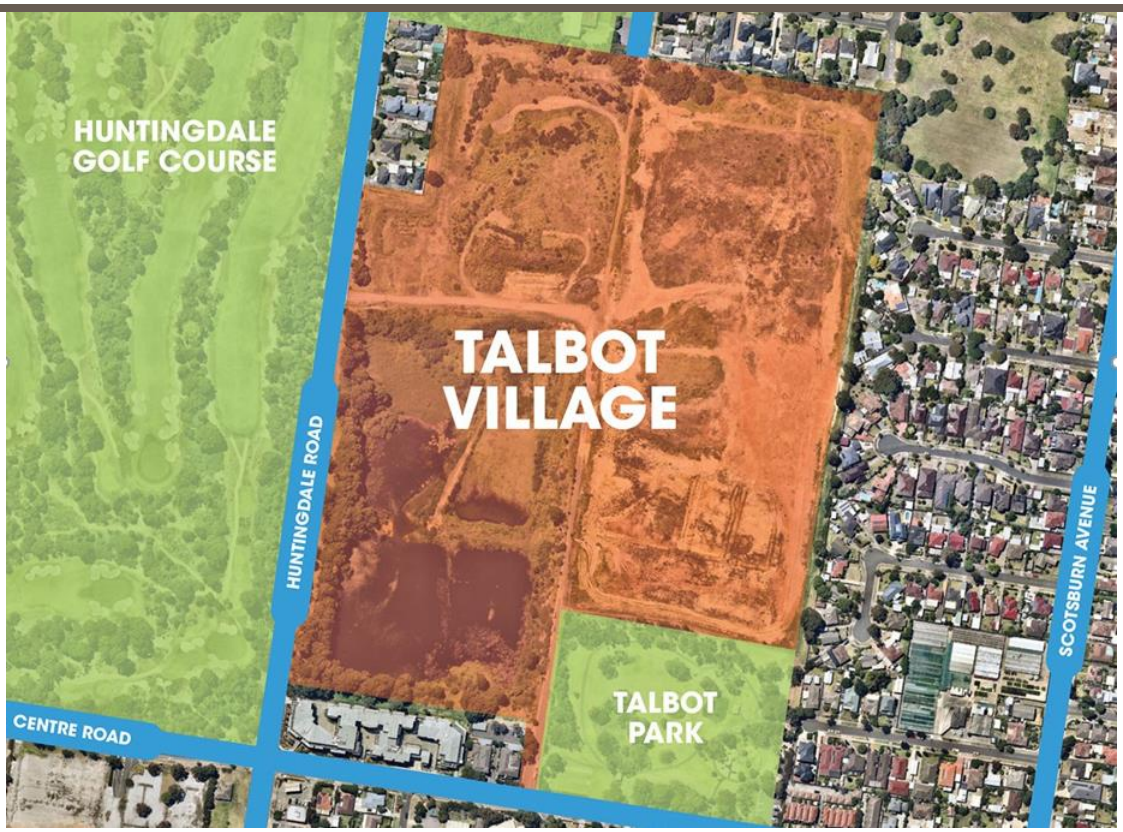
TETRA TECH COFFEY

Talbot Village, Oakleigh South

Domain 1 Preload Design Report

Huntingdale Estate Nominees Pty Ltd
c/- Sterling Global



Reference: 754-GEOTABTF09257AA-EF_Rev02

12 November 2021

TALBOT VILLAGE, OAKLEIGH SOUTH

Domain 1 Preload Design Report

Report reference number: 754-GEOTABTF09257AA-EF_Rev01
12 November 2021

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QUALITY INFORMATION

Revision history

Revision	Description	Date	Author	Reviewer	Approver
Draft	Domain 1 Preload Design Report	7 September 2021	F. Khayyer	I. Pedler	F. Khayyer
00	Domain 1 Preload Design Report	27 September 2021	F. Khayyer R. Gibbs	I. Pedler	F. Khayyer
01	Domain 1 Preload Design Report	1 October 2021	F. Khayyer	I. Pedler	F. Khayyer
02	Domain 1 Preload Design Report	12 November 2021	F. Khayyer	I. Pedler	F. Khayyer

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ACRONYMS / ABBREVIATIONS

Acronyms/Abbreviations	Definition
BGL	Below ground level
RL	Reduced level
AHD	Australian Height Datum

1. INTRODUCTION

This report presents a design prepared by Tetra Tech Coffey (Coffey) for the placement of a preload over a backfilled former quarry pit, designated as geotechnical Domain 1 (Zone 1 in the Statement of Environmental Audit[1]), on the Talbot Village site which is located on the north east corner of the intersection of Centre Road and Huntingdale Road in Oakleigh South.

Domain 1 is a former Council municipal landfill that is understood to be producing methane gas. Treatment of the uncontrolled fill and gas management controls will be required in this area. Development of such sites by the placement of additional fill or the construction of roads, lanes, open spaces, infrastructure and dwellings could cause significant total settlement and differential settlement due to the variable composition and thickness of the landfill materials and the overlying fill layers. The differential settlements could affect the integrity and function of the landfill cap and associated boundary venting system which are required to comply with the Statement of Environmental Audit. As a result, some form of ground improvement will be required to allow development of the site which should also account for surface drainage works to meet the deformation design criteria.

The aim of the preload is to investigate the settlement properties of the existing backfilled quarry to assist the design of the ground improvement strategy for the site. Preloading involves placement of load on the ground surface prior to construction such that the imposed load is equivalent or greater than the final project loading conditions. The preload causes the landfill to undergo primary consolidation associated with the expulsion of excess water from the soil. The primary consolidation phase is followed by secondary consolidation or creep settlement which occurs due to the constant loads applied during the primary consolidation phase. The magnitude of secondary settlement is significantly smaller than the primary consolidation but can continue for many years.

Preloading has been carried out across the eastern side of the site in Domains 2a, 2b, 3a, 3b, 5 and 6 (see Figure 1) with the settlement of the preload measured by a series of settlement plates and pins. The results of the settlement monitoring have been used to derive “calibrated” ground deformation parameters for use in numerical analysis to predict future ground movements across the development. It is proposed that the same approach be used in Domain 1 to allow the collection of settlement data to inform the development design.

In addition to assessing the settlement properties, the preload will provide a more uniform load across the site which will act to reduce potential differential settlement following the removal of the preload, construction of the structural fill and landfill cap layers and subsequent construction of infrastructure and dwellings.

The preload design was commissioned by Mr Simon Hicks of Sterling Global by email dated 29 April 2021 following acceptance of Coffey proposal GEOTABTF09257AA-EA. This report has been revised to include further information requested by Monash City Council in the document ref TPA/53179 dated 26 October 2021.

This preload design document should be read in conjunction with the *Workplan For Zone 1 Temporary Boundary Venting Measures* (Coffey 2021). The workplan outlines the design for a temporary boundary venting system to be constructed at the north western site boundary prior to commencement of pre-loading activities. Construction of the boundary venting system prior to preloading is a condition of the Statement of Environmental Audit for the site.

[1] EHS Support (2020) *53X Environmental Audit of Land at 1221-1249 Centre Road and 22 Talbot Avenue, Oakleigh South, Vic*, Ref. AUS##C01679_2019, dated 13 May 2020

2. BACKGROUND

The Talbot Village site was formerly used for sand mining operations which commenced during the mid to late 1950's, initially at the northern end of the site, and continued until the mid to late 1990s, with progressive mining and filling operations during this time. The backfilling has been undertaken in various stages, using a mixture of materials including putrescible waste, rubble, soils and clay slimes until 1992. Selected aerial photographs during the period of pit operations are presented in Plate 1.

Domain 1 is in the north west corner of the site and includes a former municipal landfill that operated from ~1972 to 1975. The aerial photographs indicate that stripping activities had commenced in 1951 and quarrying activities were underway by 1956. A pond is visible within this domain in the 1963 photograph. The 1972 photograph indicates that much of this domain has been quarried. The 1978 photograph indicates that much of this domain has been filled, although the surface appears to be irregular, and quarrying activities appear to be continuing over the southern and eastern portion of the domain, and are still evident to a lesser extent in the 1992 photograph.

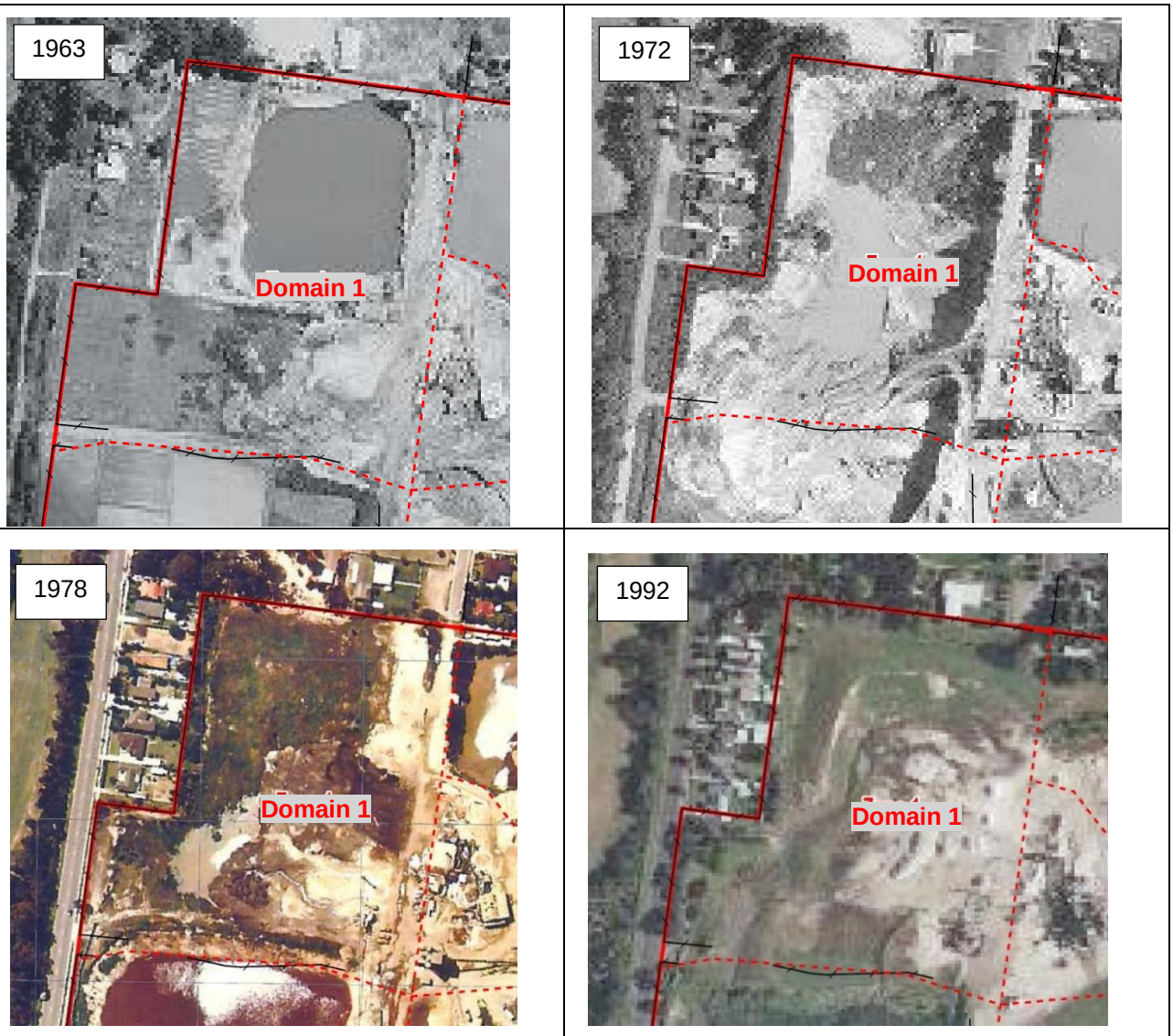


Plate 1: Domain 1 Historical Aerial Imagery

Geotechnical investigations have been carried out in Domain 1 since the early 2000s by a number of consultants for several different site owners including a more recent geotechnical investigation undertaken by Coffey in 2020-21 (Coffey, 2021). The results of the Domain 1 investigations are summarised in Section 3.

3. RESULTS OF GEOTECHNICAL INVESTIGATIONS

3.1 SURFACE CONDITIONS

Domain 1 is a closed landfill site covered with inert uncontrolled fill. The current surface of Domain 1 comprises soil mounds and stockpiles with surface elevations ranging from RL59m to over RL66m (see Figure 1).

3.2 SUBSURFACE CONDITIONS

The historical and 2020-21 investigation data was used to develop a 3D subsurface model using the software package “Leapfrog”. The Leapfrog model represents an interpretation of the data collect by Coffey and information from previous investigations which may differ from the original borehole logs presented in those reports. The Leapfrog model is presented in Figure A1 of Appendix A. Figure A2 presents a north south geotechnical Section LL cut from the Leapfrog model.

The subsurface profile through Domain 1 comprises uncontrolled fill or stockpile materials up to 5m high overlying uncontrolled fill (typically foundry sands waste) of 1- 5 m thickness (typically 4m), which has been used to cap the underlying municipal landfill wastes. The foundry waste comprises predominantly sandy materials with a trace of gravels, cobbles, brick pieces and building rubble. The underlying municipal landfill waste generally comprises domestic waste, green waste, tyres, brick, plastic, paper, timber and metal pieces in a wet sand matrix. The foundry and municipal wastes are up to 20m thick and overlie natural Brighton Group sand. The contours of the thickness of municipal waste derived from the Leapfrog model is shown in Figure A3.

The static groundwater levels across the Domain ranged from about RL56m to RL51m AHD.

Ongoing environmental management controls are required in this part of the site as part of any future redevelopment, in accordance with the Statement of Environmental Audit. These management controls are primarily associated with the management of potential landfill gas risks associated with the former landfill. This includes construction of an inground pathway intervention (landfill cap and venting system) and gas protection measures for any future structures.

3.3 TRIAL PADS

A series of trial settlement monitoring pads were constructed across the site by former site owners in 2004. Pads 1 and 2 were located in Domain 1 as shown in Figure B1 of Appendix B. The pads were constructed to a height of about 2m and covered an area of approximately 40m by 40m.

The results of the trial pads provided some data on the settlement of the site. The proposed preload aims to build on this limited response to assess the settlement performance across the entire site. Preliminary estimates of the settlement due to the preload are discussed in Section 4.3.

4. PRELOAD DESIGN CRITERIA AND ASSUMPTIONS

The proposed preload design in Domain 1 is based on the following design criteria and assumptions.

4.1 FINAL SITE LEVEL (FSL)

The final site levels (FSLs) vary between RL63.5m at the northern end to RL59m in the southern end of Domain 1.

The proposed levels have considered:

- Stormwater management controls whereby the surface has been graded towards Domain 4 to the south. Runoff to be collected and directed within the site, preventing flow paths to neighbouring properties. Erosion controls to be implemented as part of the stormwater management measures.
- Increase to the minimum longitudinal grade of potential future roads (1% minimum) to accommodate for differential settlement that may occur due to secondary consolidation following the removal of the Preload.
- Building in allowance within the structural Fill zone to accommodate for the installation of utilities and services (including gravity services) within 'clean' Fill, consequently avoiding or at least minimising the potential for penetration into the underlying waste materials.

4.2 EXTENT OF PRELOAD

The proposed preload layout has considered the following issues:

- **Landfill cap requirements:** The concept design for landfill gas protection measures included the Statement of Environmental Audit issued for the site, incorporates an engineered landfill cap and associated boundary venting system to be constructed in Domain 1. The purpose of the pathway intervention in these areas being to control the vertical and lateral migration of landfill gas (i.e. prevent vertical migration to overlying structures or lateral migration off-site or to areas of lower gas risk). The landfill cap and venting must be constructed prior to any future redevelopment. The landfill cap needs to incorporate all buried landfill wastes in Domain 1 (i.e. extends across the extent of the filled area). As such, the preload should extend as close as practicable to the edges of the former pit to mitigate the impact of potential differential settlement across the quarry edge on the integrity and performance of the landfill cap and venting system.
- **Location of boundary venting trench:** As outlined in the Coffey Workplan (2021) it is a requirement of the Statement of Environmental Audit that temporary boundary venting system be installed at the north western site boundary prior to construction of the preload. The venting trench will be located along the north western site boundary and is approximately 200m long, 600 mm wide and 4 m deep. **T**he trench is to be constructed approximately 5m from the property boundary to provide an adequate Factor of Safety (FoS) for excavation of the trench.
- **Gas** protection **measures for structures:** As outlined in the Statement of Environmental Audit, gas protection measures are required for all future buildings to be constructed in Domain 1 including a gas resistant membrane and sub-floor ventilation system. The preload would assist with mitigating the potential impact of differential settlement across Domain 1 on the integrity and performance of the building gas protection measures required.
- **Pit edges:** The aerial photographs in Plate 1 above show the footprint of the former sand pit. Figure 2 shows the estimated pit crest lines from the aerial photographs as well as the pit crest inferred from the test pits excavated for pit crest definition as part of the 2020-21 additional investigation (Coffey, 2021). The offset distance from the crest of the batter to the western boundary is about 10m to 15m

with a smaller offset along the northern boundary. The extent of the preload with respect to the pit edges is shown on Figure 2.

4.3 PRELOAD LEVELS

The current surface of Domain 1 comprises soil mounds and stockpiles with surface elevations ranging from RL59m to over RL66m. The preload will be placed at three levels across the site varying from RL66m at the northern end, RL65m in the middle and RL64m at the southern end. These levels correspond to at least 2.5m above the proposed final site levels and have been adopted to provide an applied load of about 25kPa greater than the final applied loads to accelerate the settlement that occurs and to reduce the magnitude of settlement that occurs during the placement of the structural fill and dwellings. Due to the variations in current surface levels, these levels may result in the preload being thicker in the lower parts of the Domain. The proposed levels are preliminary only and subject to change during detailed design to account for the final surface drainage system and the construction of the temporary access track.

The trial pads constructed in 2004 provide some limited indication of the settlement properties of the backfill materials at the site. Based on this data, the predicted settlement due to the preload after 1.5 years is shown in Figure B2 which varies up to 400mm. The results of the preload settlement monitoring will provide data to assess the settlement properties and to assist in predicting future settlement across the site. The predicted settlement will then be used to assess whether preloading alone will be suitable to allow the construction of the landfill cap and dwellings or other additional ground improvement methods will be required to allow development of this area.

5. PRELOAD GEOMETRY

Figure 3 presents the proposed preload layout showing the location of the toe, crest and surface levels across the preload. A series of cross-sections showing the existing and proposed preload levels along the western boundary are presented in Figures 4 to 14. Additional east-west and north-south sections extending across the entire site showing the maximum height of existing stockpiles and the levels of adjoining residential properties are presented in Appendix C.

The key features are:

- Proposed preload levels vary from RL66m at the northern end to RL64m at the southern end of the site which corresponds to a minimum 2.5m high preload with a small allowance for future settlement.
- Retention of existing stockpiles with current elevations higher than the proposed preload levels.
- A 5m buffer from the site boundary to the toe of preload batter.
- Based on the geotechnical properties of the fill material, a 2H:1V batter slope are considered suitable for the proposed preload height, except for a 3H:1V batter along the southern side of Domain which abuts the north wall of the quarry to the south (Domain 4).
- A minimum 5m buffer from the crest of the north wall of the quarry void to the south (Domain 4) to the toe of the preload batter. This is based on a stability assessment described in Coffey report reference 754-GEOTABTF09257AA-CX dated 26 March 2019 (Coffey, 2019a) indicating the preload may be constructed to the southern side of the existing gravel track with a 3H:1V batter slope with a factor of safety (FoS) of 1.3 (a copy of this report is provided in Appendix F).

6. SETTLEMENT MONITORING

As part of the preload, settlement pins and plates will be installed to record settlement of the preload over time. The plates will be installed prior to placing the preload and extended with a steel rod up through the fill to allow the total settlement due to the preload to be surveyed on a regular basis. The pins are installed on the surface of the preload. The difference in settlement of the plates and pins is a measure of the settlement of the preload materials. The locations of settlement pins and plates are presented in Appendix D.

7. INDICATIVE CONSTRUCTION PROGRAM

Table 1 shows an indicative timeframe for the construction of the preload. It should be noted that there is potential for significant variation in this timing due to external factors such as weather and material availability.

Table 1: Indicative construction program

Stage of Work		Likely Timeframe	Comment
1	Construction of the boundary venting system	4 weeks	Will depend on weather conditions
2	Vegetation removal and site preparation	3 weeks	
3	Site Survey	Ongoing throughout the site preparation	
4	Stockpiling of imported fill materials	4 to 6 months	Will depend on contractor progress, weather conditions, and material availability
5	Survey	Ongoing throughout the stockpiling works	
6	Pins and plates installation	Ongoing throughout the stockpiling works	
7	Settlement Monitoring	Ongoing throughout the stockpiling works	
8	Preload removal	12 to 18 months after construction of the preload	To be confirmed based on the results of the preload monitoring

8. CONSTRUCTION CONSIDERATIONS

The following construction issues and actions are to be addressed by the Contractor engaged to construct the preload:

- Construction of the temporary boundary venting system must be completed in accordance with the Coffey Workplan (2021) and verified by an appointed environmental auditor prior to preload construction.

- The importation of any fill soils to the site must be in accordance with EPA Victoria legislative requirements, the CEMP (Coffey 2020) and associated Site Backfilling Protocol (Coffey 2015). Importation is subject to specific site criteria (e.g. geotechnical) and must be approved prior to importation.

  Following the Preload removal, the excavated fill will be transported for backfilling the former quarry pit in Domain 4 (subject to additional planning permits for backfilling). The fill must meet the specific requirements for the importation of fill as outlined in the Backfill Design Specification (Coffey, 2019) otherwise it will be transported off-site.

