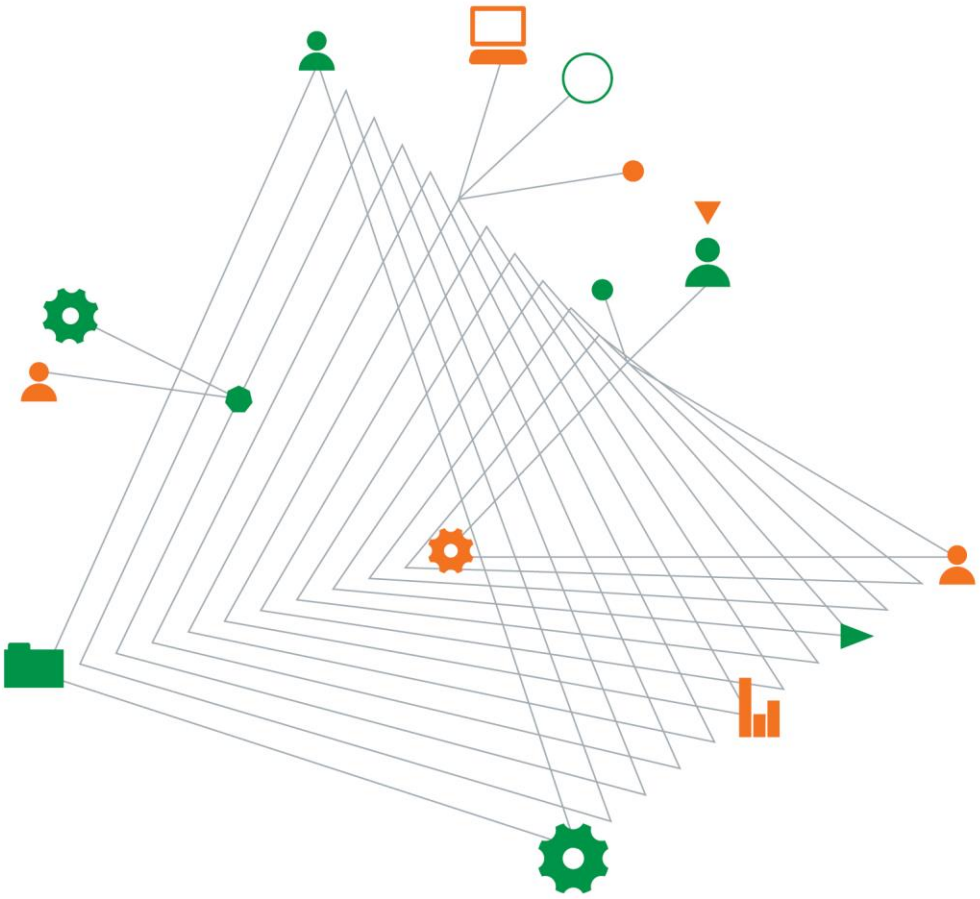
Huntingdale Estate Nominees Pty Ltd

Huntingdale Estate: 1221 – 1249 Centre Road & 22 Talbot Avenue, Oakleigh South, Victoria

Workplan For Zone 1 Temporary Boundary Venting Measures

11 November 2021



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Huntingdale Estate: 1221 – 1249 Centre Road & 22 Talbot Avenue, Oakleigh South, Victoria

Prepared for
Huntingdale Estate Nominees Pty Ltd

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Abbreviations:

AHD	Australian Height Datum
BGS	Below Ground Surface
CQA	Construction quality assurance
EPA	Environment Protection Authority (Victoria)
ESA	Environmental Site Assessment
HDPE	High density polyethylene
LFG	Landfill gas
MGA	Map Grid Australia
MQA	Manufacturing quality assurance
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RL	Reduced level
SOP	Coffey Standard Operating Procedure

1. Introduction

Huntingdale Estate Nominees Pty Ltd (Huntingdale Estate) engaged Tetra Tech Coffey Pty Ltd (Coffey, formerly trading as Coffey Environments Australia Pty Ltd) to update the workplan for the design and construction of a temporary boundary venting system in Zone 1 at 1221 to 1249 Centre Road, Oakleigh South, Victoria (the site).

