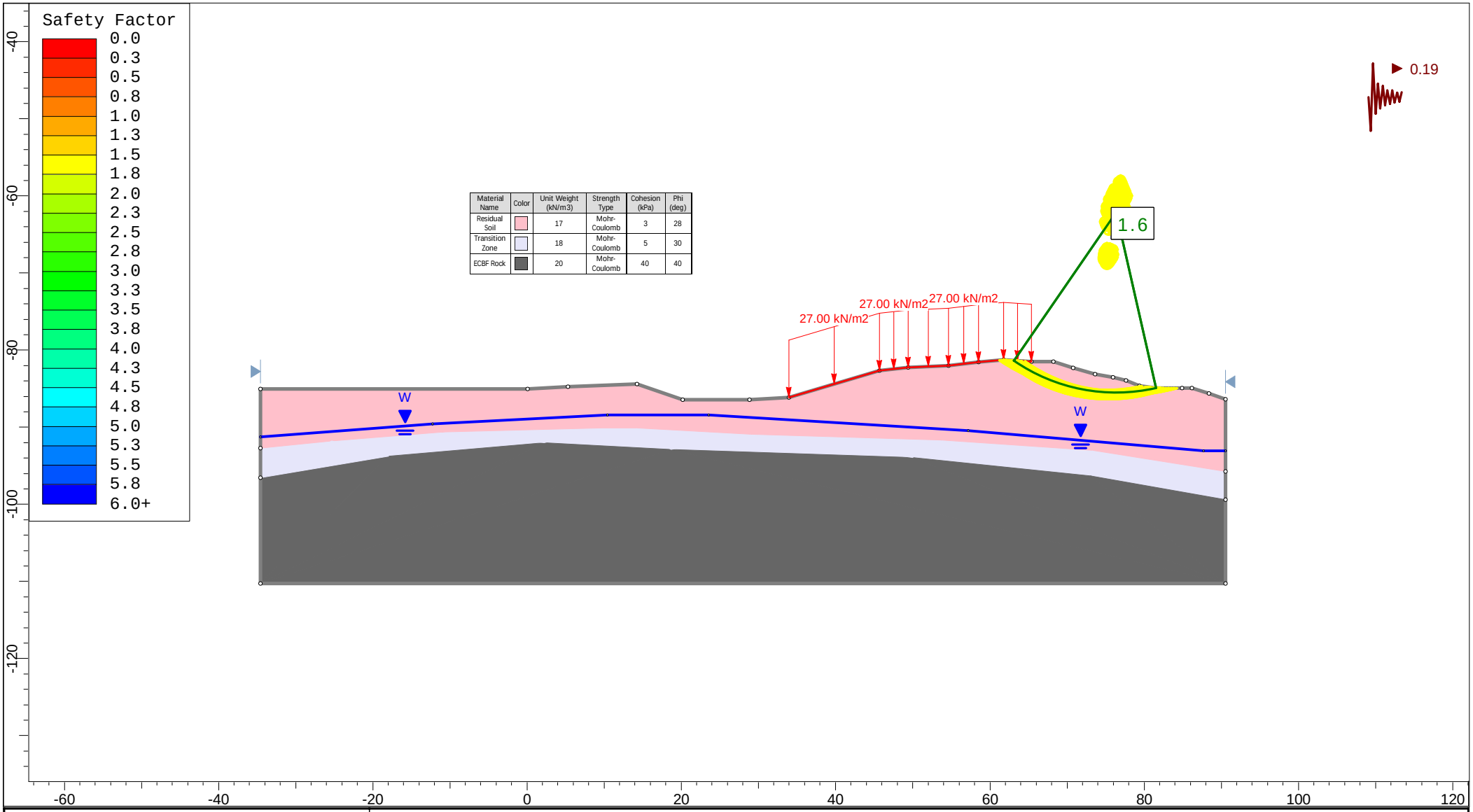
ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 8 - L to R - Static Case - Circles FoS <2.0	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