- The preload fill is to be placed in even layers and track rolled across the site. The maximum difference in the height of placed fill is to be no more than 1m.
- To confirm the effectiveness of the temporary boundary venting measures and assess the potential effect of the preload works on landfill gas transport in Domain 1 ongoing landfill gas monitoring is required during the preload works in accordance with the CEMP (Coffey 2020) and Coffey Workplan (2021). The existing groundwater monitoring wells and gas bores within Domain 1 will need to be vertically extended through the preload and protected prior to commencing the filling operation.
- Dust management during the works, during prolonged periods where no filling is being placed, and upon completion of works is to be conducted in accordance with the Construction Environmental Management Plan (CEMP) and as directed by the Superintendent.
- All trees and some ground vegetation removal as required across the site for construction of the proposed preload. The locations of the trees are presented in Appendix E.
- Access to the site is primarily from the west via Huntingdale Road. During fill placement in the south-western portion of the Domain, a temporary access ramp (15H:1V) as shown on Figure 2 is proposed. The Contractor is responsible for design and construction of the proposed access ramp.
- Survey of the settlement plates during construction will be conducted initially on a fortnightly basis which may be extended out to monthly as settlement trends become evident.
- A specific construction methodology is required for placement of the preload adjacent to the pit crest of Domain 4 to ensure safe batter stability during the works in this area. This will be developed by the selected contractor prior to the commencement of works.
- Stormwater at the site currently drains to the Domain 4 quarry void. Prior to construction works commencing a stormwater management plan must be prepared to manage stormwater quality and site drainage during construction.

9. ADDITIONAL SITE MANAGEMENT REQUIREMENTS

The gas vent trench and the preload activities are governed by the relevant sections of the following standards, guidelines and consents:

- Statement of Environmental Audit ref. CARMs: 70403-2 Service Order No.: 8004092 (EPA, 2020).
- The project approved Construction Environmental Management Plan (CEMP) dated 01 May 2020 (Coffey, 2020a).
- Work Health and Safety & Regulations 2021.
- AS3798-2007: Guidelines on Earthworks for Commercial and Residential Developments.

In addition, the site works will need to:

- Comply with the general requirements of the latest revisions of all other Standards and Specifications and Codes of Practice.

- Be carried out in full consideration of and in full compliance with the statement of environmental audit and any notices from EPA
- Be carried out in accordance with the contractor operations OH&S and risk management procedures.
- Be carried out in accordance with "Good Design and Construction Practices" as required under the Council license.

10. REFERENCES

[1] Coffey Geotechnics Pty Ltd (Coffey), 2015. *Zone 4 Backfill Design Report, Huntingdale Estate, Oakleigh South, VIC.* GEOTABTF09257AA-AQ_Rev10, September 2015.
[2] Coffey Geotechnics Pty Ltd (Coffey), 2019. *Zone 4 Backfill Design Specification, Huntingdale Estate, Oakleigh South, VIC.* GEOTABTF09257AA-BC_Rev10 dated April 2019.
[3] Coffey Services Australia Pty Ltd (Coffey), 2019a. *North Wall Zone 4, Zone 1 preload stability assessment.* Ref. GEOTABTF09257AA-CX dated 26 March 2019
[4] EHS Support (2020) 53X Environmental Audit of Land at 1221-1249 Centre Road and 22 Talbot Avenue, Oakleigh South, Vic, Ref. AUS##C01679_2019, dated 13 May 2020.
[5] Coffey Services Australia Pty Ltd, 2020. *Construction Environmental Management Plan (CEMP), 2020. Huntingdale Estate, Oakleigh South, VIC.* Ref. 754-ENAUABTF00751AB_R17 dated 1 May 2020a.
[6] Coffey Services Australia Pty Ltd (Coffey), 2020b. *Former Talbot Quarry – A summary of the geotechnical history of the project.* Ref. GEOTABTF09257AA-DR dated 10 August 2020.
[7] Coffey Services Australia Pty Ltd (Coffey), 2021. *Geotechnical Investigation Report 2020-21 Additional Investigation.* Ref. GEOTABTF09257AA-EC, 2021
[8] Coffey *Services* Australia Pty Ltd (Coffey), 2021a. *Settlement Predictions Report.* Ref GEOTABTF09257AA-ED, 2021.
[9] Tetra Tech Coffey Pty Ltd (Coffey), 2021. *Workplan For Zone 1 Temporary Boundary Venting Measures*. Ref: ENAUABTF00751AA_R11_Rev03 dated 13th September 2021.

11. LIMITATIONS

This report has been prepared solely for the use of our client, their professional advisers and relevant authorities in relation to the specific project described in this document. No liability is accepted in respect of it use for any other purpose by any other person or entity. All future owners of this property should seek professional geotechnical advice to satisfy themselves as to its ongoing suitability for their intended use.

The preliminary settlement estimate contained within this report is based on limited data from the short-term trial pads and further assessment of the proposed Zone 1 preload is required to assess the appropriate settlement parameters for the landfill materials for future settlement predictions.

Your attention is drawn to the attached document entitled "*Important Information about your Coffey Report*".

IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY REPORT

As a client of Tetra Tech Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Tetra Tech Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Tetra Tech Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Tetra Tech Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Tetra Tech Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Tetra Tech Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Tetra Tech Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Tetra Tech Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Tetra Tech Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Tetra Tech Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Tetra Tech Coffey to work with other project design professionals who are affected by the report. Have Tetra Tech Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Tetra Tech Coffey for information relating to geoenvironmental issues.

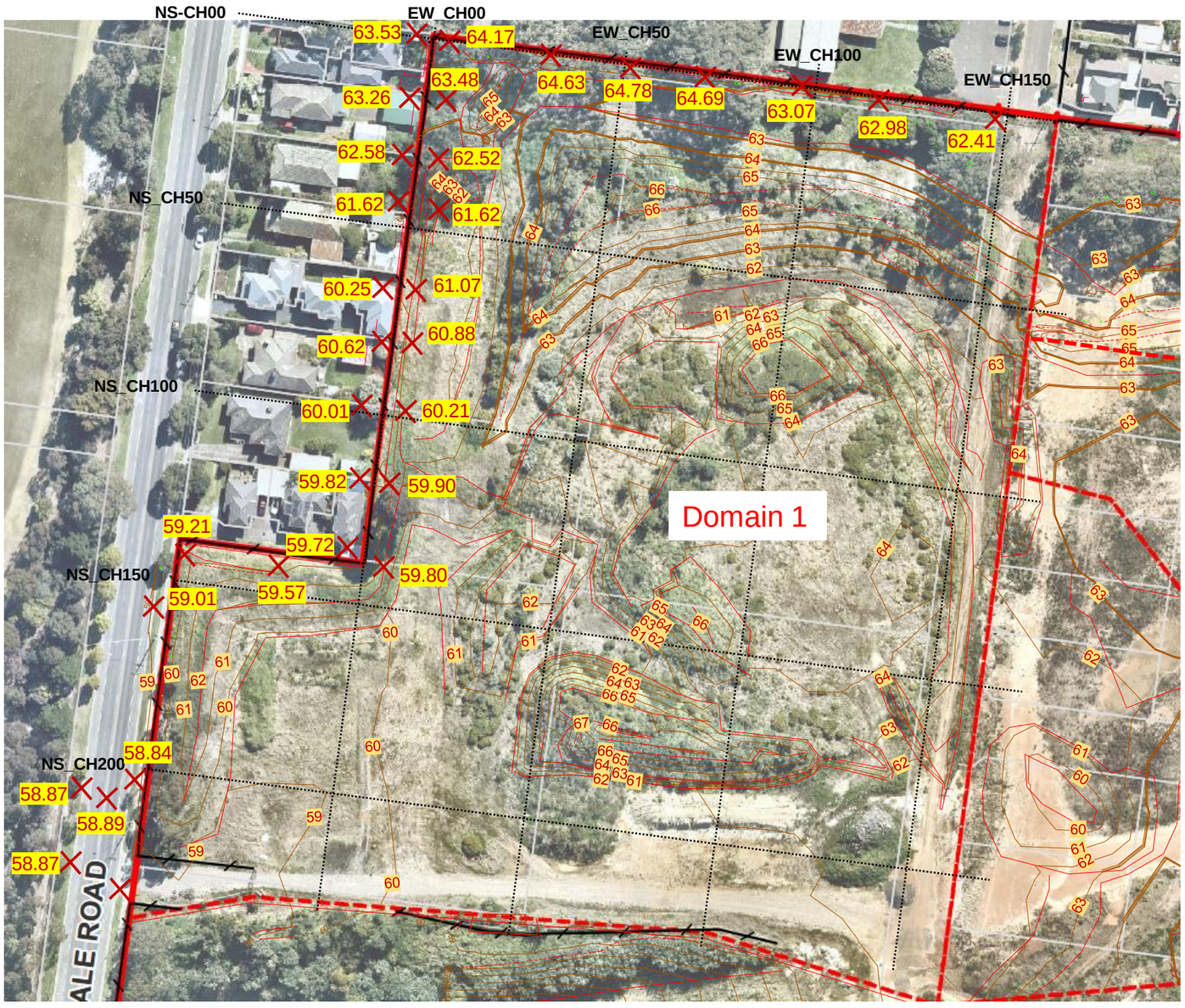
Rely on Tetra Tech Coffey for additional assistance

Tetra Tech Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Tetra Tech Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Tetra Tech Coffey to other parties but are included to identify where Tetra Tech Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Tetra Tech Coffey closely and do not hesitate to ask any questions you may have.

FIGURES



EXISTING GROUND LEVELS – DOMAIN 1

SITE GEOTECHNICAL DOMAINS

LEGEND

- 65 — EXISTING GROUND CONTOUR
- TOP OF BANK
- TITLE BOUNDARY
- CHAINAGE
- 59.80 — BOUNDARY LEVELS
- DOMAIN BOUNDARY

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	EXISTING CONDITIONS PLAN
project no:	GEOTABTF092574AA
figure no:	1

LEGEND

- 65 — EXISTING GROUND CONTOUR
- TOP OF BANK
- TITLE BOUNDARY
- CHAINAGE
- DOMAIN BOUNDARY
- PIT CREST INTERPRETED FROM TEST PITS
- RL66 — PROPOSED PRELOAD LEVELS
- TEMPORARY CONSTRUCTION ACCESS (1:15 RAMP)
- 5m — SETBACK FROM BOUNDARY TO THE TOE
- VENT RISER LOCATION (AT NO MORE THAN 20M SPACING WHERE PRELOAD OVERLAPS BOUNDARY VENTING TRENCH)
- BOUNDARY VENT TRECH
- PRELOAD STOCKPILE AT RL66m
- PRELOAD STOCKPILE AT RL65m
- PRELOAD STOCKPILE AT RL64m
- TRANSITION BATTER

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:
- FINISHED STOCKPILE LEVELS APPLY TO NEW FILL AND DO NOT APPLY TO EXISTING SITE LEVELS THAT ARE HIGHER
- THE BOUNDARY TRANSITION BATTER SLOPES AT 2H:1V. THE EXTENT OF THE BATTERS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND MAY SUBJECT TO MINOR CHANGES DURING CONSTRUCTION.

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: PRELOAD LAYOUT WITH RESPECT TO PIT CREST

project no: GEOTABTF092574AA

figure no: 2

FIGURE 4: 412 HUNTINGDALE ROAD CROSS SECTION

FIGURE 5: 414 HUNTINGDALE ROAD CROSS SECTION

FIGURE 6: 416 HUNTINGDALE ROAD CROSS SECTION

FIGURE 7: 418 HUNTINGDALE ROAD CROSS SECTION

FIGURE 8: 420 HUNTINGDALE ROAD CROSS SECTION

FIGURE 9: 422 HUNTINGDALE ROAD CROSS SECTION

FIGURE 10: 424 HUNTINGDALE ROAD CROSS SECTION

FIGURE 11: 426 HUNTINGDALE ROAD CROSS SECTION

FIGURE 12: HUNTINGDALE ROAD CROSS SECTION

LEGEND

- 65 EXISTING GROUND CONTOUR
- TOP OF BANK
- TITLE BOUNDARY
- CHAINAGE
- DOMAIN BOUNDARY
- CROSS SECTIONS
- RL66 PROPOSED PRELOAD LEVELS
- BOUNDARY VENT TRECH
- VENT RISER LOCATION (AT NO MORE THAN 20M SPACING WHERE PRELOAD OVERLAPS BOUNDARY VENTING TRENCH)
- PRELOAD STOCKPILE AT RL66m
- PRELOAD STOCKPILE AT RL65m
- PRELOAD STOCKPILE AT RL64m
- TRANSITION BATTER

FIGURE 14: 2/426 HUNTINGDALE ROAD CROSS SECTION

FIGURE 13: SCOUT HALL CROSS SECTION

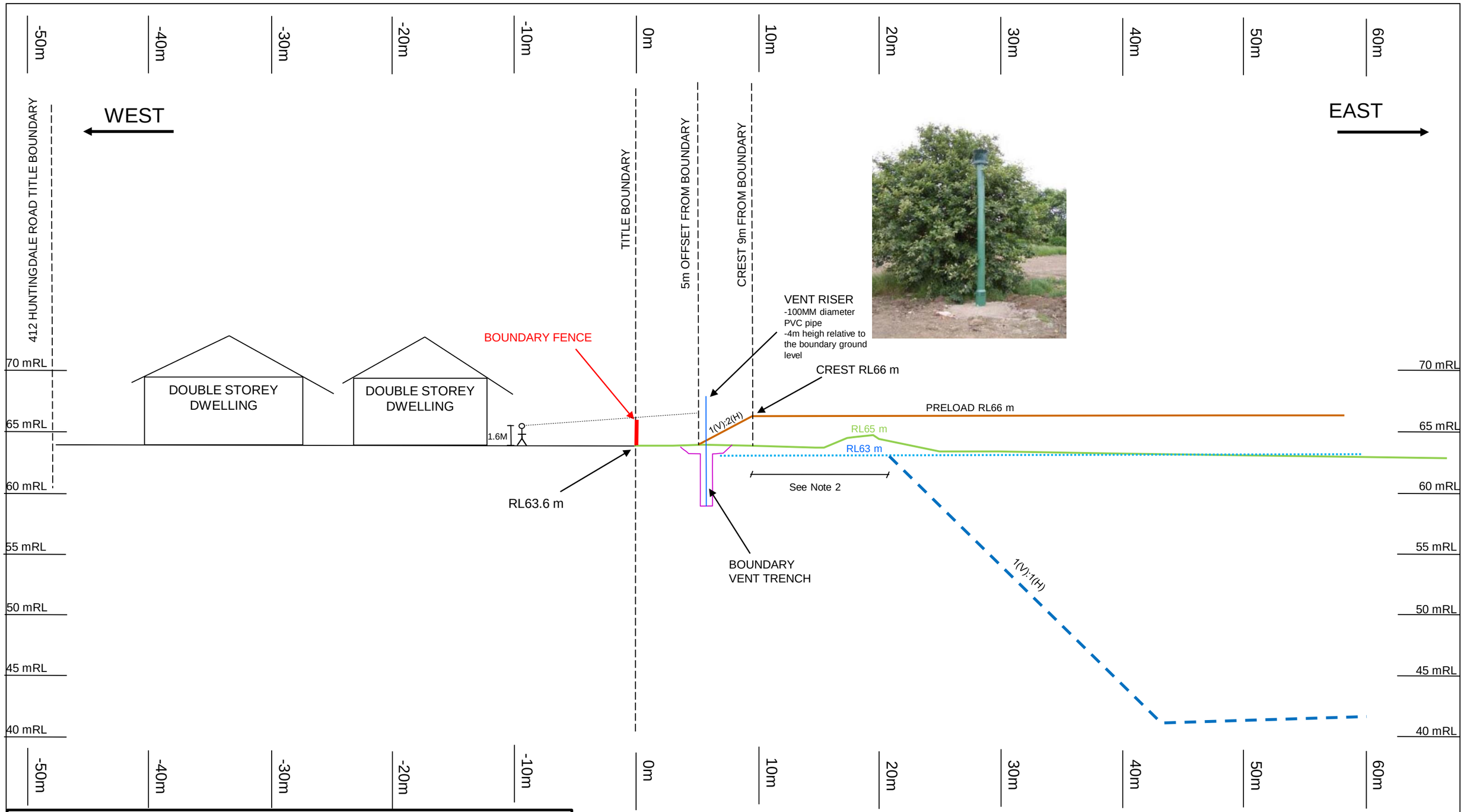
revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:
- FINISHED STOCKPILE LEVELS APPLY TO NEW FILL AND DO NOT APPLY TO EXISTING SITE LEVELS THAT ARE HIGHER
- THE BOUNDARY TRANSITION BATTER SLOPES AT 2H:1V. THE EXTENT OF THE BATTERS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND MAY SUBJECT TO MINOR CHANGES DURING CONSTRUCTION.

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	CROSS SECTIONS LOCALITY PLAN
project no:	GEOTABTF092574AA
figure no:	3



LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

1- Due to the presence of trees, no test pits has been excavated at this location and the quarry pit crest has been inferred from aerial image only Due to the uncertainty, the preload has been further extended toward boundary to ensure the full coverage of the pit edge.

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	CROSS SECTION 412 - HUNTINGDALE RD
project no:	GEOTABTF092574AA
figure no:	4

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

WEST

EAST

414 HUNTINGDALE ROAD TITLE BOUNDARY

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 10m FROM BOUNDARY

VENT RISER
-100MM diameter PVC pipe
-4m heigh relative to the boundary ground level

BOUNDARY FENCE

CREST RL66 m

PRELOAD RL66 m

1(V):2(H)

RL65 m

RL64.5 m

RL63 m

70 mRL

65 mRL

60 mRL

55 mRL

50 mRL

45 mRL

40 mRL

SINGLE STOREY DWELLING

1.6M

SHED

RL63.3 m

BOUNDARY VENT TRENCH

1(V):1(H)

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 414 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 5

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

WEST

EAST

416 HUNTINGDALE ROAD TITLE BOUNDARY

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 8.5m FROM BOUNDARY

VENT RISER
-100MM diameter PVC pipe
-4m heigh relative to the boundary ground level

BOUNDARY FENCE

CREST RL66 m

PRELOAD RL66 m

RL66.5 m

EXISTING SOIL MOUND

RL62.8 m

1(V):2(H)

SINGLE STOREY DWELLING

1.6M

RL61.6 m

BOUNDARY VENT TRENCH

1(V):1(H)

70 mRL
65 mRL
60 mRL
55 mRL
50 mRL
45 mRL
40 mRL

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 416 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 6

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

WEST

EAST

418 HUNTINGDALE ROAD TITLE BOUNDARY

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 12m FROM BOUNDARY

VENT RISER
-100MM diameter PVC pipe
-4m heigh relative to the boundary ground level

CREST RL66 m

BOUNDARY FENCE

SINGLE STOREY DWELLING

1.6M

SHED

1(V):2(H)

PREALOD RL66 m

EXISTING SOIL MOUND

RL62.6 m

RL61.3 m

BOUNDARY VENT TRENCH

1(V):1(H)

70 mRL
65 mRL
60 mRL
55 mRL
50 mRL
45 mRL
40 mRL

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

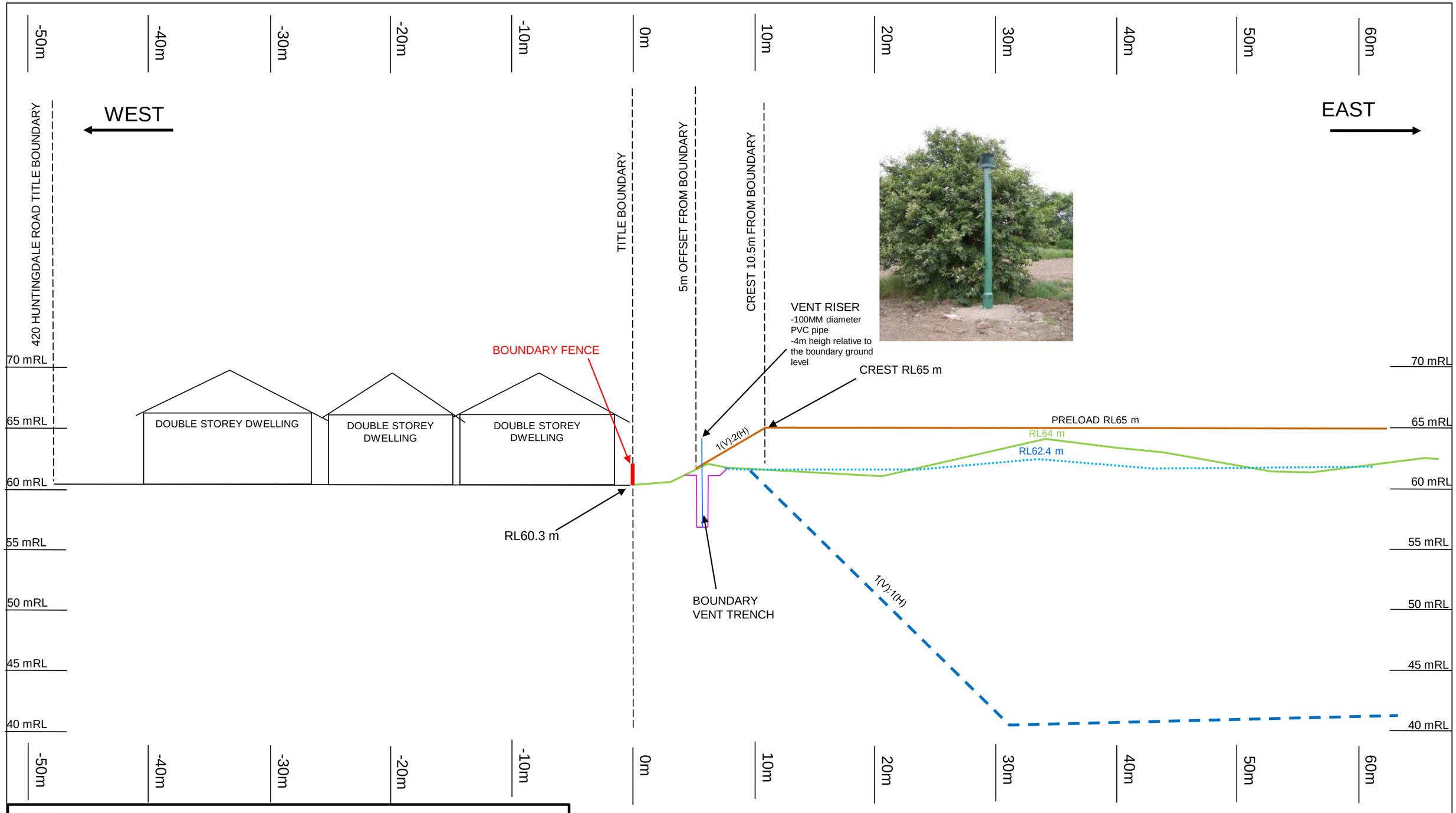
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 418 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 7



LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

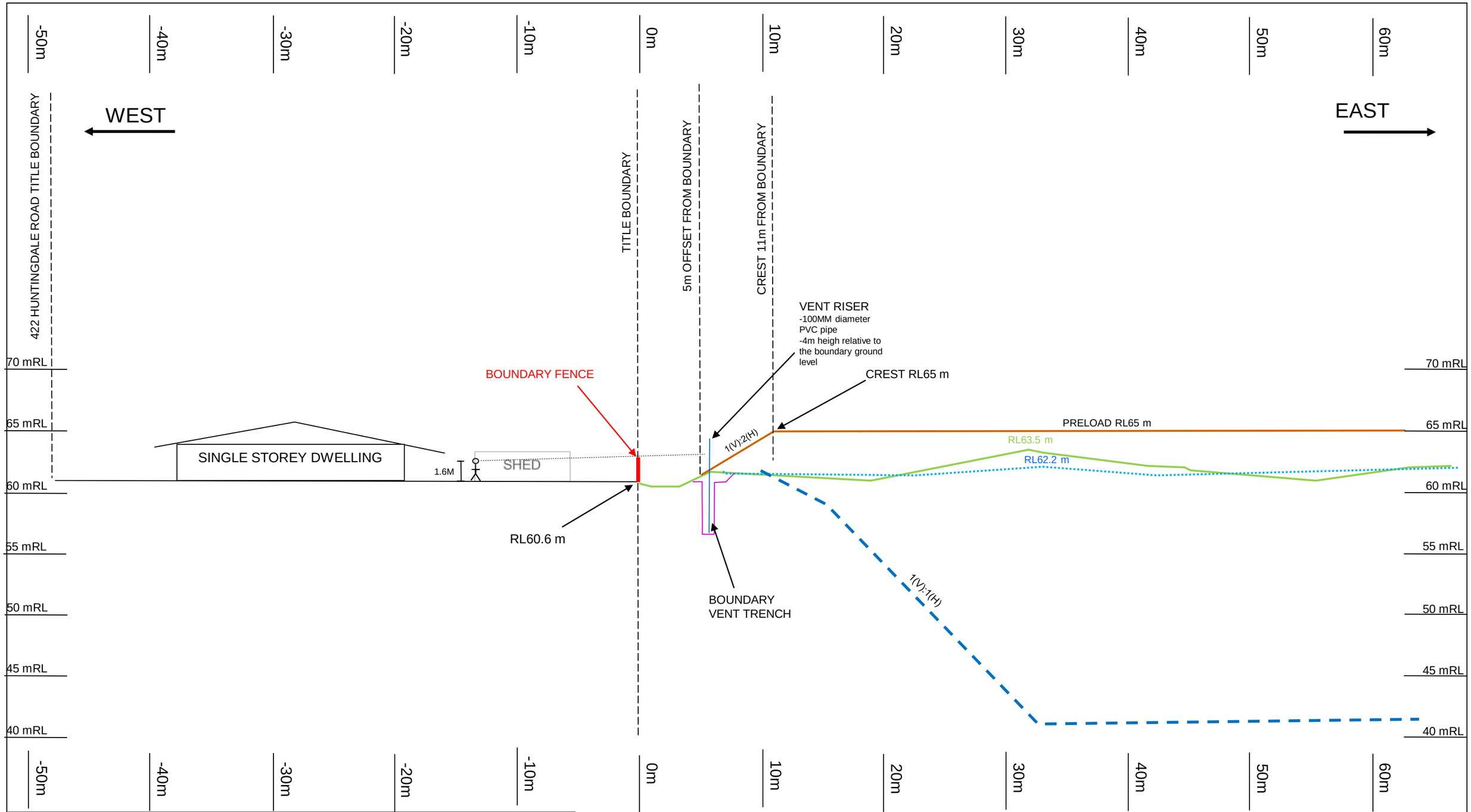
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 420 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 8



LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 422 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 9

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

424 HUNTINGDALE ROAD TITLE BOUNDARY

WEST

EAST

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 11m FROM BOUNDARY

VENT RISER
-100MM diameter PVC pipe
-4m heigh relative to the boundary ground level

CREST RL65 m

BOUNDARY FENCE

70 mRL
65 mRL
60 mRL
55 mRL
50 mRL
45 mRL
40 mRL

SINGLE STOREY DWELLING

1.6M

1(V):2(H)

PRELOAD RL65 m

RL63 m

RL62 m

RL60 m

BOUNDARY VENT TRENCH

1(V):1(H)

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 424 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 10

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

WEST

EAST

426 HUNTINGDALE ROAD TITLE BOUNDARY

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 12m FROM BOUNDARY

VENT RISER
-100MM diameter PVC pipe
-4m heigh relative to the boundary ground level

BOUNDARY FENCE

CREST RL65 m

PRELOAD RL65 m

1(V):2(H)

RL61.8 m

EXISTING SOIL MOUND

RL59.7 m

BOUNDARY VENT TRENCH

1(V):1(H)

DOUBLE STOREY DWELLING

DOUBLE STOREY DWELLING

DOUBLE STOREY DWELLING

70 mRL
65 mRL
60 mRL
55 mRL
50 mRL
45 mRL
40 mRL

-50m -40m -30m -20m -10m 0m 10m 20m 30m 40m 50m 60m

LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	11.10.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

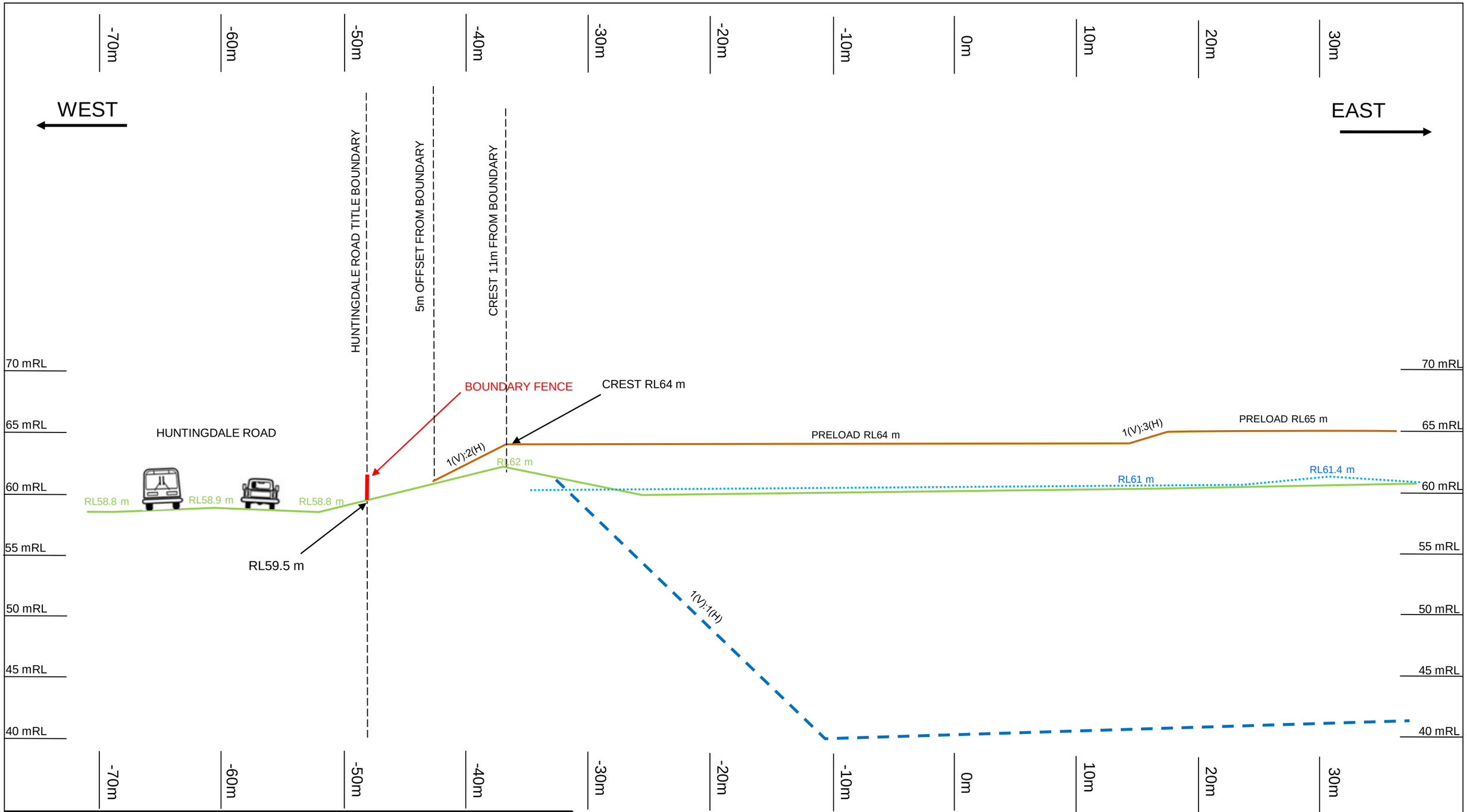
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 426 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 11



LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

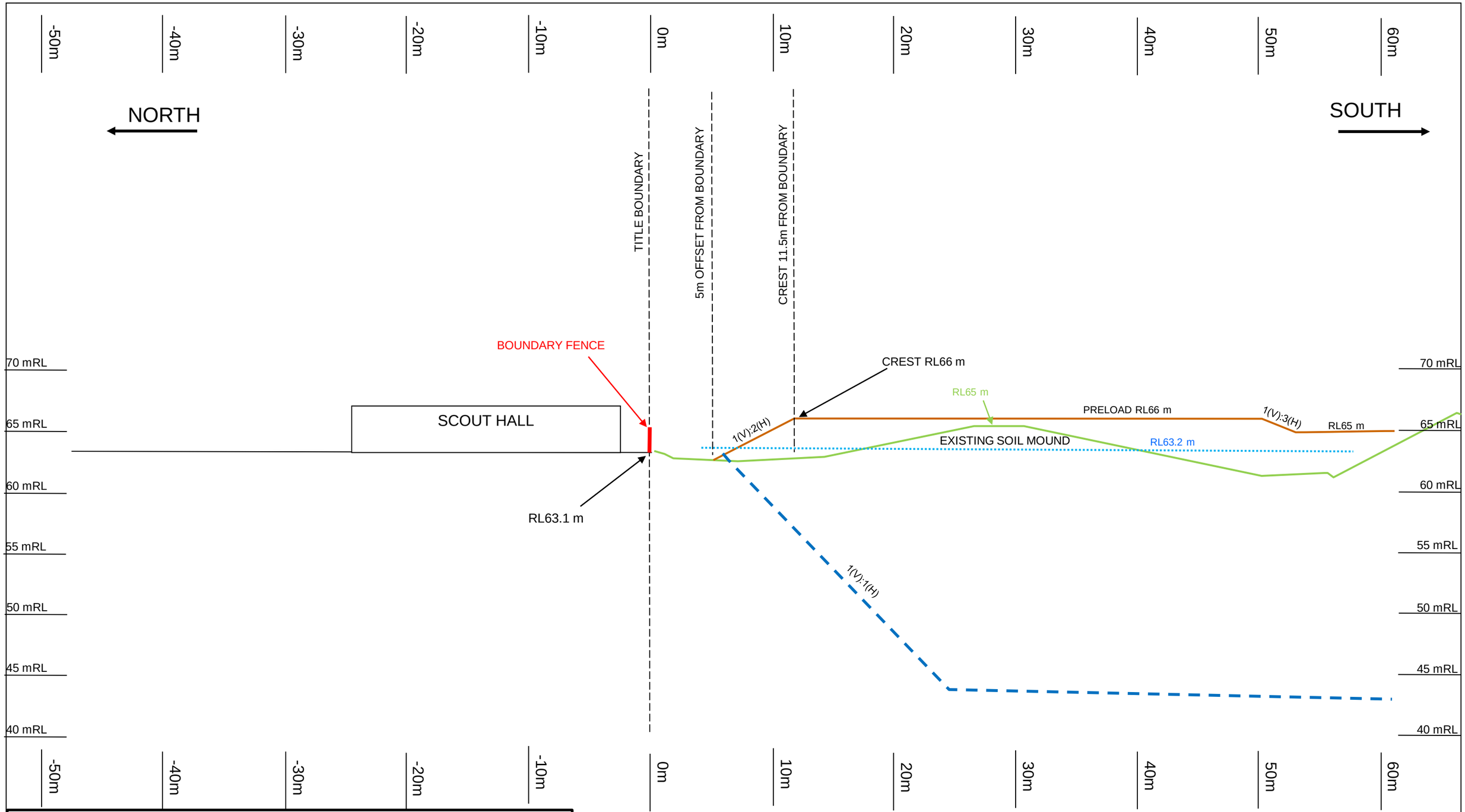
revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21

NOTES:

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	HUNTINGDALE ROAD CROSS SECTION
project no:	GEOTABTF092574AA
figure no:	12



LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21

NOTES:

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SCOUT HALL CROSS SECTION
project no:	GEOTABTF092574AA
figure no:	13

90m 100m 110m 120m 130m 140m 150m 160m 170m 180m 190m 200m

NORTH

SOUTH

424 HUNTINGDALE ROAD TITLE BOUNDARY

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 11m FROM BOUNDARY

VENT RISER
-100MM diameter PVC pipe
-4m heigh relative to the boundary ground level

BOUNDARY FENCE

2/426 HUNTINGDALE ROAD

DOUBLE STOREY DWELLING

DRIVEWAY

CREST RL64 m

PRELOAD RL64 m

1(V):2(H)

RL62.5 m

RL60.1 m

RL59.7 m

BOUNDARY VENT TRENCH

1(V):1(H)

70 mRL
65 mRL
60 mRL
55 mRL
50 mRL
45 mRL
40 mRL

90m 100m 110m 120m 130m 140m 150m 160m 170m 180m 190m 200m

LEGEND

- INFERRED PIT BATTER (APPROX.)
- FINAL SITE LEVEL (APPROX.)
- STOCKPILE FILL LEVEL
- EXISTING GROUND LEVEL

revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

NOTES:

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

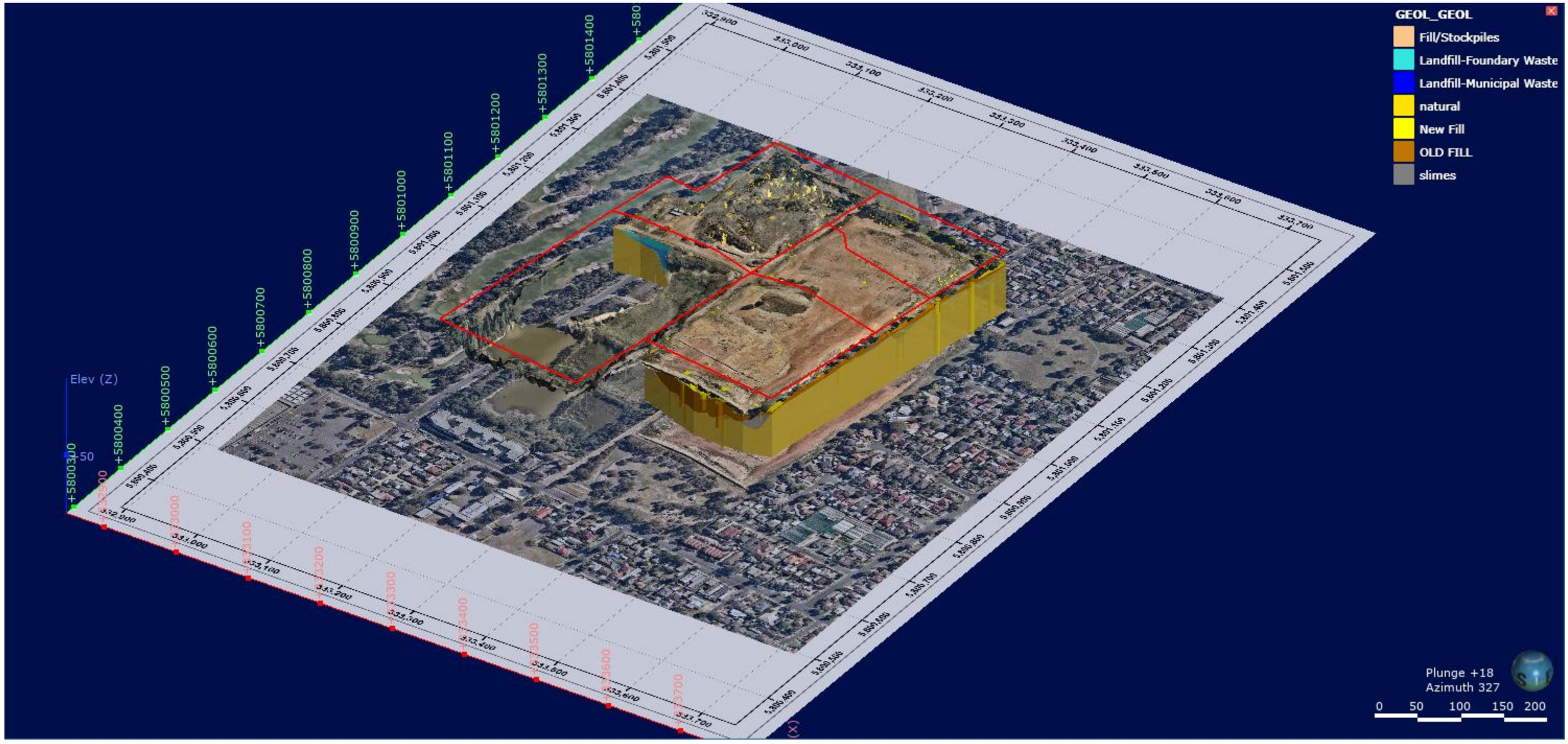
project: TALBOT AVENUE, OAKLEIGH SOUTH

title: 2/426 HUNTINGDALE ROAD CROSS SECTION

project no: GEOTABTF092574AA

figure no: 14

APPENDIX A: 3D LEAPFROG MODEL



revision	description	drawn	approved	date

drawn	FK
approved	IVP
date	26.02.21
scale	AS SHOWN
original size	**A3**

coffey
A TETRA TECH COMPANY

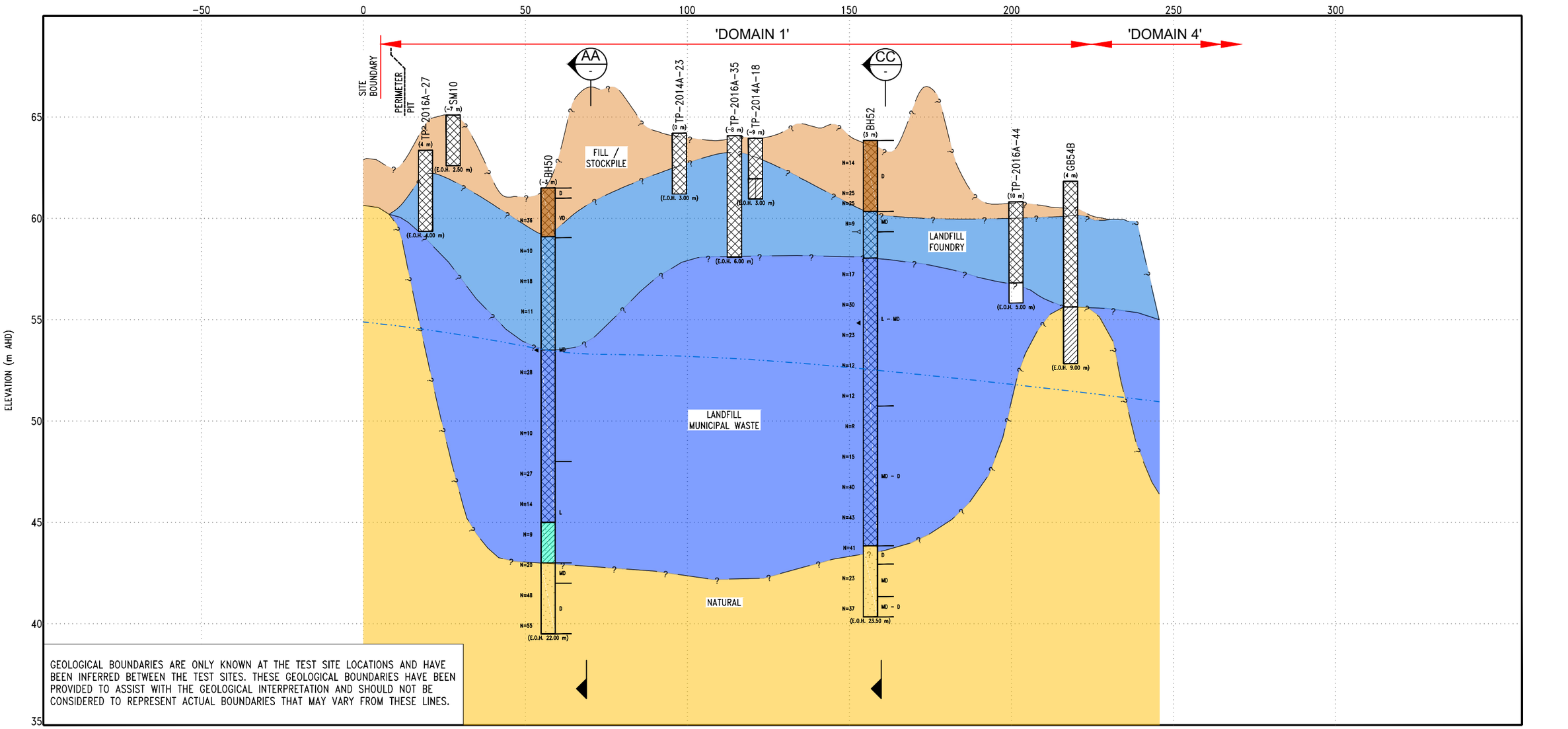
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: 1221-1249 CENTRE ROAD & 22 TALBOT AVENUE OAKLEIGH SOUTH, VICTORIA

title: Leapfrog Model

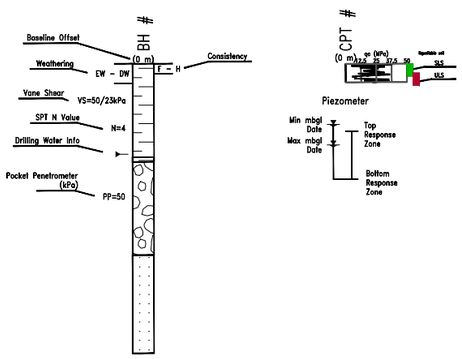
project no: GEOTABTF09257AA

figure no: A1



GEOLOGICAL BOUNDARIES ARE ONLY KNOWN AT THE TEST SITE LOCATIONS AND HAVE BEEN INFERRED BETWEEN THE TEST SITES. THESE GEOLOGICAL BOUNDARIES HAVE BEEN PROVIDED TO ASSIST WITH THE GEOLOGICAL INTERPRETATION AND SHOULD NOT BE CONSIDERED TO REPRESENT ACTUAL BOUNDARIES THAT MAY VARY FROM THESE LINES.