The site comprises a former sand quarry and municipal landfill and is proposed to be redeveloped for a range of residential land uses including designated areas of open space and commercial use.

This workplan was originally prepared in support of a s53X environmental audit of the site completed in May 2020 by Mr Ken Mival of EHS Support Pty Ltd[1] (EPA CARMS reference: 70403-2 and Service Order Number: 8004092). The workplan forms part of the Construction Environmental Management Plan (CEMP) (Coffey 2020) compliance with which is a requirement of the Statements of Environmental Audit (SoEA).

The workplan has been updated to reflect a revised preload (stockpiling) design for Zone 1[2], and should be read in conjunction with this document. This workplan refers to 'Zone 1' throughout the document in order to be consistent with the SoEA. It should be noted that corresponding geotechnical nomenclature (as referenced in the preload design report) is 'Domain1', these terms represent the same area.

In accordance with the SoEA and CEMP (Coffey 2020) this revised workplan should be verified by an EPA appointed environmental auditor prior to construction of the trench.

2. Project Understanding and Strategy

As part of ongoing geotechnical investigation and ground improvement works at the site, bulk earthworks are proposed in Zone 1 comprising the stockpiling of imported Fill Material.

The construction of stockpiles (pre-loading) is proposed as the engineered treatment of uncontrolled fill material in Zone 1. The pre-loading exercise will also provide settlement data to inform the development design (including for construction of the Zone 1 landfill cap) and ground improvement strategy for the site.

From an environmental perspective the key concerns with the stockpiling works are:

- The potential for settlement or compression of buried landfill wastes in Zone 1 that may displace soil gas and have the potential to increase (temporarily) off-site gas migration; and/or
- The potential for stockpiling/compaction of less permeable materials across the Zone 1 surface to impact landfill gas migration in this area.

[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] *Talbot Village, Oakleigh South – Domain 1 Preload Design Report*. Coffey, September 2021. Reference: 754-GEOTABTF09257AA-EF.

Whilst the likelihood of these concerns being realised due to proposed stockpiling in Zone 1 is low, due to the relative proximity of Zone 1 to the interface with sensitive (residential) land uses at the northwest site boundary, landfill gas contingency measures are proposed to be established in this area prior to stockpiling works occurring.

Construction of temporary (or permanent) boundary venting measures in Zone 1 prior to any pre-loading activities is a requirement of the SoEA, condition 5(a) states that:

"The CEMP and CDSMM prepared by Coffey Services Australia Pty Ltd attached to this Statement, also must be adhered to prior to the commencement of construction and followed in detail regarding the proposed staging; the location of required gas protection measures (i.e. gas pathway intervention and building/ services protection measures); and required continuing monitoring of landfill gases. In particular:

> *A temporary or permanent boundary gas venting system constructed prior to pre-loading activities, along the northwest site boundary of Zone 1*".

An outline of our understanding of the key issues to be addressed in the boundary venting design is provided in the following section.

2.1. Proposed Stockpiling Design

Pre-loading works are proposed to be undertaken in accordance with the design outlined in the Domain 1 Preload Design Report (Coffey 2021).

The proposed importation and stockpiling of fill material will be undertaken by an appointed earthworks contractor in accordance with the CEMP (Coffey 2020) and associated supporting documentation including the *Site Backfilling Protocol* (Coffey, 2015).

The pre-load stockpile in Zone 1 has been designed to allow for the further development of the site; including construction of roads, residential and commercial buildings and underground services, as well as the required environmental management measures including an engineered landfill cap.

The crest of the pre-load will extend to the edge of the former quarry pit crest in order to reduce the potential impact of any differential settlement on future roads, buildings, underground services and the engineered landfill cap. This dictates that the crest of the preload will be located ~ 17 – 18 m from northern and western site boundaries. Adopting a batter slope of 2H:1V (wherever practicable) this would result in toe of the preload stockpile being located ~ 5 m from the site boundary.