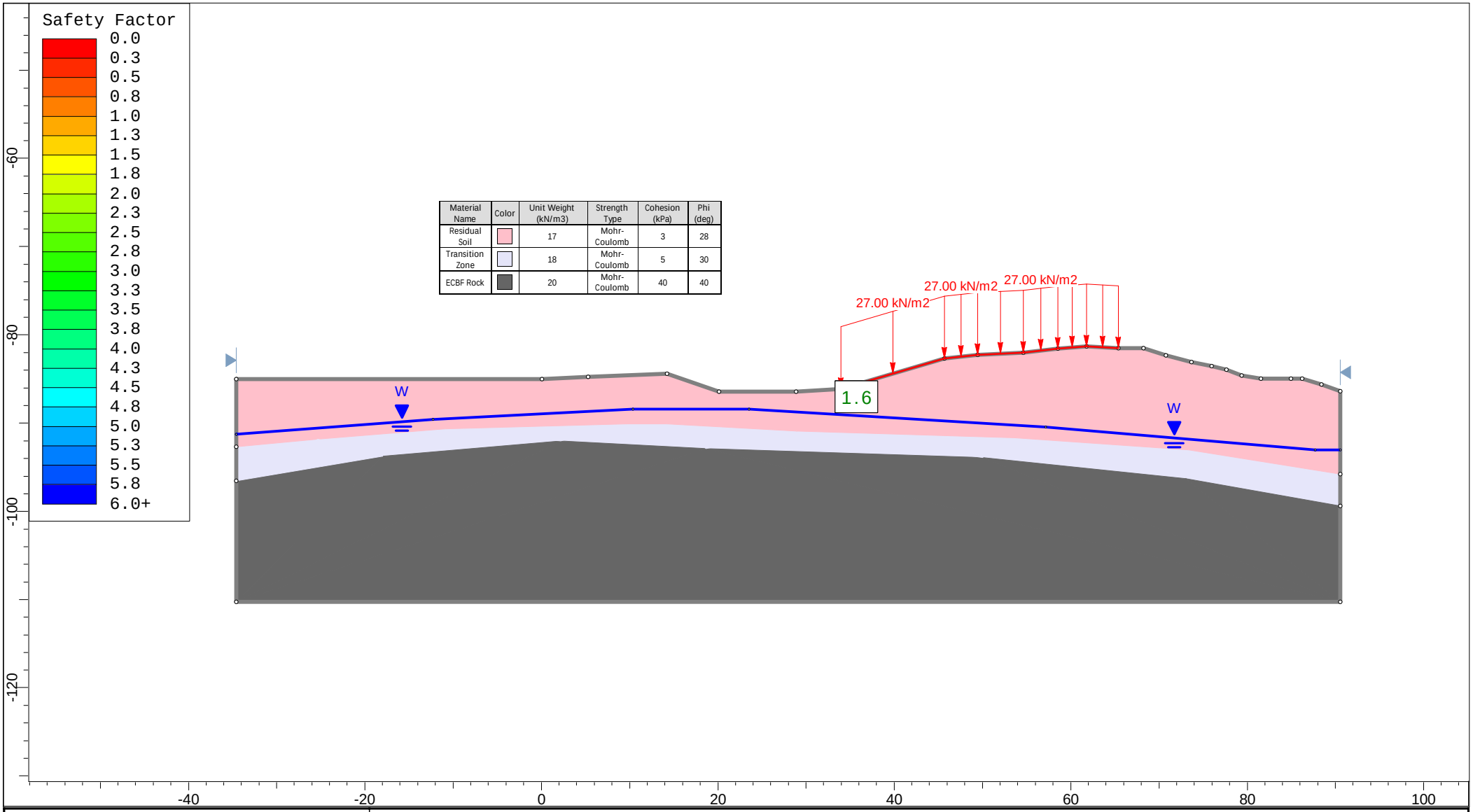
ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 8 - L to R - Transient Case - Circles FoS <2.3	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 8 - L to R - Seismic Case - Circles FoS <1.6	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