POST LEGEND



MATERIAL GRAPHIC

- FILL
- CLAY
- SANDY CLAY
- SILTY CLAY
- SAND
- SW – Well Graded SAND

NOTES:

1. ELEVATIONS ARE TO AUSTRALIAN HEIGHT DATUM, M AHD
2. COORDINATES ARE TO ZONE 55, GDA94
3. DUE TO THE BOREHOLE OFFSETS, THE LEAPFROG GEOLOGICAL BOUNDARIES SHOWN ON THE SECTIONS DO NOT COMPLETELY MATCH WITH THE BOREHOLE GEOLOGICAL UNITS AT SOME LOCATIONS.
4. THE TOP OF NEW FILL IN ZONES 2, 3 & 5 AND FILL & STOCKPILES IN ZONE 1 IS INFERRED FROM THE APRIL 2019 SURVEY LEVELS PLUS THE SETTLEMENT THAT HAS OCCURRED UNDER THE PRE-LOAD FROM APRIL 2019 TO NOVEMBER 2020.
5. THE TOTAL PRE-LOAD SETTLEMENT THAT HAS OCCURRED FROM MAY 2018 TO NOVEMBER 2020 HAS BEEN APPLIED TO THE TOP OF SLIMES SURFACE.
6. THE TEST LOCATION MARKED WITH AN ASTERISK (*) HAVE BEEN SLIGHTLY RELOCATED ON SECTION DRAWINGS FOR CLARITY.

LEAPFROG LEGEND

- NEW FILL
- FILL / STOCKPILE
- C & D WASTE ?
- OLD FILL
- TRANSITIONAL
- SLIMES
- LANDFILL – FOUNDRY
- NATURAL
- LANDFILL – MUNICIPAL WASTE
- 2020 GROUNDWATER MEASUREMENTS
- ? INFERRED GEOLOGICAL BOUNDARIES (POST SETTLEMENT)
- * RELOCATED TEST LOCATIONS

H 1:1250
0 15 30 45 60 75m
V 1:200
0 2 4 6 8 10m
Coord.System: MGA94 Height Datum: AHD

drawn	M.J.B.
approved	I.V.P.
date	15-06-2021
scale	H 1:1250 V 1:200
original size	A3

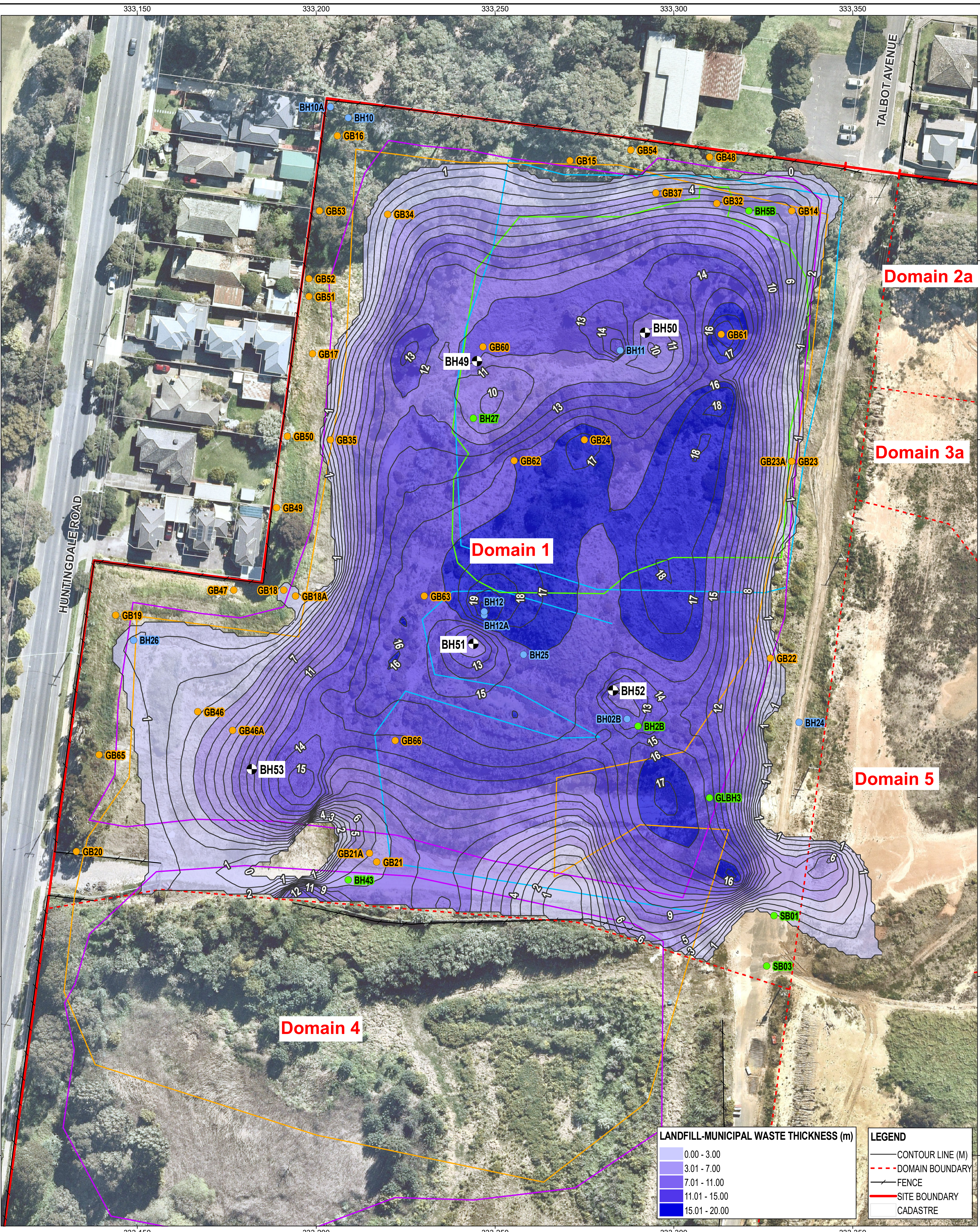
coffey
A TETRA TECH COMPANY

client: HUNTINGDALE ESTATE NOMINEES

project: TALBOT QUARRY
22 TALBOT AVENUE, OAKLEIGH SOUTH

title: SUBSURFACE SECTION LL'

project no: 754-GEOTABTF09257AA | fig no: Figure A2 | rev: 2



no.	description	drawn	approved	date
A	ORIGINAL ISSUE	JS	FK	19.05.21

revision

STAGE 1 INVESTIGATION LOCATION (2019-2020)

BOREHOLE

HISTORICAL INVESTIGATION LOCATION

BOREHOLE
GROUNDWATER BORE
GAS BORE

PIT CREST (YEAR)

1963 1972
1968 1978

IMAGERY SOURCE: Nearmap (06-09-2020)

SCALE 0 10 20 30 40 METRES
1:1,000 (A3)
Projection: GDA 1994 MGA Zone 55

drawn	JS
approved	FK
date	19.05.2021
scale	1:1,000
original size	A3

coffey
A TETRA TECH COMPANY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: GEOTECHNICAL SITE INVESTIGATION
1221-1249 CENTRE ROAD & 22 TALBOT AVENUE
OAKLEIGH SOUTH, VICTORIA

title: MUNICIPAL WASTE THICKNESS CONTOUR PLAN (DOMAIN 1)

project no: GEOTABTF09257AA-DW | figure no: FIGURE A3 | rev: A

MXD Template Reference: 09257AA_DW_GIS022_v0_1

APPENDIX B: DOMAIN 1 PRELIMINARY SETTLEMENT PREDICTIONS

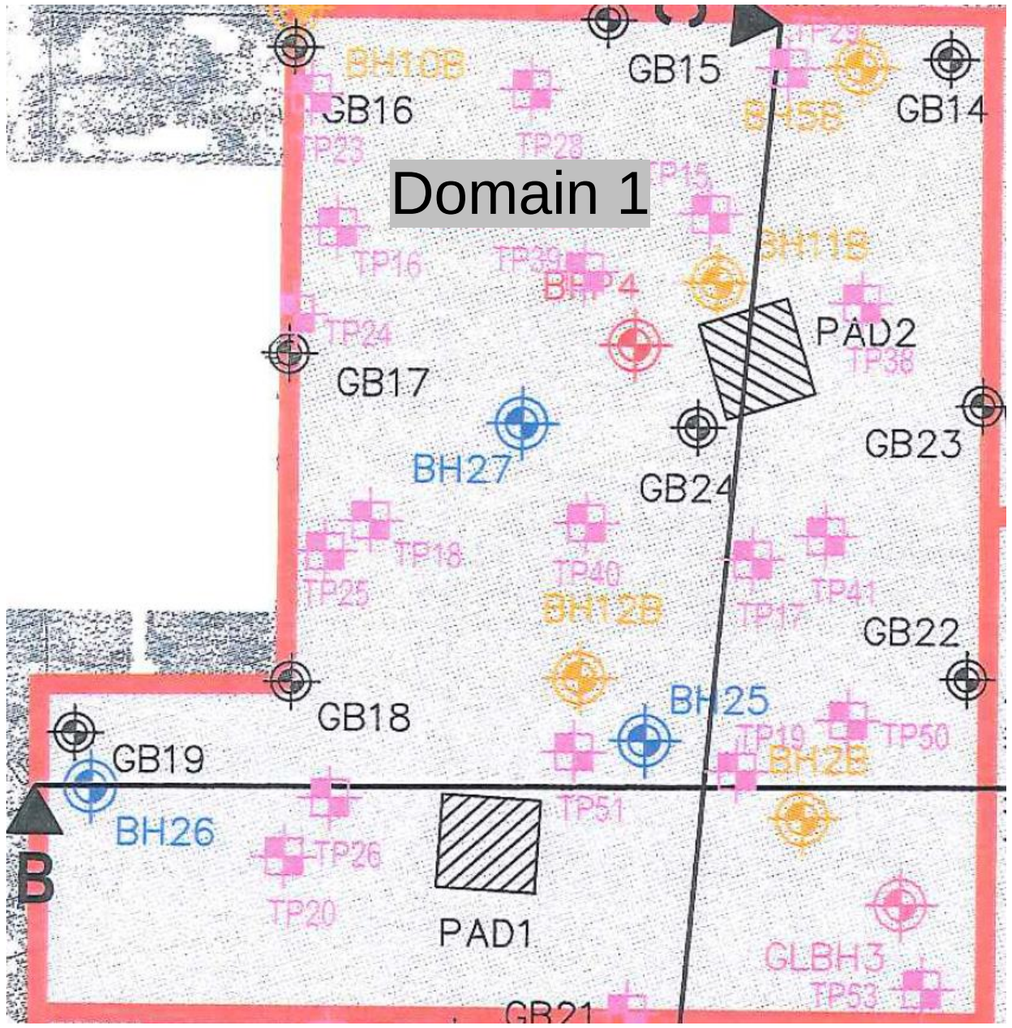
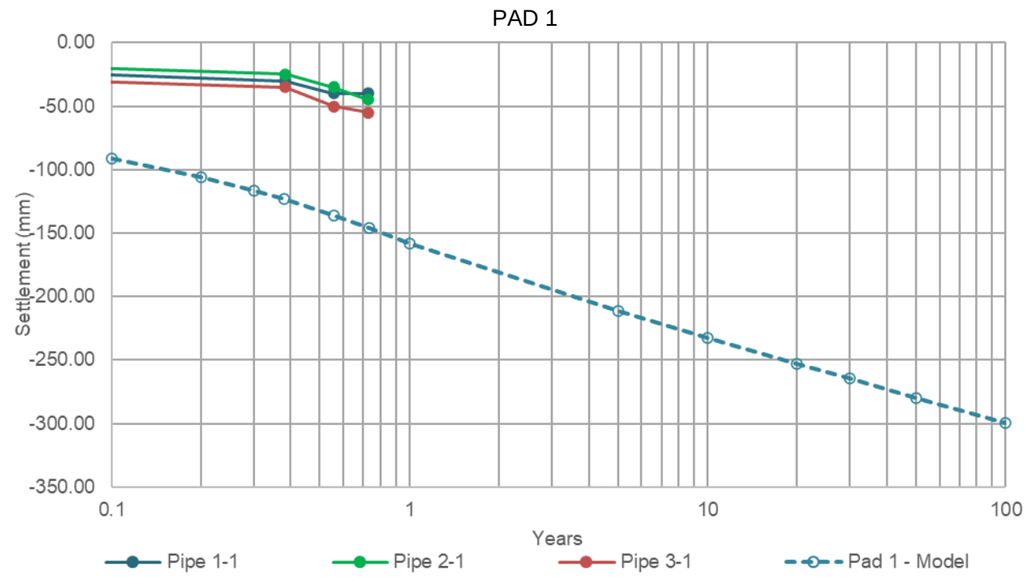
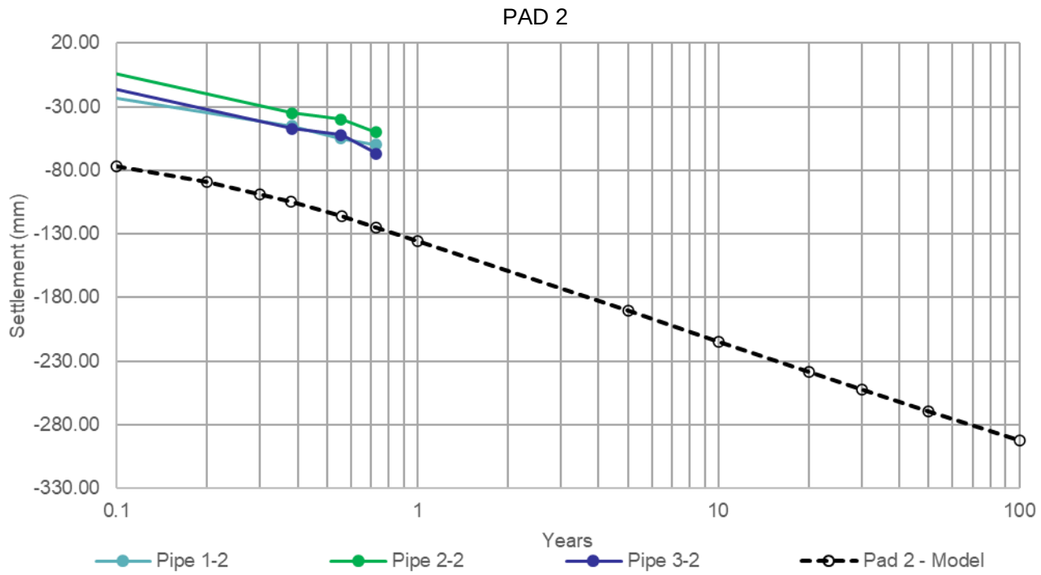


Table 1: Model Parameters

Unit	Unit Weight (kN/m3)	S_u (kPa) [i]	c' (kPa)	ϕ' (°)	E′ (MPa)	Cc [iii]	Cr [iv]	Cα [v]	Cαr [v]	Cv (m2/yr)
Fill / Stockpiles	20	30	4	25	15	0.1	0.01	-	-	10
Landfill - Foundry Sand	20	-	0	36	15	-	-	-	-	-
Landfill - Municipal Waste	20	-	2	34	10	0.4	0.04	0.01	0.005	15

Calibration of model parameters using the results of 2004 trial pads



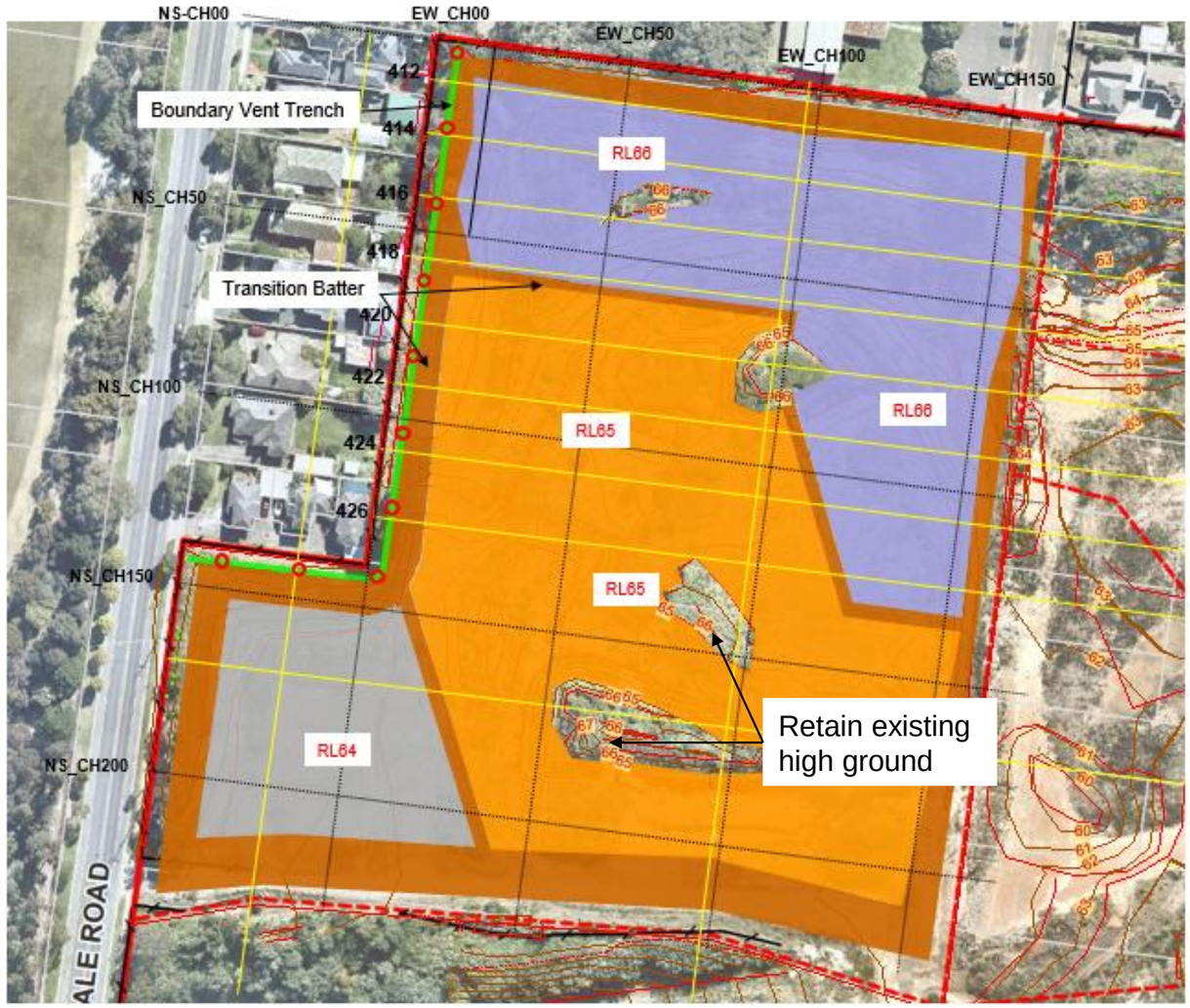


revision	description	drawn	approved	date

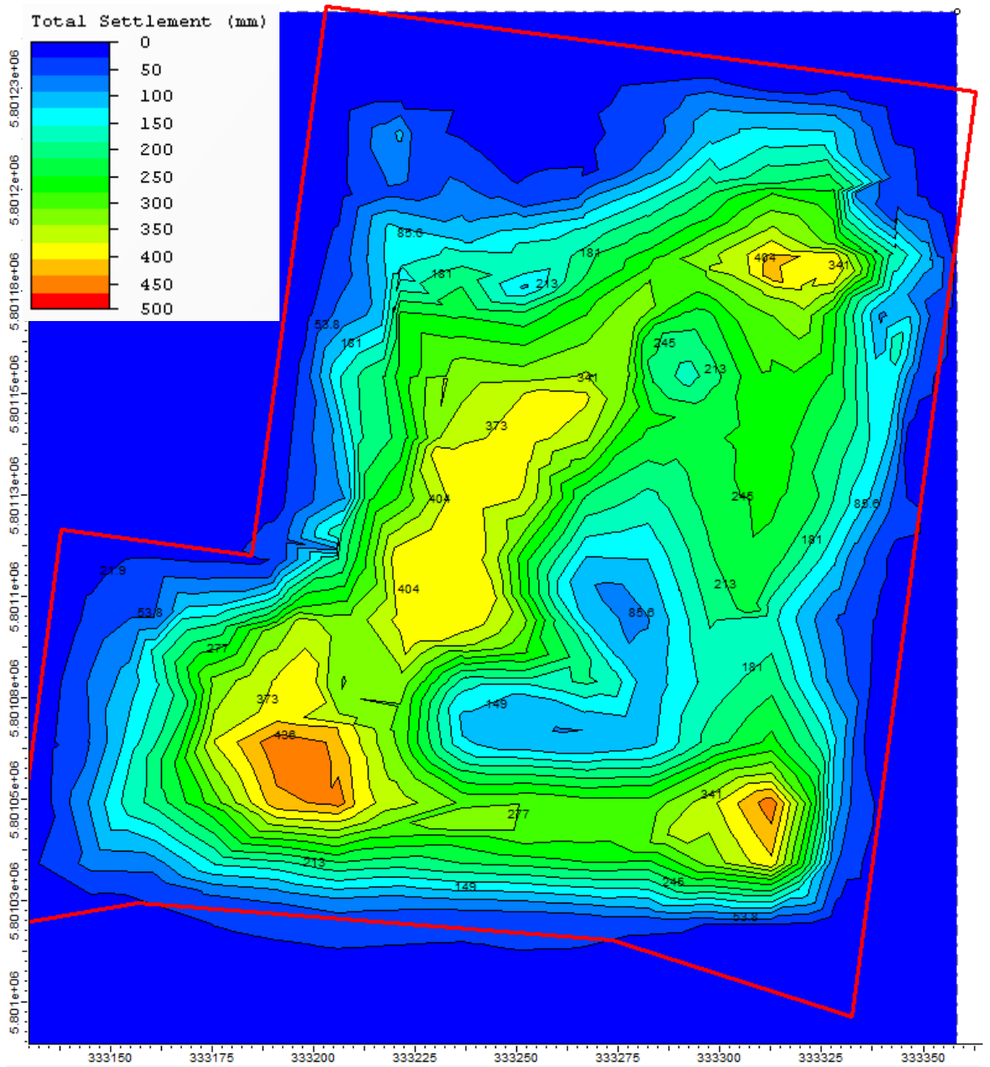
drawn	FK
approved	IP
date	15.09.21
scale	AS SHOWN
original size	**A3**

coffey
A TETRA TECH COMPANY

client:	HUNTINGDALE ESTATE NOMINEES
project:	TALBOT QUARRY 22 TALBOT AVE, OAKLEIGH SOUTH
title:	Model Calibration - Domain 1
project no:	GEOTABTF09257AA
figure no:	B1