The results of geotechnical investigation works indicate that a 2.5 m high pre-load stockpile is the minimum needed to treat the site in Zone 1.

The current surface of Zone 1 comprises soil mounds and stockpiles with surface elevations ranging from RL 59 m to over RL 66 m. These existing stockpiles have provided an uneven pre-load over the underlying uncontrolled fill, and it will be necessary to fill in the low-lying areas between the stockpiles to achieve adequate pre-loading over Zone 1.

Given the presence of existing fill over large areas of Zone 1 and the heavy traffic over the site, it is expected that the ground will not undergo significant ground displacement during and post construction of the pre-load stockpiles. However, in areas of Zone 1 that have not previously been subject to fill mounds some primary settlement would be expected.

An outline of the proposed pre-load stockpile extent in Zone 1 is provided in Figure A1 (**Attachment A**).

2.2. Landfill Gas Migration in Zone 1

Detailed discussion of the potential fate and transport of landfill gas in Zone 1 is provided in the environmental site assessment prepared by Coffey in support of the environmental audit (Coffey 2020). The text below also considerers the results of additional (post audit) landfill gas monitoring undertaken at the site in accordance with the CEMP (Coffey 2020).

The current landfill gas situation can be summarised as follows:

- With regards to the potential landfill gas migration in Zone 1 (under current site conditions), no detectable methane concentrations were recorded for the boundary delineation bores during the current phase of assessment and gas concentrations dropped relatively quickly with distance from the waste mass.

- Flow and pressure measurements taken at the site suggest that significant pressure differentials created through rapid methane generation are not present. We interpret this to mean that the majority of migration is occurring due to diffusion (which would be expected based on the age of the landfill); i.e. pressure differences between inside and outside of the closed landfill are not great and are not causing landfill gas to be transported away from the landfill in a manner that would result in high gas flows in the subsurface under nearby residential properties.

- The variability of the methane concentrations during continuous monitoring and the correlation of gas concentrations with atmospheric pressure changes indicates that barometric pumping is having a significant effect on gas migration in these locations. However, this is likely to be limited to land that may have a connection to wastes or areas of low permeability soil.

- Under current site conditions, vertical gas migration and subsequent discharge at the surface (maximum methane surface emissions of 19,400 ppm reported in August 2016) was considered to be the dominant methane migration pathway, as opposed to lateral migration. Diffusion and barometric pumping were likely to be the key drivers of gas migration.

As outlined above, based on our understanding of the gas migration regime in Zone 1, the preferential gas migration pathway is vertical migration through the current surface. The concern is whether the proposed stockpiling exercise could both increase the potential for gas migration and reduce the preference for gas to move vertically.

The time periods with the greatest likelihood of the stockpiling works altering landfill gas transport mechanisms would be during any primary settlement (i.e. settlement/compaction of wastes) and at the completion of stockpiling works and as conditions return to steady state.

Considering the above, boundary venting is proposed as a conservative measure to provide a level of contingency in the case that stockpiling activities have an impact on gas migration in Zone 1.

3. Temporary Boundary Venting Design

The temporary boundary venting measures are proposed to be present for the duration of the pre-load or until permanent boundary venting is installed (whichever occurs first). This is expected to be a 12 to 24 month duration. Details on the proposed trench design is outlined in the following Sections.

3.1. Location of Temporary Boundary Venting

The temporary boundary venting is proposed to comprise a vertical trench backfilled with a high permeability material installed along the length of the northwest site boundary between the edge of the buried waste and the sensitive site boundary (i.e between the source of LFG (buried landfill wastes in Zone 1) and the receptor (adjacent residential properties)). Landfill wastes have been encountered as close as 9 m from the north western boundary at test pit TP-2019A-20.