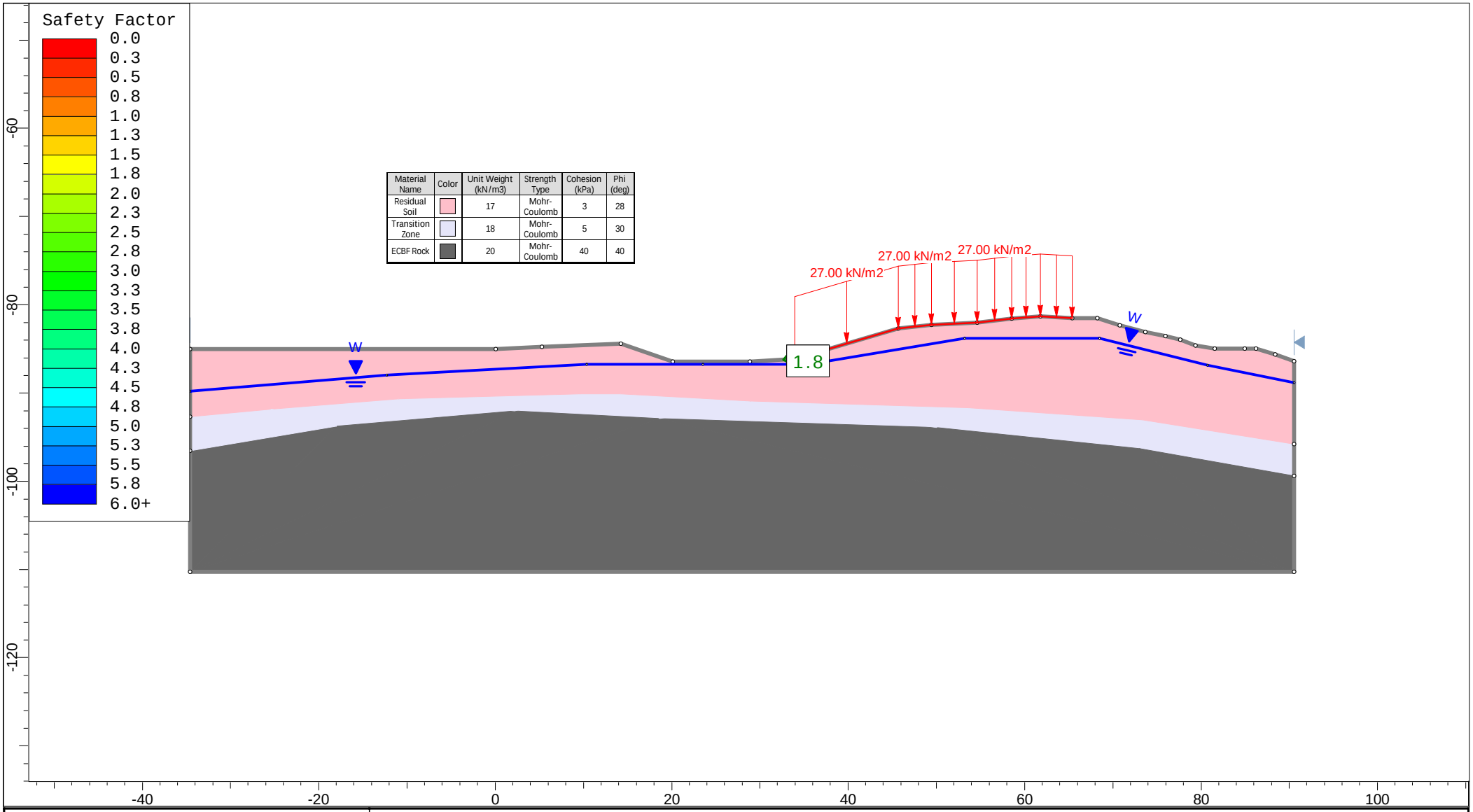
SLIDEINTERPRET 9.027



ENGEO

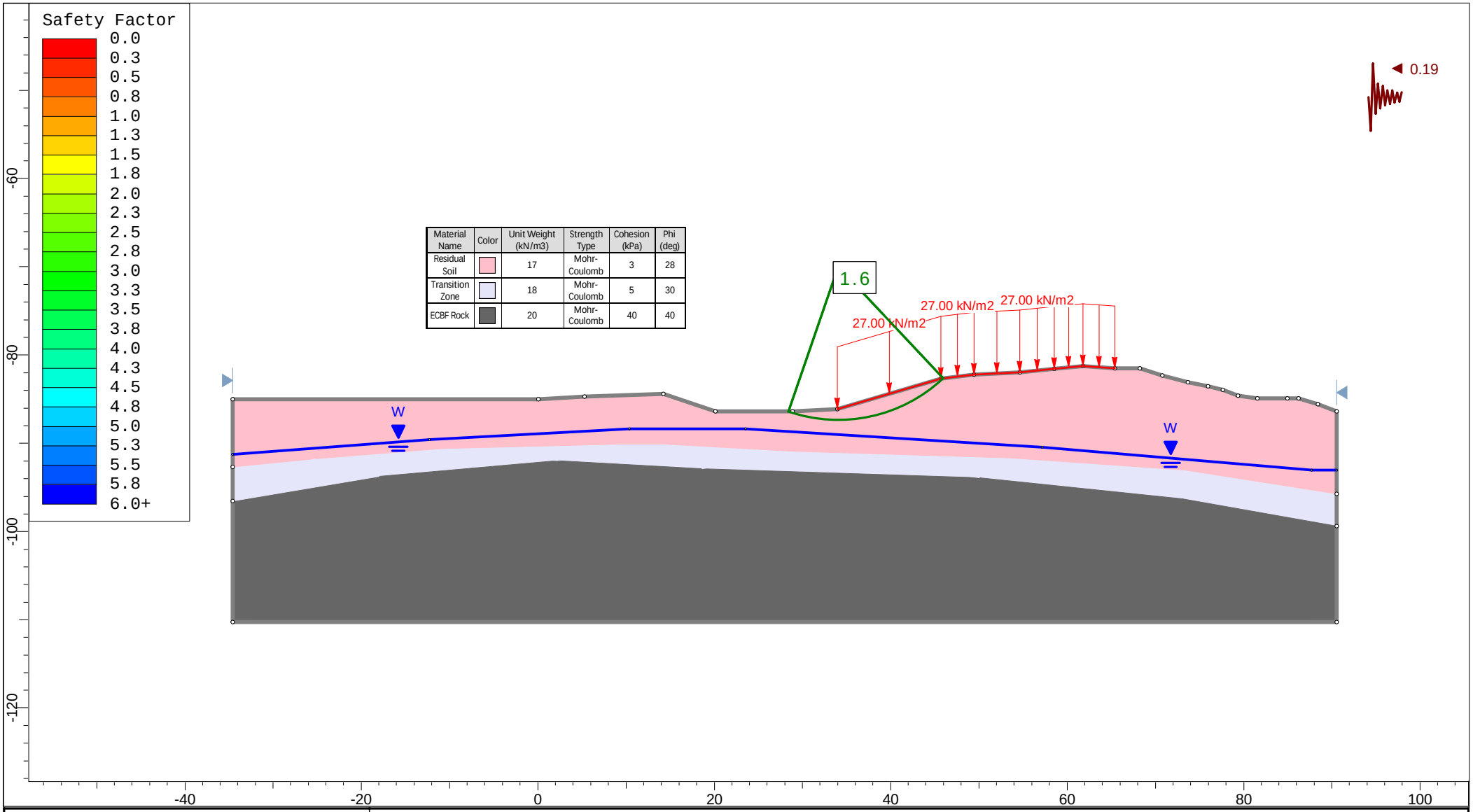
SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 8 - R to L - Static Case - Circles FoS < 1.6		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4



ENGEO	*Project*	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4	
	Analysis Description	Cross Section 8 - R to L - Transient Case - Circles FoS < 1.8	
	Drawn By	SJ/BF	*Client* Harbour View Heights Limited
	Date	5/09/2024	*File Name* Settlement Road - Stage 4

SLIDEINTERPRET 9.027



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Residual Soil		17	Mohr-Coulomb	3	28
Transition Zone		18	Mohr-Coulomb	5	30
ECBF Rock		20	Mohr-Coulomb	40	40

ENGEO

SLIDEINTERPRET 9.027

Project	13230.001.004 - Settlement Road - Rural Plan Change, Stage 4		
Analysis Description	Cross Section 8 - R to L - Seismic Case - Circles FoS < 1.6		
Drawn By	SJ/BF	*Client*	Harbour View Heights Limited
Date	5/09/2024	*File Name*	Settlement Road - Stage 4

APPENDIX 10:

Specific Design Zone

Legend

- Specific Design Zone
- Updated Concept plan

0 10 m 20 m

ENGEO

Produced by **Datanest.earth**

Title: Specific Design Zone within Lots 27 - 35B		
Client: Harbour View Heights LP		Size: A4
Project: 162 - 166 Settlement Road Subdivision	Drawn: BF	Figure No.: 3
Date: 17-12-2023	Checked: PF	
Proj No: 13230.001.002	Scale: 1:1000	Version: 2.0