A: Domain 1 Preload Design



B: Settlement due to 1.5-year preloading

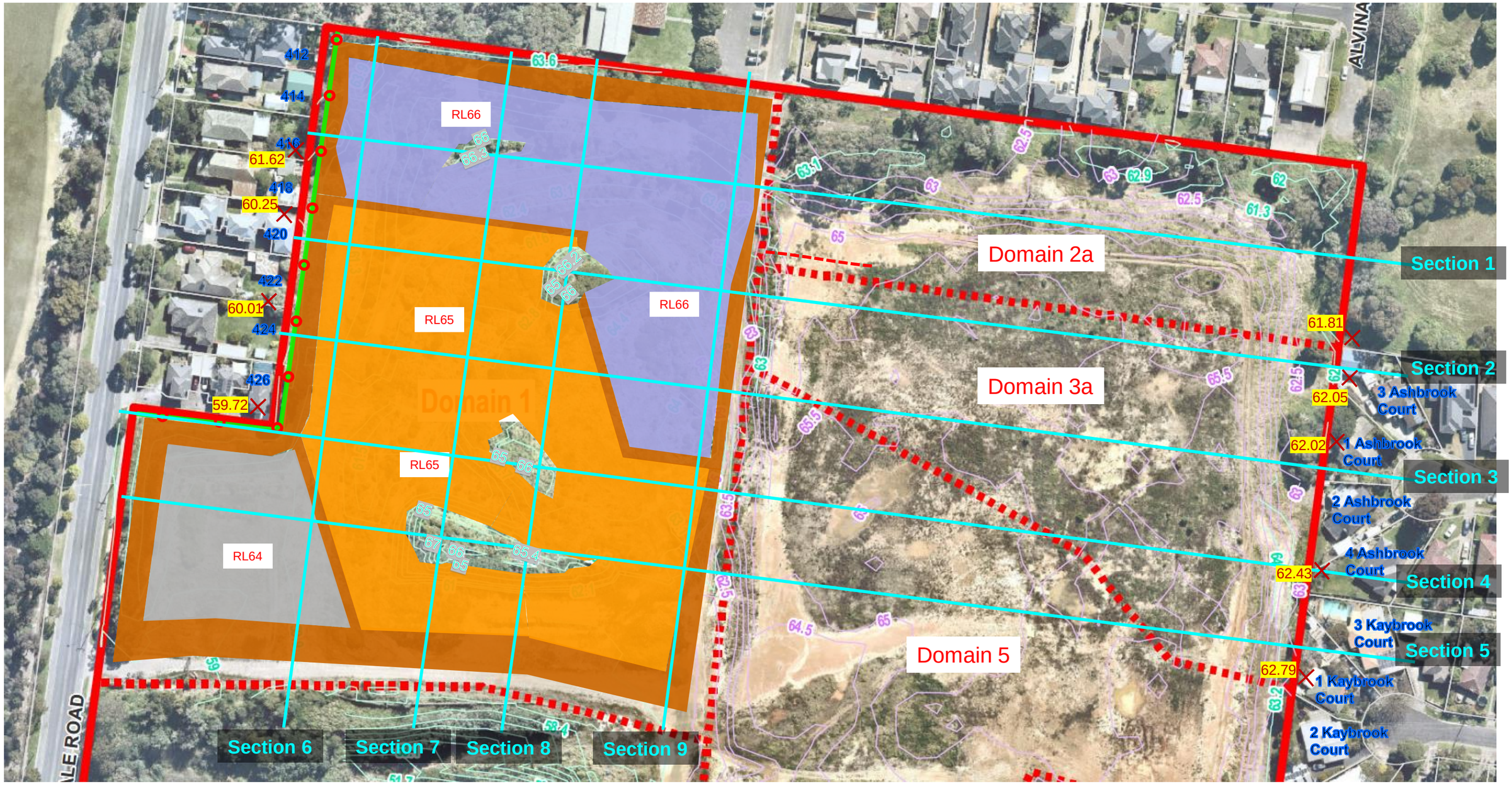
revision	description	drawn	approved	date

drawn	FK
approved	IP
date	15.09.21
scale	AS SHOWN
original size	**A3**

coffey
A TETRA TECH COMPANY

client:	HUNTINGDALE ESTATE NOMINEES
project:	TALBOT QUARRY 22 TALBOT AVE, OAKLEIGH SOUTH
title:	Preliminary Settlement Estimate due to 1.5-year preloading in Domain 1
project no:	GEOTABTF09257AA
figure no:	B2

APPENDIX C: LONG SECTIONS



LEGEND

- EXISTING GROUND CONTOUR DOMAIN 1 (65)
- EXISTING GROUND CONTOUR DOMAINS 2a, 3a and 5 (65)
- TOP OF BANK
- TITLE BOUNDARY
- CHAINAGE
- BOUNDARY LEVELS (59.80)
- DOMAIN BOUNDARY
- CROSS SECTIONS
- RL66 PROPOSED PRELOAD LEVELS
- PRELOAD STOCKPILE AT RL66m
- PRELOAD STOCKPILE AT RL65m
- PRELOAD STOCKPILE AT RL64m
- TRANSITION BATTER
- BOUNDARY VENT TRECH
- VENT RISER LOCATION (AT 20M SPACING WHERE PRELOAD OVERLAPS BOUNDARY VENTING TRENCH)

revision	description	drawn	approved	date
		FK		08.11.21

NOTES:
- FINISHED STOCKPILE LEVELS APPLY TO NEW FILL AND DO NOT APPLY TO EXISTING SITE LEVELS THAT ARE HIGHER
- THE EXTENT OF THE TRANSITION BATTERS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND MAY SUBJECT TO MINOR CHANGES DURING CONSTRUCTION.

drawn	FK
approved	
date	08.11.21
scale	AS SHOWN
original size	**A3**

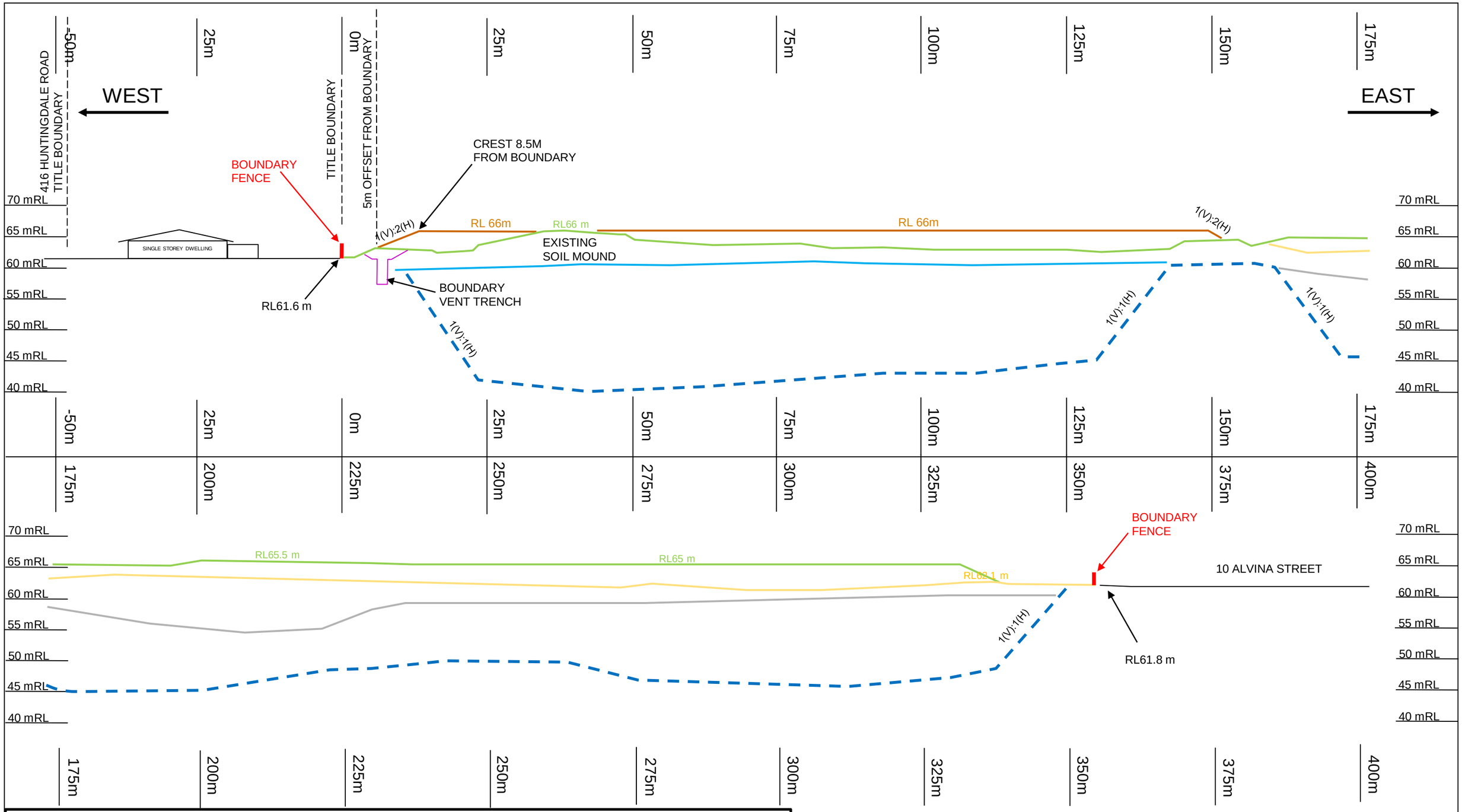
TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTIONS LOCALITY PLAN

project no: GEOTABTF092574AA figure no: C1



LEGEND

- PRELOAD LEVEL
- TOP OF OLD FILL (APPROX.)
- INFERRED PIT BATTER (APPROX.)
- EXISTING GROUND LEVEL
- TOP OF LANDFILL (APPROX.)
- TOP OF SLIMES

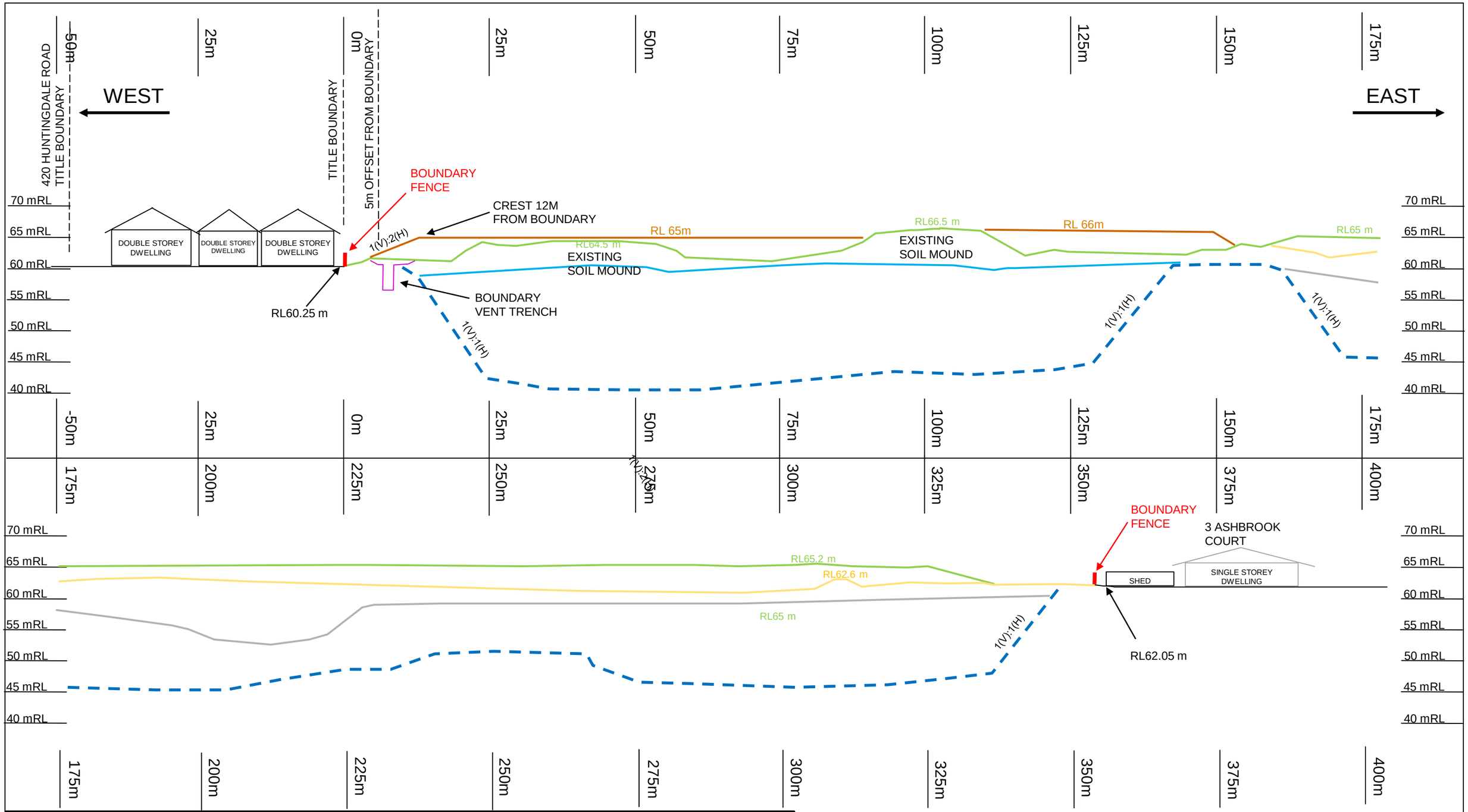
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 1
project no:	GEOTABTF092574AA
figure no:	C2



LEGEND

- PRELOAD LEVEL
- TOP OF OLD FILL (APPROX.)
- INFERRED PIT BATTER (APPROX.)
- EXISTING GROUND LEVEL
- TOP OF LANDFILL (APPROX.)
- TOP OF SLIMES

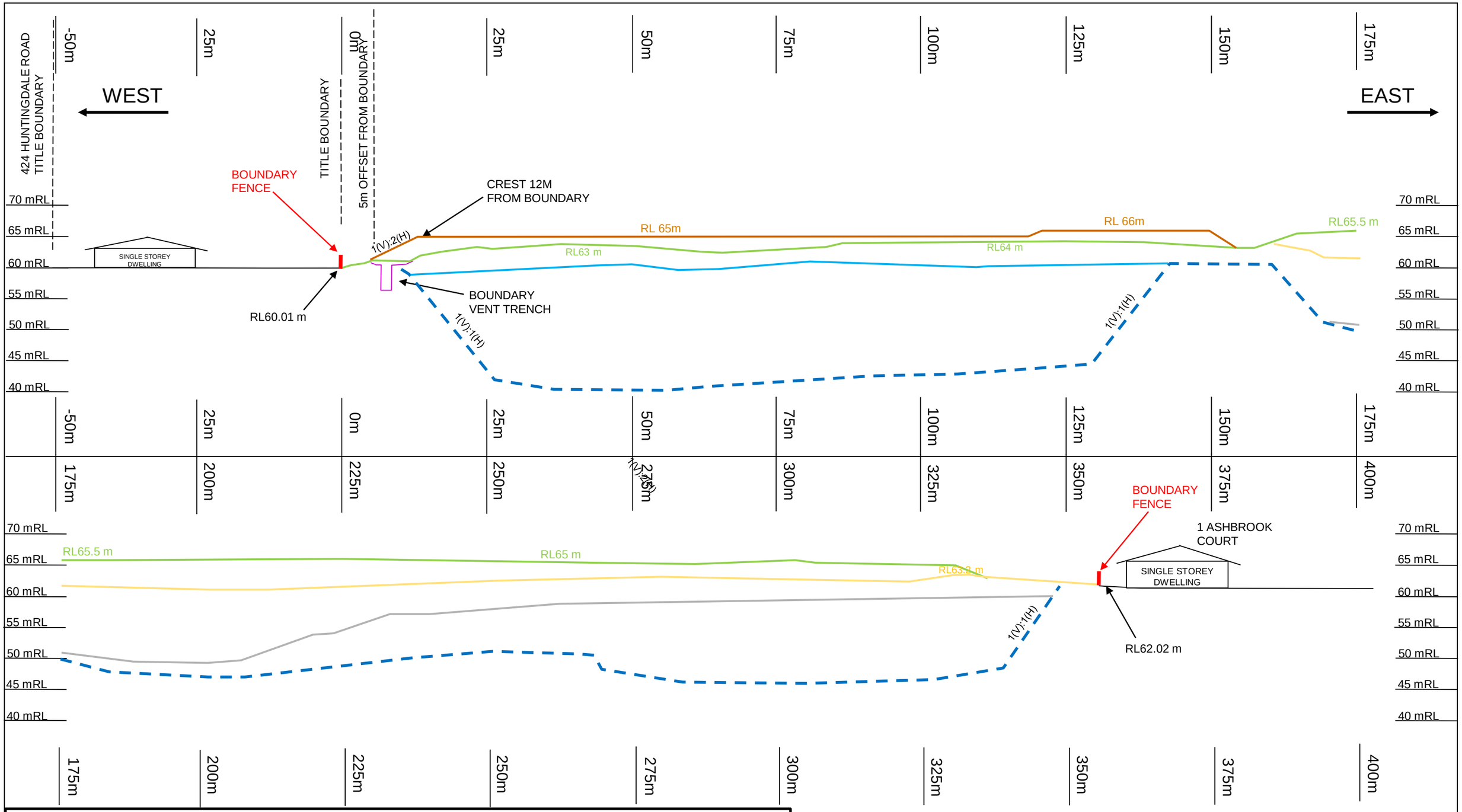
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 2
project no:	GEOTABTF092574AA
figure no:	C3



LEGEND

- PRELOAD LEVEL
- TOP OF OLD FILL (APPROX.)
- INFERRED PIT BATTER (APPROX.)
- EXISTING GROUND LEVEL
- TOP OF LANDFILL (APPROX.)
- TOP OF SLIMES