The proposed location of the trench is confined to the north western boundary of the site (Zone 1) based on the proximity of the adjoining sensitive residential land uses in this area (412-426 Huntingdale Road) to the former landfill. Due to the proximity of these properties to Zone 1 it would be difficult to implement LFG control measures in this area on a reactive basis, in the unlikely event of unexpected gas migration. The trench is being proposed as a precautionary and preventative measure based on the potential nature of the impacts rather than the likelihood of them occurring.

The 1970 aerial photograph shown in Plate 1 was taken during quarrying which shows the footprint of the Zone 1 pit (Zone 1 was filled with refuse in 1972-1975). The offset distance from the crest of the pit batter to the western boundary has been estimated from the aerial photograph to be approximately 10 m – 15 m. The northern boundary appears to have only a narrow crest to boundary off-set.

Plate 1 - Aerial photograph of Zone 1 from October 1970

The position of the trench will also largely be determined by the preload extent (i.e. the trench will need to be boundary side of the pre-load, refer Figure 2 and 3) such that any lateral gas migration associated with the pre-load (in the event this was to occur) is intercepted by the trench. To minimise potential amenity impact to the neighbours the trench will be installed as far from the site boundary as practicable without needing to excavate into the residual buried wastes (excavated spoil would largely be expected to comprise natural or reworked natural material).

The position of the trench will also be determined by a geotechnical Factor of Safety against slope instability (FoS) to mitigate against any detrimental geotechnical impact to adjacent properties and structures (see Section 3.4).

Based on the preload design and estimated waste extent in Zone 1 the trench will be installed approximately 5 m from the site boundary (refer Figure 1 to Figure 14 in **Attachment A** for further detail). A buffer of 4-6 m is proposed to allow for any localised variation in the trench orientation should any buried wastes be encountered (i.e. to ensure that the trench is located boundary side of any buried wastes and avoid a requirement to excavate wastes during construction).

3.2. Trench Design

The trench will be established to the approximate depth of the water table (i.e. extent of unsaturated zone) to ensure that there is no pathway for LFG to migrate under the trench. Whilst extended to the ~depth of the water table, the trench would not be installed to intersect groundwater and would not be expected to influence groundwater flow or effect contaminant concentrations (including dissolved methane) in groundwater. This will result in a trench depth of between 4.0 and 5.0 m below the current ground surface (generally 4.0 m).

There would be some variation along the length of the trench based on undulations of the current surface level and the change in groundwater depth across Zone 1. Expected groundwater RL in this area ranges from 56 m AHD at the northern boundary to approximately 55 m AHD at the southern extent of the trench.

In terms of the width of the trench the aim is for it to be as narrow as possible without collapse, and for practicality the width of an excavator bucket to be used. An estimated width of 600 mm has been assumed based on these design parameters.

Prior to excavating the trench, a 4 m wide strip would be levelled, with a 1:1 batter formed in the side of the existing soil mounds along the length of the trench. The total estimated length of the trench is 196 m.

The trench would be constructed such that the toe of the preload overlaps the top of the trench (i.e. entirety of the trench is covered by the pre-load toe). This would ensure that any surface run-off from the preload batter does not discharge into the trench. Other than the vent risers (Section 3.3) the trench would effectively finish flush with the ground surface (prior to placement of the pre-load) and as such would not be expected to pose any amenity impacts to the neighbours following installation.

The trench is designed as a passive system (i.e. no active pumping of LFG) to provide a pathway intervention were LFG migration to occur and will not cause LFG to accumulate or be drawn towards the boundary. Were LFG migration to occur and gas is vented from the trench it would dissipate into the atmosphere and would not pose a risk to neighbouring residents.

Given the significant length of the trench, historical monitoring of gas conditions, typical wind flow direction and the presence of oxygen within the trench (to potentially facilitate rapid oxidation of odorous compounds), and that the trench will be covered with the pre-load, it is considered unlikely that the installation of the trench will pose any olfactory amenity impacts.

Due to structural concerns and to avoid the potential for trench collapse the trench would be dug in maximum 10.0 m sections and then backfilled sequentially.

The trench design is outlined in Figures 1-14 and detail provided in Figure 15 in **Attachment A**.