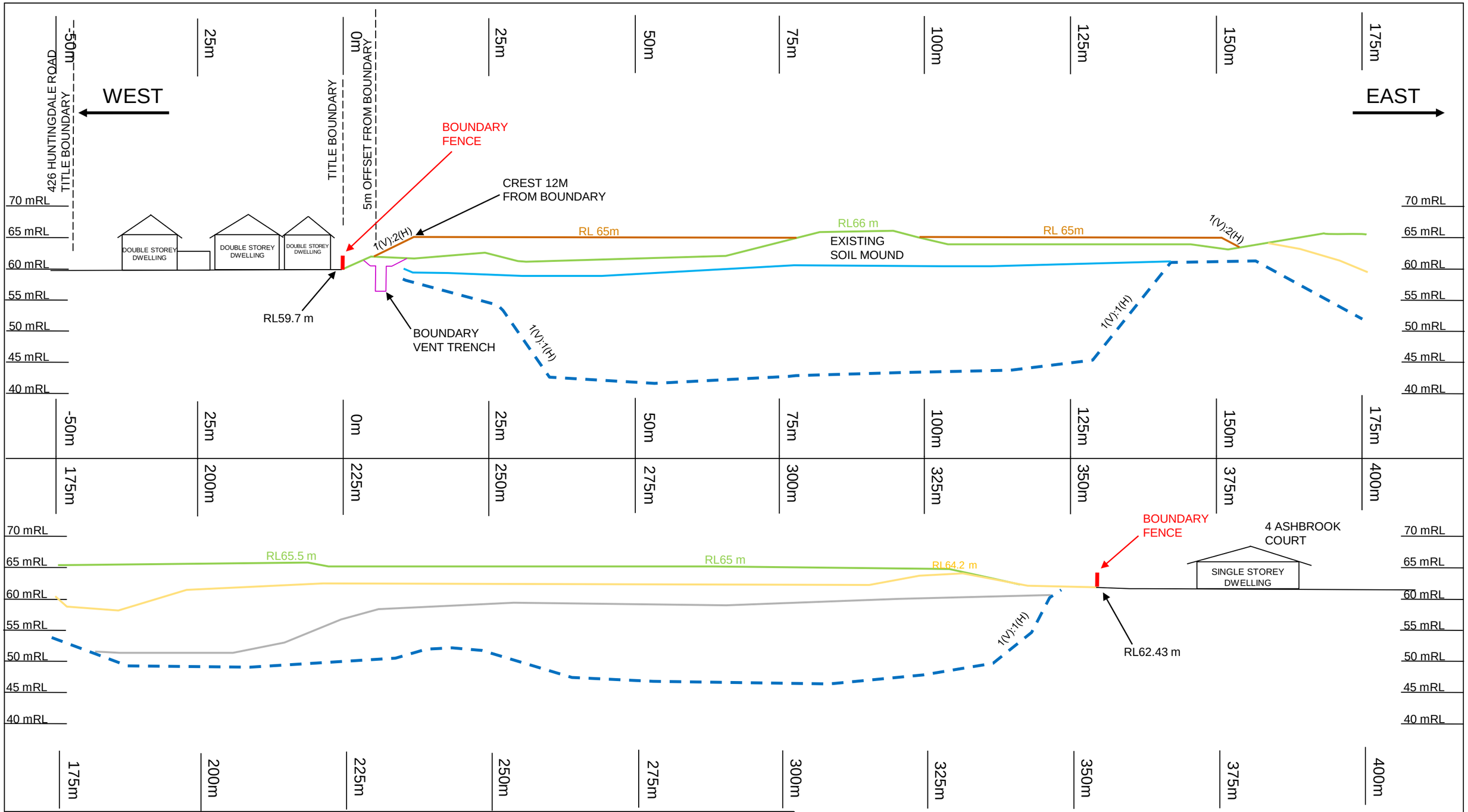
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 3
project no:	GEOTABTF092574AA
figure no:	C4



LEGEND

- PRELOAD LEVEL
- TOP OF OLD FILL (APPROX.)
- INFERRED PIT BATTER (APPROX.)
- EXISTING GROUND LEVEL
- TOP OF LANDFILL (APPROX.)
- TOP OF SLIMES

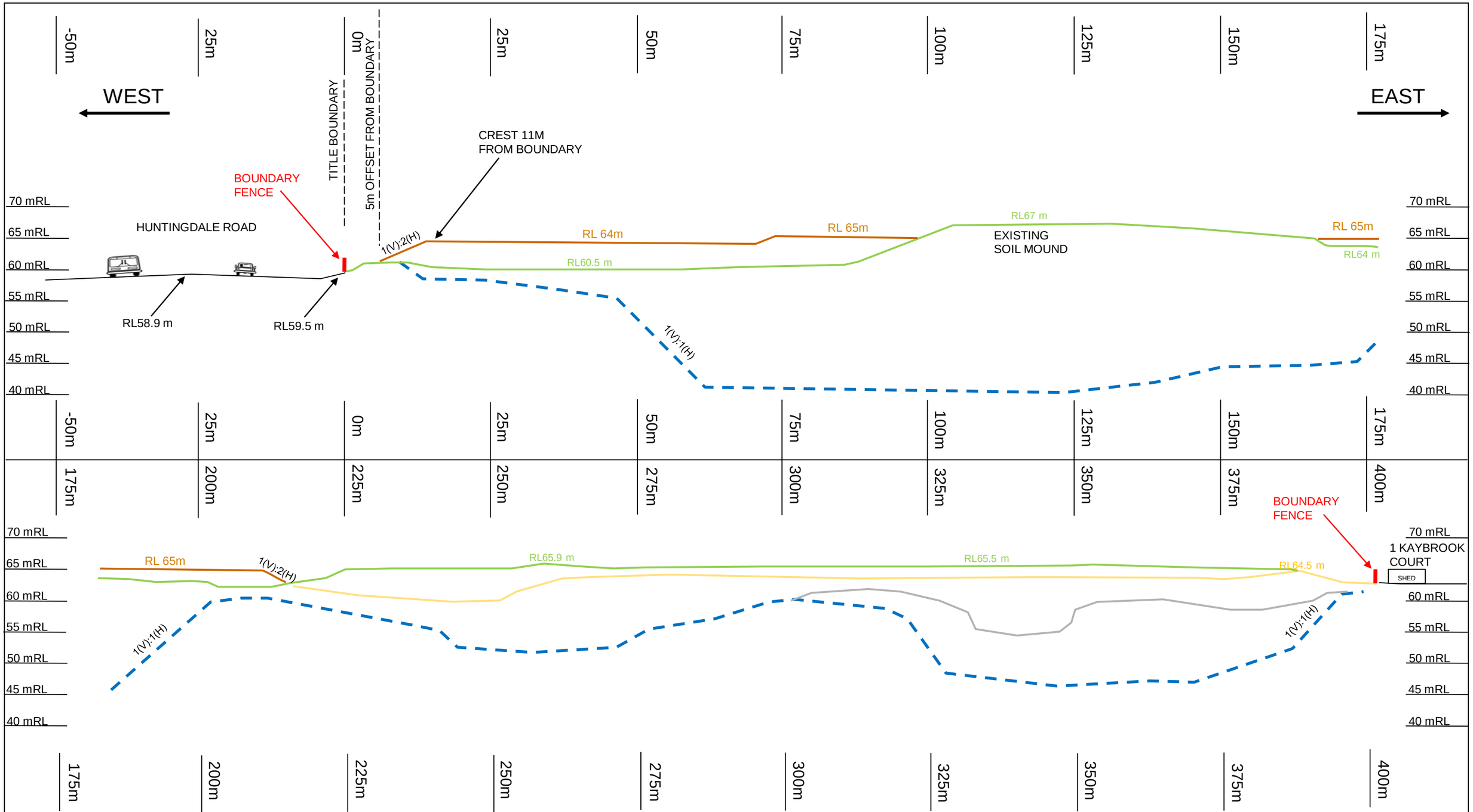
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 4
project no:	GEOTABTF092574AA
figure no:	C5



LEGEND

- PRELOAD LEVEL
- TOP OF OLD FILL
- INFERRED PIT BATTER (APPROX.)
- EXISTING GROUND LEVEL
- TOP OF LANDFILL (APPROX.)
- TOP OF SLIMES

revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

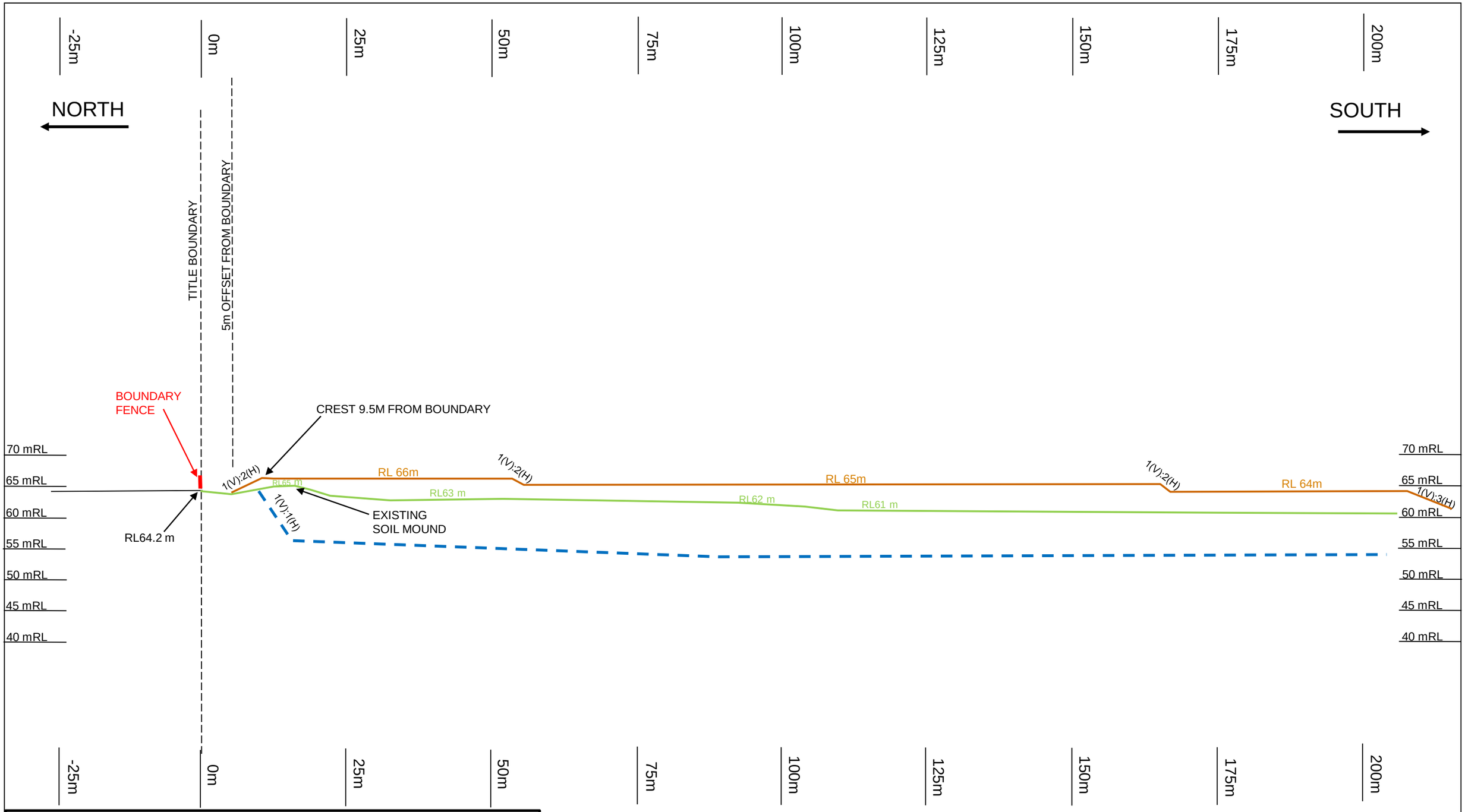
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: SECTION 5

project no: GEOTABTF092574AA

figure no: C6



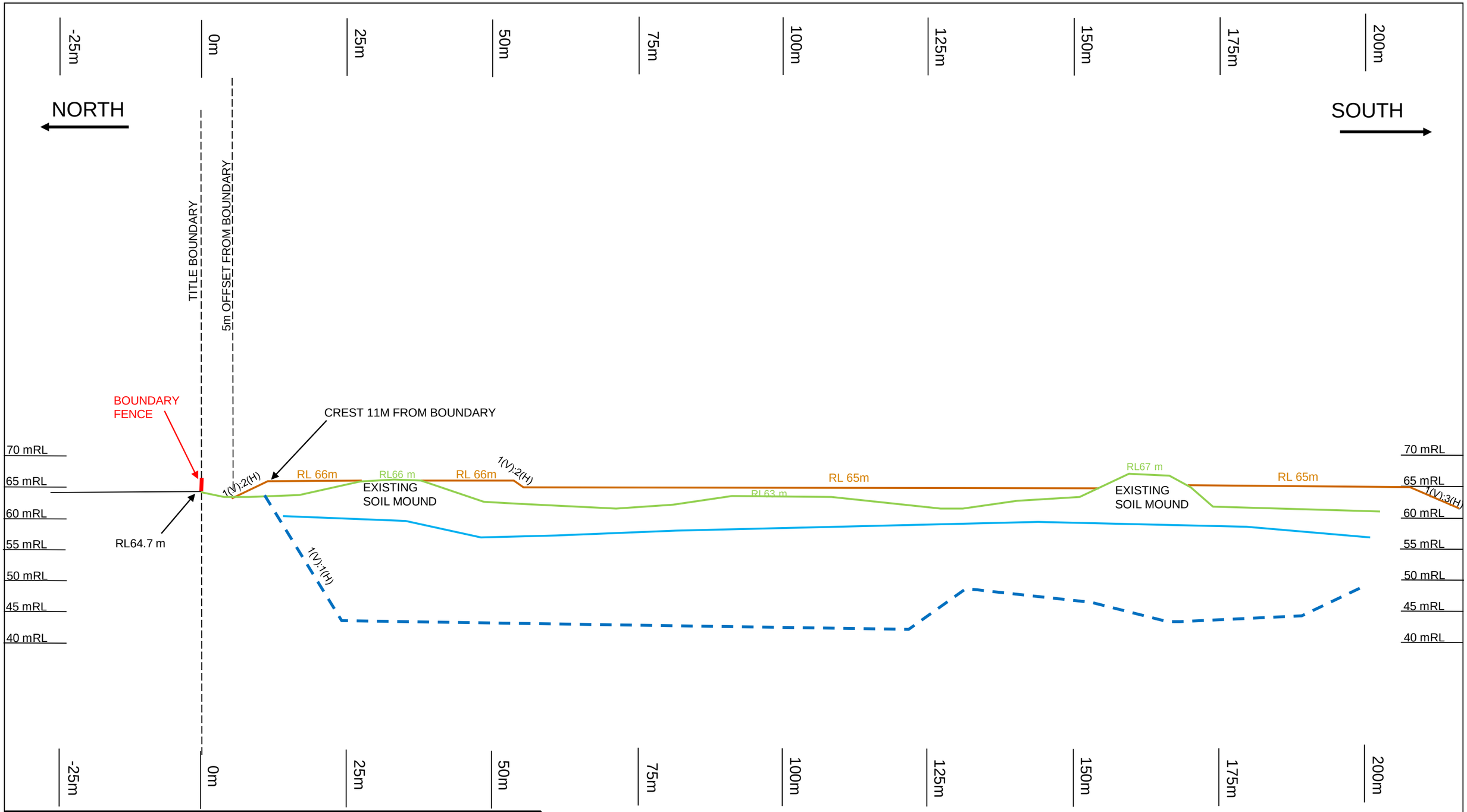
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 6
project no:	GEOTABTF092574AA
figure no:	C7



LEGEND

- PRELOAD LEVEL
- INFERRED PIT BATTER (APPROX.)
- EXISTING GROUND LEVEL
- TOP OF LANDFILL (APPROX.)

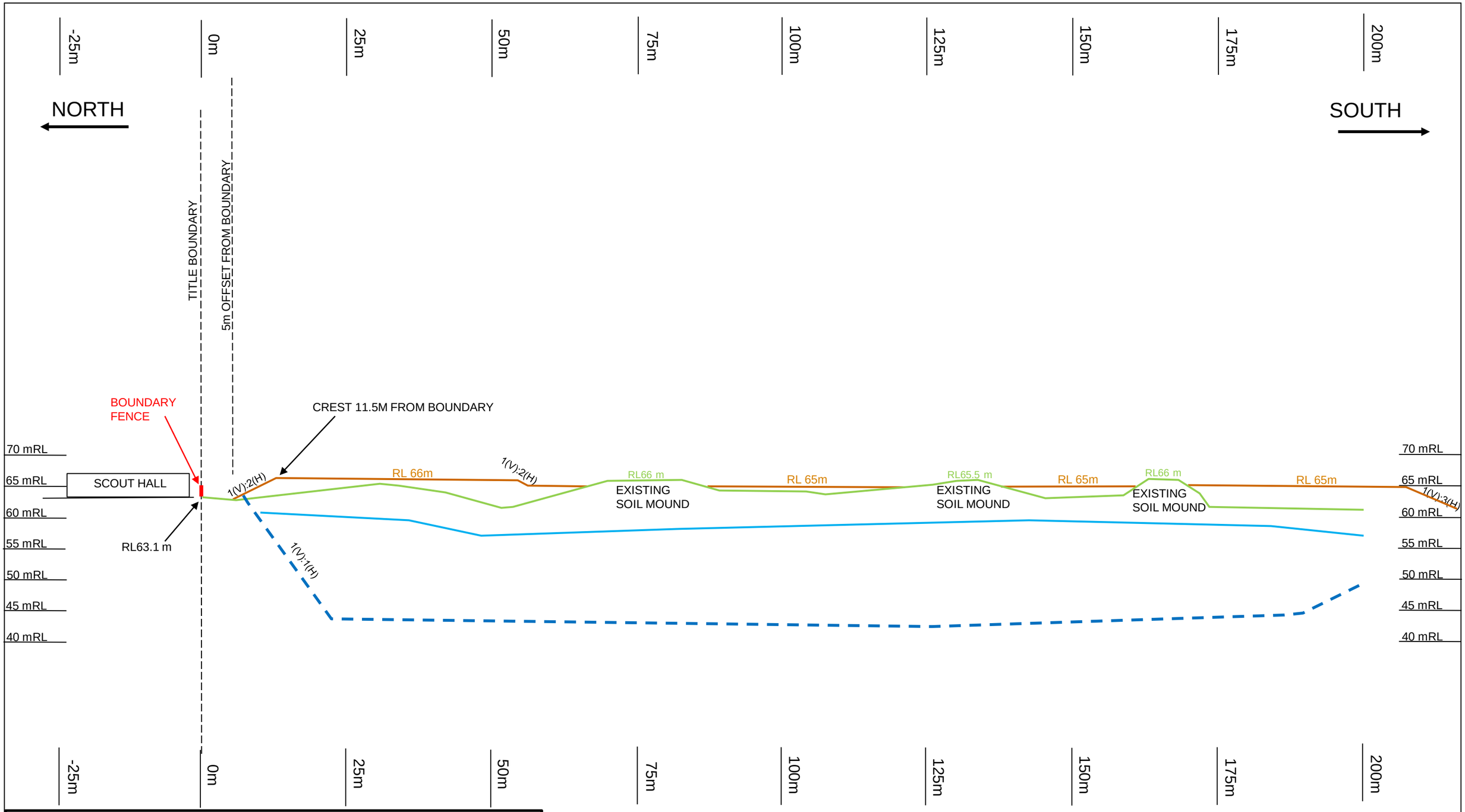
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 7
project no:	GEOTABTF092574AA
figure no:	C8



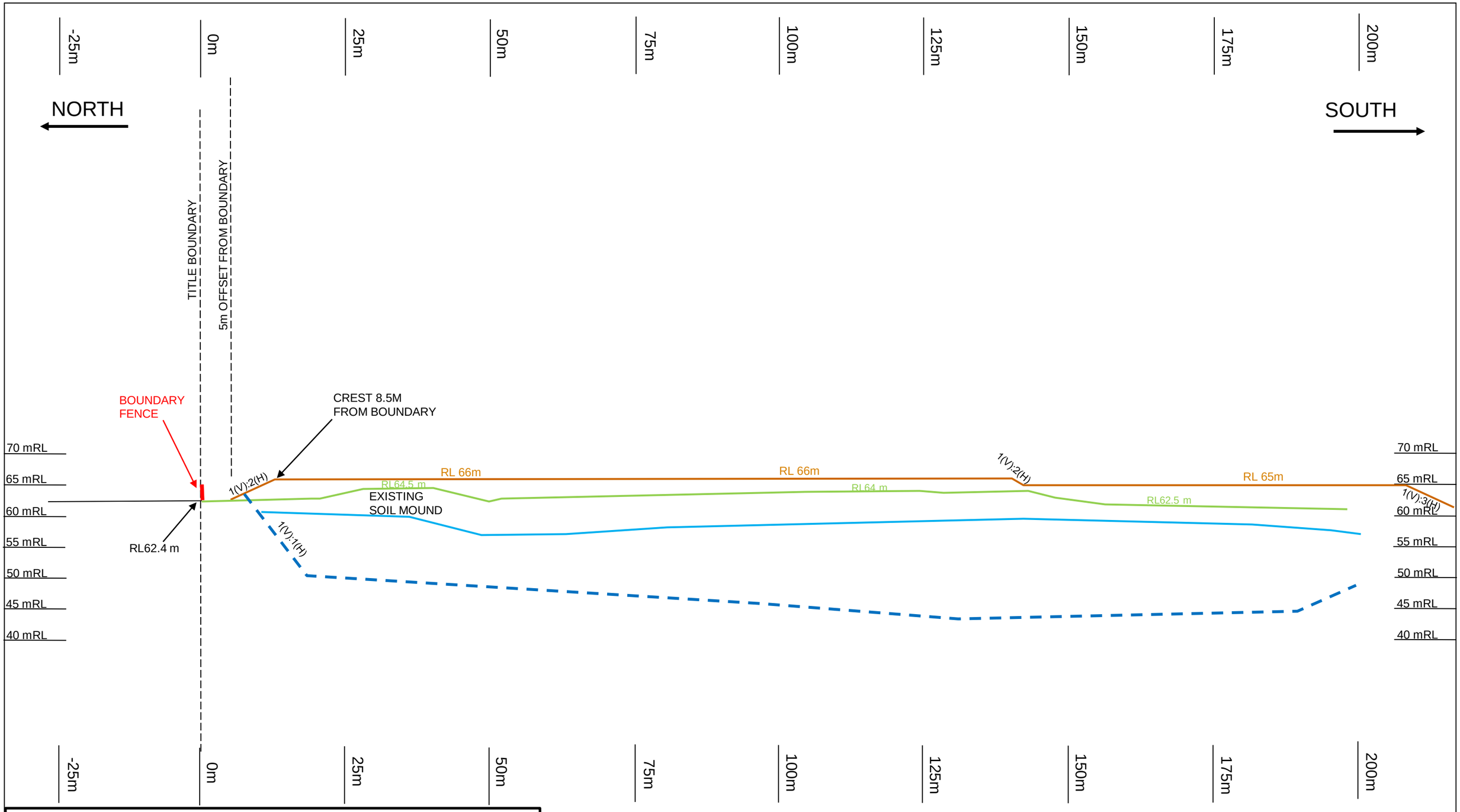
revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:
1- The scale is vertically exaggerated

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 8
project no:	GEOTABTF092574AA
figure no:	C9



revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

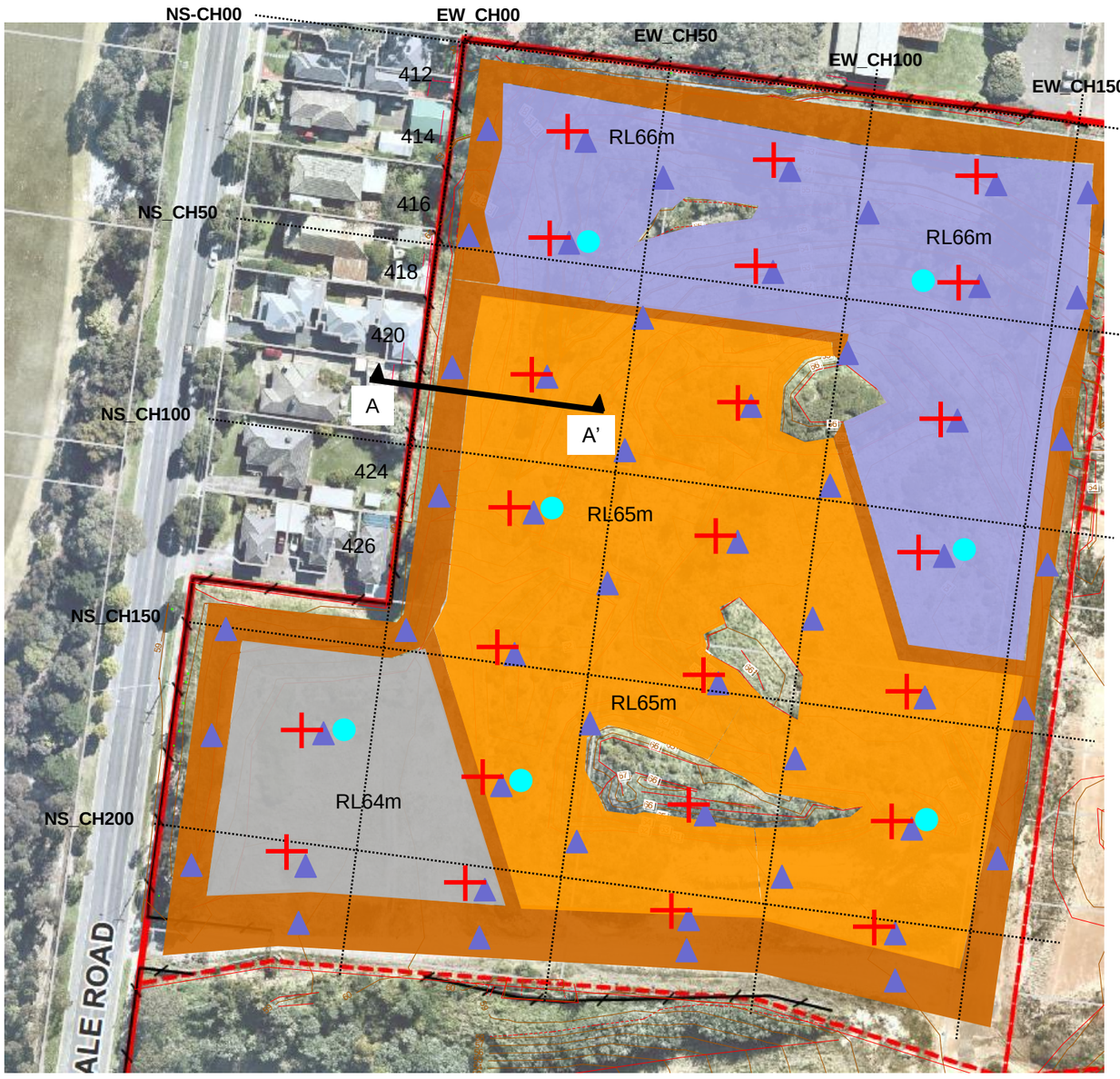
NOTES:
1- The scale is vertically exaggerated

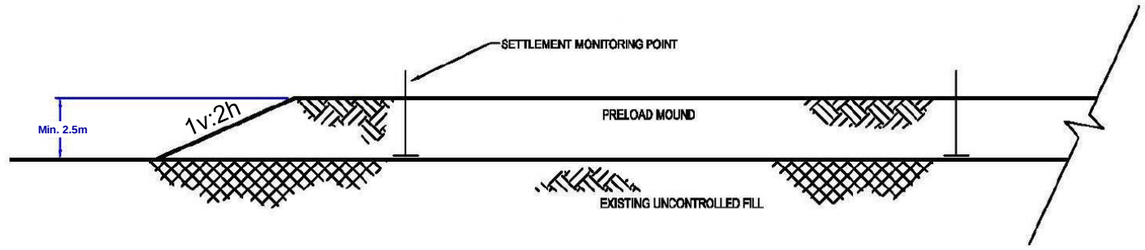
drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client:	HUNTINGDALE ESTATE NOMINEES PTY LTD
project:	TALBOT AVENUE, OAKLEIGH SOUTH
title:	SECTION 9
project no:	GEOTABTF092574AA
figure no:	C10

APPENDIX D: SETTLEMENT PINS AND PLATES LOCALITY PLAN





Section A-A' – Typical Section of Preload Mound

LEGEND

- EXISTING GROUND CONTOUR
- TOP OF BANK
- TITLE BOUNDARY
- CHAINAGE
- ZONE BOUNDARY
- SETTLEMENT PLATES
- SURFACE PINS
- VIBRATING WIRE PIEZOMETER (VWP)
- PRELOAD STOCKPILE AT RL66m
- PRELOAD STOCKPILE AT RL65m
- PRELOAD STOCKPILE AT RL64m
- TRANSITION BATTER 3H:1V

revision

description	drawn	approved	date
DRAFT	FK	IP	23.07.21
DRAFT	FK	IP	07.09.21
V0	FK	IP	21.09.21	

NOTES:

drawn	FK
approved	IP
date	21.09.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: SETTLEMENT PINS AND PLATES LOCALITY PLAN

project no: GEOTABTF092574AA

figure no: D1

APPENDIX E: TREE REMOVAL PLAN

LEGEND

- TITLE BOUNDARY
- CHAINAGE
- DOMAIN BOUNDARY
- SMALL GROUP OF TREE TO BE REMOVED
- TREE TO BE REMOVED

revision	description	drawn	approved	date
	V0	FK	IP	12.11.21

NOTES:

drawn	FK
approved	IP
date	12.11.21
scale	AS SHOWN
original size	**A3**

TETRA TECH COFFEY

client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: TREE REMOVAL PLAN

project no: GEOTABTF092574AA figure no: E1

APPENDIX F: NORTH WALL ZONE 4, ZONE 1 PRELOAD STABILITY ASSESSMENT (REF. GEOTABTF09257AA-CX)

Level 1, 436 Johnston Street
Abbotsford
Vic 3067 Australia

t: +61 3 9290 7000
f: +61 3 9290 7499
coffey.com

26 March 2019

Our ref: GEOTABTF09257AA-CX

Huntingdale Estate Nominees
C/- Sterling Global
Level 50, South Tower,
525 Collins Street
Melbourne VIC 3000

Attention: Simon Hicks

Dear Simon,

North Wall Zone 4, Zone 1 preload stability assessment

1. Introduction

It is understood that as part of the planned Zone 1 preload stockpile Sterling Global wish to extend the preload to the crest of the Zone 4 pit as detailed in Coffey letter reference GEOTABTF0925AA-CQ Rev01. The stability of the north batter of the Zone 4 pit has not previously been assessed and Simon Hicks of Sterling Global has commissioned Coffey to undertake a stability assessment of the batter taking into consideration the proposed preload stockpile.

This letter provides the results of stability analysis performed for the north wall of Zone 4. It assesses the stability under the scenario of constructing a 2m high preload up to the edge of the pit whilst also considering the excavation of the slimes and uncontrolled fill at the base of the pit during backfilling of Zone 4.

2. Site History

The quarry void in Zone 1 was backfilled with land fill in the mid-1970s. The aerial photograph shown in Figure 1 was taken in 1970 during quarrying, it shows that the eastern side of the Zone 1 pit had extended into Zone 4. By 1975 an overlapping pit had been excavated in the northern part of Zone 4, which is shown inundated with water in Figure 2 and the Zone 1 pit had been partially backfilled with municipal landfill waste.

The north wall of the Zone 4 pit has some waste materials including cloth and metal items visible on the batter surface. A number of gas bores and groundwater monitoring wells have been excavated since 2004 in the vicinity of the Zone1 / Zone 4 boundary which are shown in Figure 3 also encountered land fill and foundry sand materials to various depths, but often did not penetrate as far as the natural Brighton Group soils underlying the fill materials in the pit wall which indicates that the bund wall between the Zone 1 and Zone 4 pits evident in the 1975 aerial photograph in Figure 2 was

constructed from landfill materials which were of sufficient strength and impermeable to retain water in the Zone 4 pit.

3. Additional site investigation

To supplement the existing boreholes which have been drilled and logged primarily for environmental purposes, an additional 26m deep geotechnical borehole (BH43) was drilled adjacent to the crest of the Zone 4 north wall at the location shown in Figure 3. The borehole was drilled on the 21 and 22 January 2019 by Matrix Drilling using a Boart Longyear LS250 truck mounted sonic drill rig. The sonic drill rig was selected for this investigation as the drilling method is more likely to penetrate solid wastes that would cause refusal with a conventional auger drill. Standard Penetration Tests (SPTs) were carried out on a 1.5m intervals to provide information on in-situ strength and consistency of the soils. The borehole drilling was supervised by a Coffey Geotechnical Engineer who prepared an engineering borehole log which is attached in Appendix A.

4. Subsurface conditions

The north wall of the pit has some waste materials including cloth and metal items visible on the batter surface. the general soil profile encountered in BH43 and several monitoring wells and gas bores near the crest of the pit is shown in Table 1. The boreholes encountered fill material comprising sands with cobbles of siltstone, metal, glass, PVC, plastic and cloth fragments, down to a depth of 20m below ground level. These observations confirm that the north wall of the Zone 4 pit has been formed in fill materials which were of sufficient strength and impermeable to retain water in the Zone 4 pit.

The results from the standard penetration tests were assessed for relative density as shown in Figure 4. These results were compared with published relationships for relative density and particle size vs friction angle to estimate soil strength.

The adopted material strengths used in the stability assessment for the foundry sands and refuse materials are shown in Appendix B.

5. Stability assessment

The stability of the north wall of the quarry has been assessed using limit equilibrium analysis. The model geometry is based on the section line shown in Figure 3, with subsurface geometry and material properties based on the borehole information shown in Table 1. Four scenarios were assessed:

1. Existing slope geometry and no preload;
2. Existing slope geometry with a 2m high preload stockpile at the crest;
3. Post excavation of slimes or fill, no preload; and
4. Post excavation of slimes or uncontrolled fill, with a 2m high preload stockpile at the crest.

A surcharge simulating a loaded truck on the haul road was applied in all scenarios.

The stability assessment results are shown in Figures B1 to B4 in Appendix B. The results show that for the current batter geometry for scenarios 1 and 2 the Factor of Safety (FOS) is 2.1. For scenario 3, which applies when the slope has been extended during the Zone 4 backfilling, the FOS is 1.3. Scenario 4 includes the preload in the Scenario 3 model, which has no effect on the FOS of 1.3. A FOS of 1.3 is considered acceptable for the temporary case while backfilling is occurring.

Scenario 4 also shows that the FOS of 1.5 extends halfway through the batter of the preload.

Table 1 - Subsurface materials encountered in boreholes near the north wall of the Zone 4 pit

Borehole ID	Depth from and to (m) below surface level	Material Description
BH8	0 – 11.5	Fill: Silty SAND, loose to medium dense, fine to medium grained, black, moist, metal, large sandstone gravel, cloth material
BH30	0 – 11 11-12	Fill: Gravelly SAND; fine to medium grained, black, with plastic and concrete fragments, some metal and cobbles of siltstone Sandy Silty CLAY (Brighton Group); low to medium plasticity, mottled brown/grey/green/orange, wet
BH31	0 – 6 6 – 12	Fill: Gravelly SAND; fine to coarse grained sand, brown-orange, fine to coarse grained gravel, some cobbles, dry to moist, loose, with plastic/PVC/concrete fragments Clayey SAND; fine to medium grained, light brown with grey mottling, moist, medium dense
BH43	1 – 9 9 – 20.5 20.5 – 25.9	SAND; black, fine to coarse grained, trace fine to course gravel (Foundry sand waste) Clayey SAND, Sandy CLAY, CLAY, with plastic, glass, brick, and timber pieces (Refuse landfill) Silty SAND, fine to medium grained, dark grey (Brighton Group)
GB20	0 – 6.5	Clayey SAND and Sandy CLAY
GB21A	0 – 1.5 1.5 – 6	SAND; Black, medium grained, moist, soft, minor gravel fragments. FILL; Silty SAND fine grained sand, black, some foundry waste with sand castings, loose.
GB54B	0 – 6 6 – 8.5	Gravelly SAND; fine to medium grained, light brown to black, medium to coarse grained gravel, some cobbles, dry, medium dense. Sandy CLAY; medium plasticity, green/brown, dry to moist, firm.
GB56	0 – 5 5 – 7	Fill: Gravelly SAND; fine to medium grained, dark brown/black, some cobbles, with some plastic and metal pieces Silty SAND; fine to medium grained, black, dry to moist

6. Preload Design

The stability assessment described above indicates the preload may be constructed to the southern side of the existing gravel track with a 3H:1V batter slope with a FOS of 1.3. The edge of the existing track varies between 3m and 5.7m from the crest of the north wall of the pit. We recommend that the track be modified to maintain a 4m exclusion zone in accordance with the backfill design report (GEOTABTF09257AA-AQ-Rev11).

It should be noted that construction of the preload to the southern side of the existing gravel track will required the construction of a new access road to the north over the preload. As per the Zone 4 backfill design report prior to earth works occurring between the pit crest and the haul road, the Contractor will need to prepare a risk assessment and work plan that takes into account working near the crest of the pit.

Regards,

Matthew Farrington
Associate Engineering Geologist

Attachments:

About your Coffey Report

Figures

Appendix A – Borehole engineering log

Appendix B – Slide model results

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Figure 1 - Aerial photograph of Zone 1 from October 1970

Figure 2 – Aerial photograph from December 1975

Figure 3 - Zone 1 proposed preload extending to the crest of the Zone 4 north batter

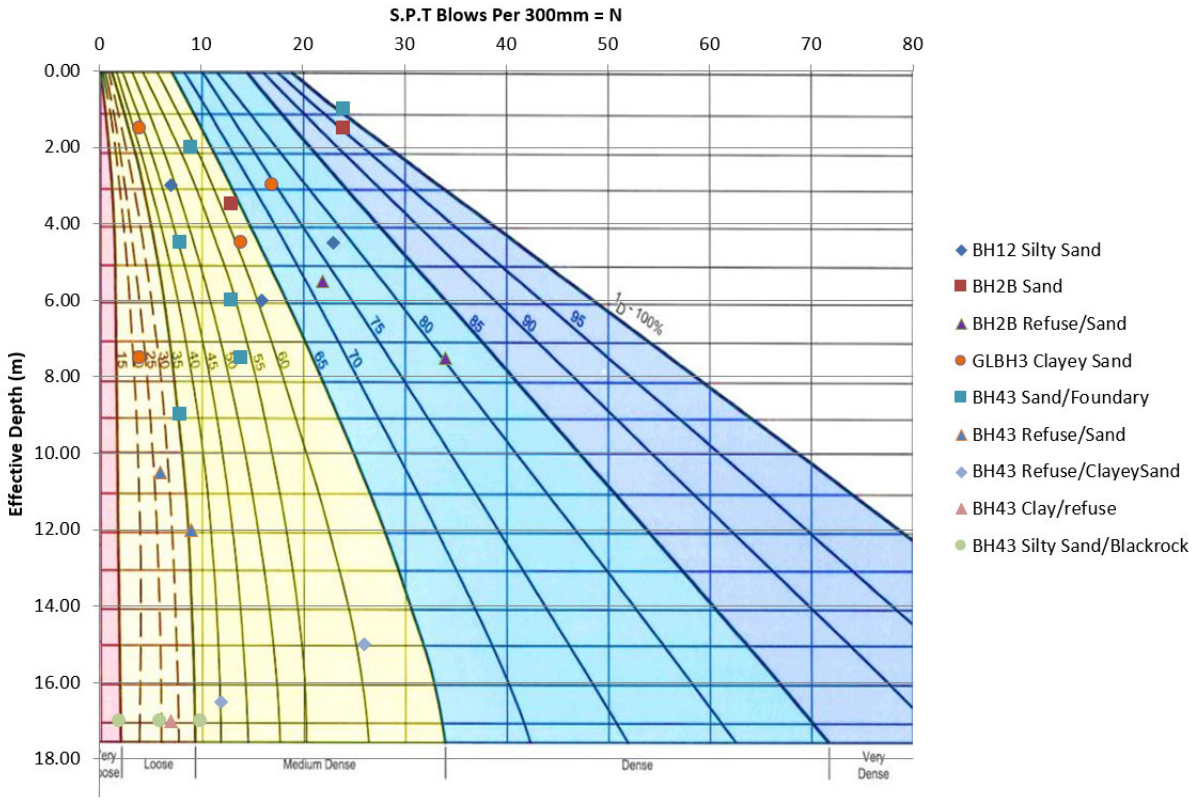


Figure 4 - Standard Penetration Test (SPT) results

Appendix A – Borehole engineering log

Soil Description Explanation Sheet (1 of 2)

DEFINITION:
In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry	Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.
Moist	Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 – 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 – 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 – 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 – 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 – 35
Medium Dense	35 – 65
Dense	65 – 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man-made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES USC (Excluding particles larger than 60 mm and basing fractions on estimated mass)						USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes		GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.		GP	GRAVEL
			GRAVELS WITH FINES Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)		GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)		GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes		SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).		SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm				
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**		
			None to Low	Quick to slow	None	ML	SILT
			Medium to High	None	Medium	CL	CLAY
			Low to medium	Slow to very slow	Low	CL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium	MH	SILT
			High	None	High	CH	CLAY
			Medium to High	None	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			PT	PEAT

● Low plasticity – Liquid Limit w_L less than 35%. ● Medium plasticity – w_L between 35% and 50%. ● High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter.	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Engineering Log - Borehole

Borehole ID.	**BH43**
sheet:	1 of 4
project no.	**754-GEOTABTF09257A**
client:	***Huntingdale Estate Nominees***
date started:	***21 Jan 2019***
principal:	
date completed:	***22 Jan 2019***
project:	***Talbot Quarry Regen - Zone 4 Northwall Assessment***
logged by:	***EY***
location:	***Huntingdale Road, Oakleigh South***
checked by:	***MF***

position: E: 333209; N: 5801027 (WGS84) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Boartlongyear LS250, Track mounted | drilling fluid: | hole diameter : 100 mm

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	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
SD, C		Not Observable					GC	**FILL: CLAYEY GRAVEL**: fine to coarse grained, angular to sub-angular, brown, with fine to coarse grained sand.	M - D	VD		**FILL**
							SC	becoming grey, low plasticity clay	M			
							SP	**FILL: CLAYEY SAND**: fine to coarse grained, orange-brown, low to medium plasticity clay, trace fine to coarse grained gravel.				
			SPT 3, 20, 14 N*=34		1.0			**FILL: SAND**: fine to coarse grained, dark grey, black, trace fine to coarse grained gravel.				
								becoming dark grey-black		MD		
			SPT 5, 5, 4 N*=9		2.0							
					3.0							
			SPT 3, 4, 4 N*=8		4.0							
					5.0							
			SPT 6, 9, 4 N*=13		6.0							
					7.0							
			SPT 3, 6, 8 N*=14									

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- SD sonic drilling

* 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
- 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.	**BH43**
sheet:	2 of 4
project no.	**754-GEOTABTF09257AA**
client:	***Huntingdale Estate Nominees***
date started:	***21 Jan 2019***
principal:	
date completed:	***22 Jan 2019***
project:	***Talbot Quarry Regen - Zone 4 Northwall Assessment***
logged by:	***EY***
location:	***Huntingdale Road, Oakleigh South***
checked by:	***MF***

position: E: 333209; N: 5801027 (WGS84) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Boartlongyear LS250, Track mounted | drilling fluid: | hole diameter : 100 mm

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	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
SD C		Not Observable					SP	**FILL: SAND**: fine to coarse grained, dark grey, black, trace fine to coarse grained gravel. *(continued)*	M	MD		**FILL**
			SPT 2, 3, 5 N*=8		9.0							
							CH	**FILL: CLAY**: high plasticity, grey, orange, red, with fine to coarse grained sand, trace plastic pieces up to 30 mm.		St		
							SC	**FILL: CLAYEY SAND**: fine to coarse grained, dark grey, brown, high plasticity clay.		MD		
					10.0		SP	**FILL: SAND**: fine to coarse grained, dark grey, with plastic sheets and pieces up to 50 mm.		L		
			SPT 3, 2, 4 N*=6									
					11.0		CI	**FILL: CLAY**: medium plasticity, grey-orange.		St	✳	HP 180 - 200 kPa
							SP	**FILL: SAND**: fine to coarse grained, dark grey, with plastic sheets and pieces up to 50 mm.		L - MD		
								FILL: CLAYEY SAND: fine to coarse grained, grey-orange, high plasticity clay, trace fine to coarse grained gravel, with timber and plastic pieces up to 50 mm.				
					12.0		SP	**FILL: SAND**: fine to coarse grained, dark grey, with plastic sheets and pieces up to 50 mm. with plastic, glass, brick and timber pieces				
			SPT 4, 4, 5 N*=9									
					13.0		CH	**FILL: Sandy CLAY**: high plasticity, brown, grey, orange, with brick and glass fragments. with medium to coarse grained gravel		St - VSt	✳	HP 180 - 250 kPa
			SPT 10/50mm HB N*=R				SP	**FILL: SAND**: fine to coarse grained, grey-orange, with plastic sheets and pieces up to 50 mm.		MD		
					14.0		CH	**FILL: Sandy CLAY**: high plasticity, brown, grey, orange, with brick and glass fragments.		St		
					15.0		SC	**FILL: CLAYEY SAND**: fine to coarse grained, black, grey, green, brown, low plasticity clay, with metal, glass and plastic pieces up to 30 mm. becoming grey, trace rootlets up to 10 mm		MD		
			SPT 9, 12, 14 N*=26									

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
SD sonic drilling

* 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
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.	**BH43**
sheet:	3 of 4
project no.	**754-GEOTABTF09257AA**
client:	**Huntingdale Estate Nominees**
date started:	**21 Jan 2019**
principal:	
date completed:	**22 Jan 2019**
project:	**Talbot Quarry Regen - Zone 4 Northwall Assessment**
logged by:	**EY**
location:	**Huntingdale Road, Oakleigh South**
checked by:	**MF**

position: E: 333209; N: 5801027 (WGS84) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Boartlongyear LS250, Track mounted | drilling fluid: | hole diameter : 100 mm

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	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
SD C		Not Observable			0.0		SC	**FILL: CLAYEY SAND**: fine to coarse grained, black, grey, green, brown, low plasticity clay, with metal, glass and plastic pieces up to 30 mm. *(continued)*	M	MD		**FILL**
			SPT 4, 8, 4 N*=12									
					17.0			wood and timber pieces (16.9-18.1 m)				
			SPT 3, 4, 3 N*=7		18.0		CI	**FILL: CLAY**: medium plasticity, brown, grey, trace brick fragments <5 mm.		F - St		
					19.0			becoming wood in a clay matrix (40%)				
							SP	**FILL: SAND**: fine to coarse grained, pale grey.		L		
					20.0		SM	**SILTY SAND**: fine to medium grained, dark grey, low plasticity silt.	W			**BLACK ROCK FORMATION**
			SPT 1, 1, 1 N*=2		21.0							
					22.0			becoming dark grey, dark green		MD		
			SPT 4, 5, 5 N*=10		23.0							
								becoming grey, mottled pale grey, nodules of weakly cemented sand present <5 mm		L		

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- SD sonic drilling

* 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
- 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.	**BH43**
sheet:	4 of 4
project no.	**754-GEOTABTF09257AA**
client:	**Huntingdale Estate Nominees**
date started:	**21 Jan 2019**
principal:	
date completed:	**22 Jan 2019**
project:	**Talbot Quarry Regen - Zone 4 Northwall Assessment**
logged by:	**EY**
location:	**Huntingdale Road, Oakleigh South**
checked by:	**MF**

position: E: 333209; N: 5801027 (WGS84) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Boartlongyear LS250, Track mounted | drilling fluid: | hole diameter : 100 mm

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	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
SD C		Not Observable	SPT 2, 3, 3 N*=6				SM	**SILTY SAND**: fine to medium grained, dark grey, low plasticity silt. *(continued)*	W	L		**BLACK ROCK FORMATION**
								becoming grey, mottled pale grey, mottled green				
					25.0		SP	**SAND**: fine to medium grained, grey.		MD		
			SPT 2, 6, 13 N*=19									
					26.0			Borehole BH43 terminated at 25.95 m Target depth				
					27.0							
					28.0							
					29.0							
					30.0							
					31.0							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- SD sonic drilling

* 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
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- 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

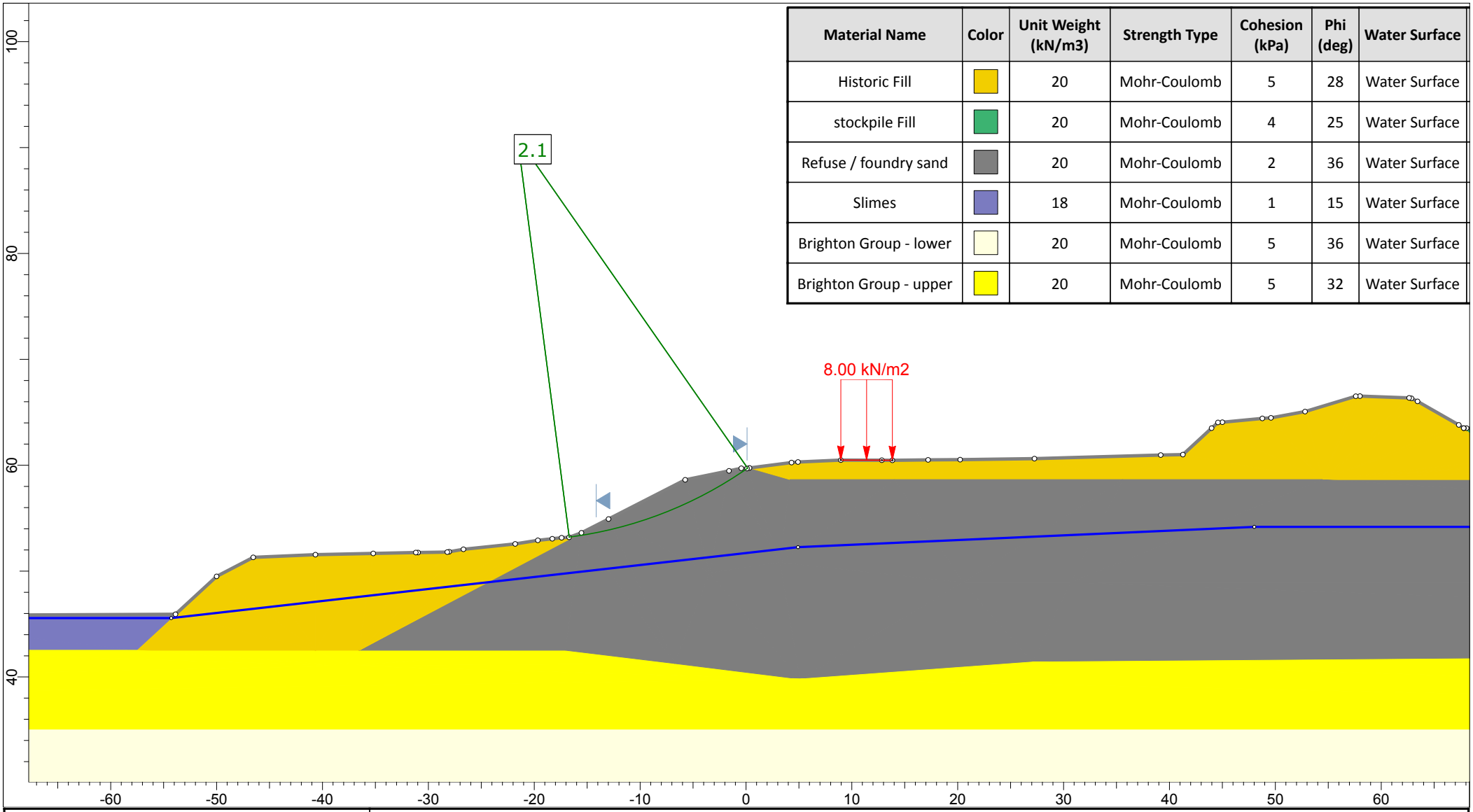
moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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

Appendix B – Limit equilibrium analysis results.

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Historic Fill		20	Mohr-Coulomb	5	28	Water Surface
stockpile Fill		20	Mohr-Coulomb	4	25	Water Surface
Refuse / foundry sand		20	Mohr-Coulomb	2	36	Water Surface
Slimes		18	Mohr-Coulomb	1	15	Water Surface
Brighton Group - lower		20	Mohr-Coulomb	5	36	Water Surface
Brighton Group - upper		20	Mohr-Coulomb	5	32	Water Surface



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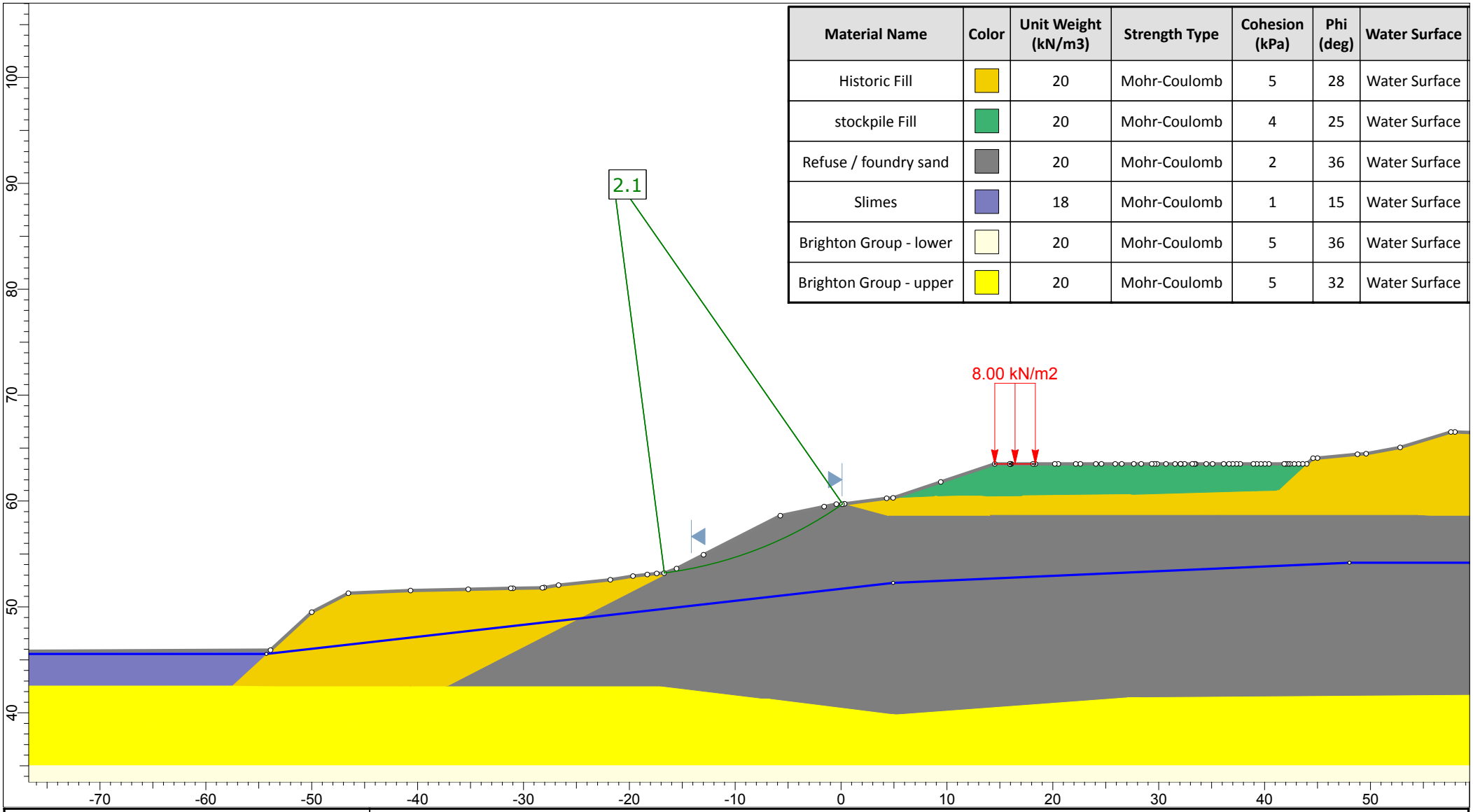
SLIDEINTERPRET 8.016

Project	Talbot Quarry Regen - Zone 1 Stockpile		
Analysis Description	Zone 4 -North wall stability assessment - current geometry		
Drawn By	M. Farrington	*Scale* 1:500	*Job Number* GEOTABTF09257AA-CX
Date	26 March 2019		*File Name* Figure B1

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Historic Fill		20	Mohr-Coulomb	5	28	Water Surface
stockpile Fill		20	Mohr-Coulomb	4	25	Water Surface
Refuse / foundry sand		20	Mohr-Coulomb	2	36	Water Surface
Slimes		18	Mohr-Coulomb	1	15	Water Surface
Brighton Group - lower		20	Mohr-Coulomb	5	36	Water Surface
Brighton Group - upper		20	Mohr-Coulomb	5	32	Water Surface



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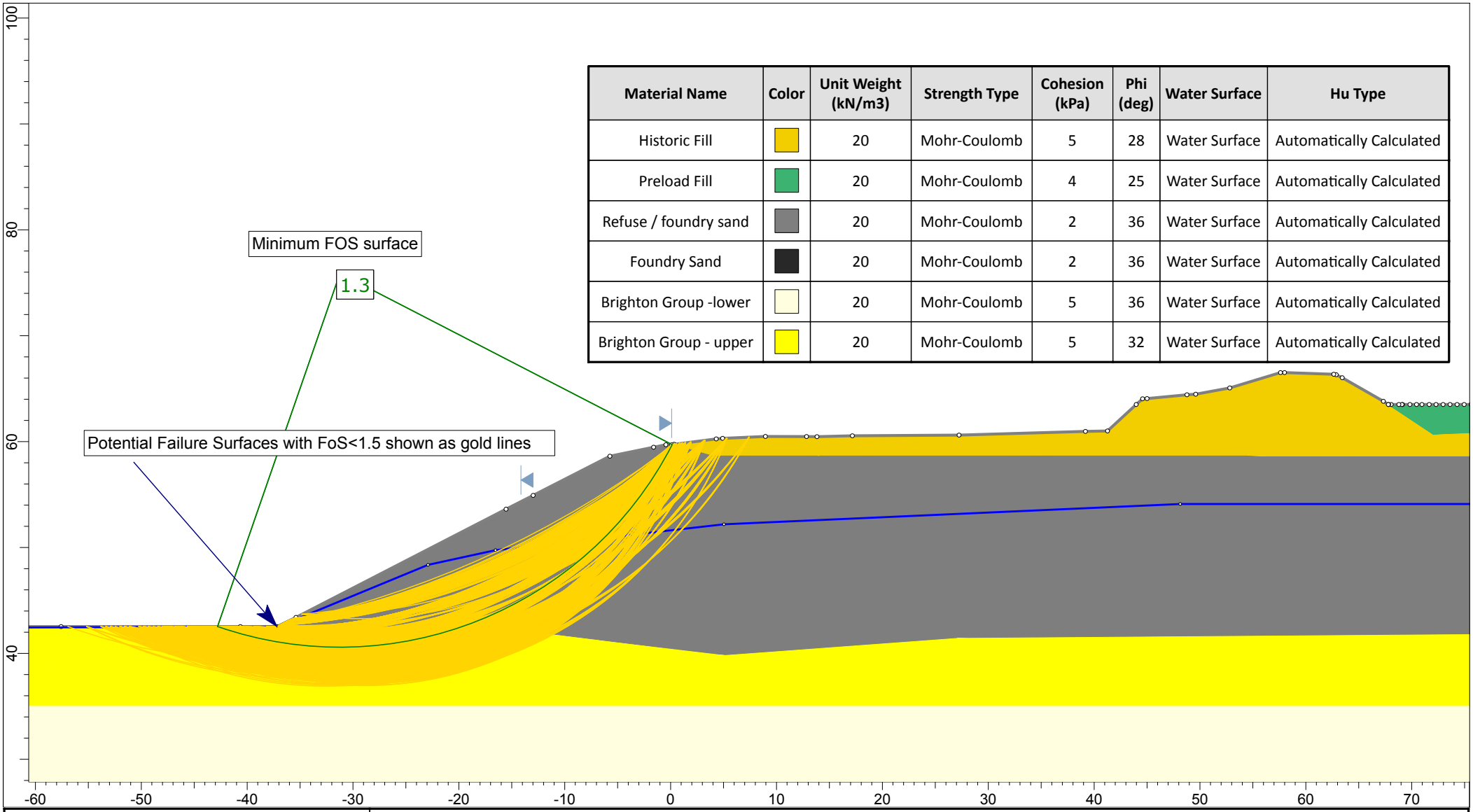
SLIDEINTERPRET 8.016

Project	Talbot Quarry Regen - Zone 1 Stockpile				
Analysis Description	Zone 4 -North wall stability assessment - with stockpile				
Drawn By	M. Farrington	*Scale*	1:500	*Job Number*	GEOTABTF09257AA-CX
Date	26 March 2019			*File Name*	Figure B2

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type
Historic Fill		20	Mohr-Coulomb	5	28	Water Surface	Automatically Calculated
Preload Fill		20	Mohr-Coulomb	4	25	Water Surface	Automatically Calculated
Refuse / foundry sand		20	Mohr-Coulomb	2	36	Water Surface	Automatically Calculated
Foundry Sand		20	Mohr-Coulomb	2	36	Water Surface	Automatically Calculated
Brighton Group -lower		20	Mohr-Coulomb	5	36	Water Surface	Automatically Calculated
Brighton Group - upper		20	Mohr-Coulomb	5	32	Water Surface	Automatically Calculated



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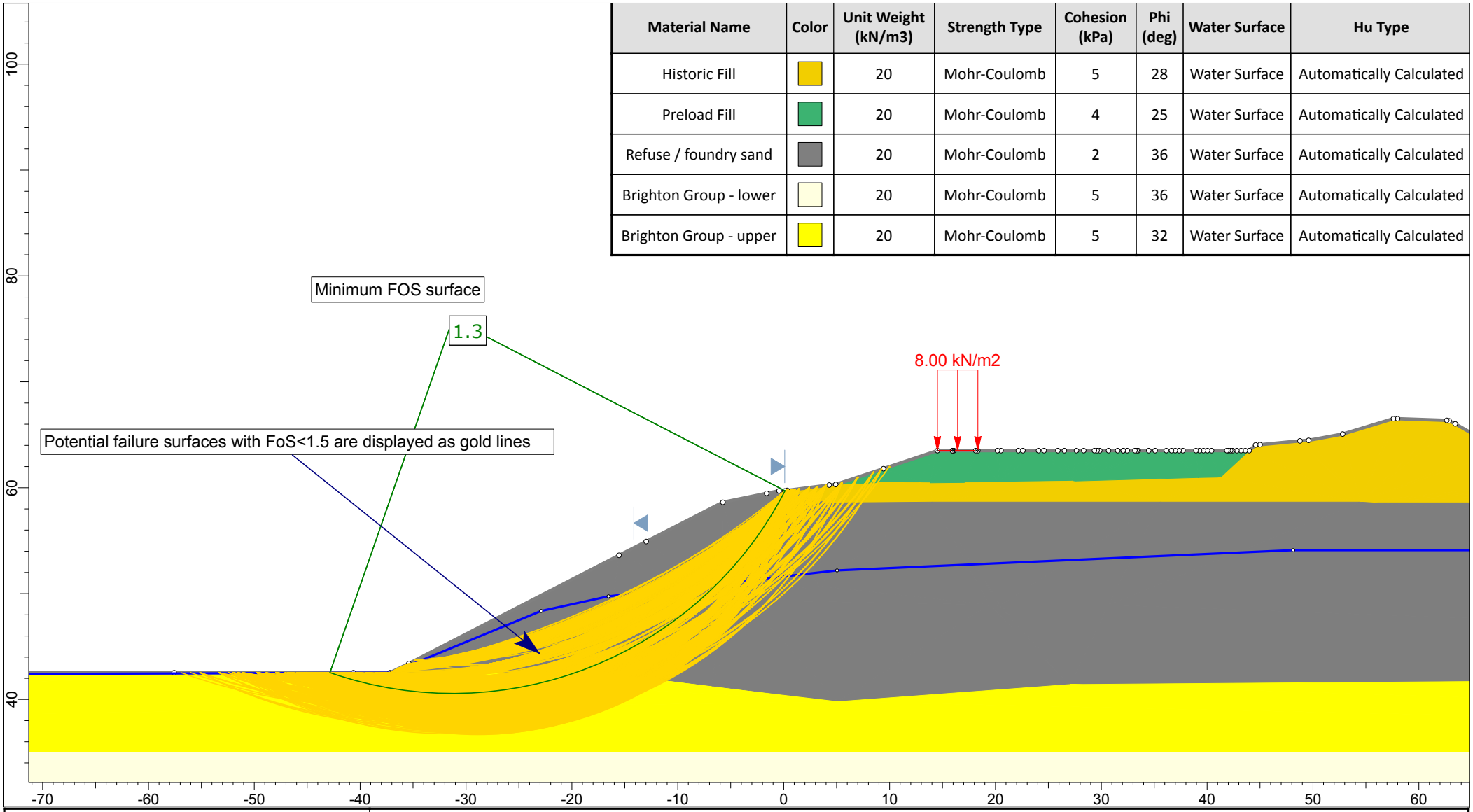
SLIDEINTERPRET 8.016

Project	Talbot Quarry Regen - Zone 1 Stockpile		
Analysis Description	Zone 4 -North wall stability assessment - after slimes excavated		
Drawn By	M. Farrington	*Scale* 1:500	*Job Number* GETOABTF09257AA-CX
Date	26 March 2019		*File Name* igure B3

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type
Historic Fill		20	Mohr-Coulomb	5	28	Water Surface	Automatically Calculated
Preload Fill		20	Mohr-Coulomb	4	25	Water Surface	Automatically Calculated
Refuse / foundry sand		20	Mohr-Coulomb	2	36	Water Surface	Automatically Calculated
Brighton Group - lower		20	Mohr-Coulomb	5	36	Water Surface	Automatically Calculated
Brighton Group - upper		20	Mohr-Coulomb	5	32	Water Surface	Automatically Calculated



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Project	Talbot Quarry Regen - Zone 1 Stockpile				
Analysis Description	Zone 4 -North wall stability assessment - after slimes excavated				
Drawn By	M. Farrington	*Scale*	1:500	*Job Number*	GEOTABTF09257AA-CX
Date	26 March 2019			*File Name*	Figure B4