3.3. Backfill Design

The trench is proposed to backfilled utilising nominal 20mm to 50 mm basalt aggregate (minimal fines) or suitable high permeability material alternative, coupled with a high density polyethylene (HDPE) geomembrane and geotextile liner to be installed on the boundary side of the trench. Geofabric would be installed over the trench prior to preloading activities to reduce the potential for sedimentation.

There is a level of redundancy incorporated into the trench design, in that it encompasses both a high permeability media to vent LFG and a barrier system (HDPE geomembrane).

As the toe of the preload overlaps the trench risers would be installed through the preload (from the trench to the preload surface) to ensure that a preferential pathway for potential gas migration remains. Risers would be installed at ~20 m spacings along the length of the trench.

A summary of the specification for the trench backfill design is outlined in Table 1. Further details are provided in Figure 15 in **Attachment A**.

Table 1 – Trench Backfill Specification

Backfill Component	Specification / Comment
HDPE Geomembrane	Double sided smooth HDPE geomembrane (minimum thickness 1.5 mm) or other suitable barrier as verified by Coffey and the appointed environmental auditor. Manufacturer to provide MQA certificates to demonstrate HDPE roll provided meet the requirements of Geosynthetic Research Institute Standard GR1-GM13. HDPE geomembrane and geotextile liner joins are to be avoided where practicable. Joins shall be approved by the on-site Coffey representative prior to installation. Liner to be installed with minimum 500 mm overlap at joins. Manufacturer to provide MQA certificates for rolls delivered to site.
Geotextile Cushion for puncture protection	Geotextile liner to be a non-woven polyester or polypropylene with a Geotextile Strength Rating “G” ≥ 3000 in accordance with VicRoads Standard RC381.01 or alternative suitable protection as verified by Coffey and the appointed environmental auditor. Where preload stockpile will overlap boundary venting trench geofabric protection layer to be installed overlying trench to prevent sedimentation. Manufacturer to provide MQA certificates for rolls delivered to site.
High Permeability Backfill	20mm to 50 mm basalt aggregate (minimal fines) or suitable high permeability material alternative (e.g. recycled product) as approved by Coffey and the appointed environmental auditor prior to use. Geotextile/fabric to be installed over final trench to prevent sedimentation.
Vent Risers	Where preload stockpile will overlap boundary venting trench, 100 mm PVC vent risers are to be installed at a minimum spacing of 20.0 m. Risers to extend to base of trench comprising 100 mm slotted PVC. Risers to extend from the trench to a minimum of 4.0 m from ground surface (at the site boundary) or so vent outlet is at least 2.0 m away from the final preload crest (whichever is greater), to allow for sufficient degree of dissipation for any LFG discharge. Risers to be installed with rotating cowl to create a negative pressure environment and enhance air mixing. The risers should be secured with a pipe collar and guy cables to stabilise the out of trench section and provide protection to the riser. The riser construction would comprise 2 distinct stages:

Backfill Component	Specification / Comment
	1. Initial slotted (in trench) section to be installed with 2.0 m of solid PVC riser extending out of the trench; 2. During stockpiling works in this area additional riser section to be installed to a minimum height of 4.0 m above ground level and backfilled. This staging would reduce the potential for the riser sections to be damaged during construction. Caution will be required during construction of the preload stockpile to ensure integrity of risers is maintained

3.4. Controls During Construction

The construction of the trench must be in accordance with the CEMP (Coffey 2020).

The CEMP includes measures to address health, safety and environmental risks during construction, associated with residual soil, groundwater and landfill gas contamination at the site and describes how activities undertaken during the construction phase of the site redevelopment (including the trench construction) will be managed to avoid or mitigate negative environmental impacts on site (or off-site) and how these environmental management requirements will be implemented.

Compliance with the CEMP is a requirement of the SoEA.

The CEMP requires that prior to construction works occurring (including trench construction) an overarching site specific OH&S plan must be developed to include the controls described in the CEMP. All contractors and subcontractors are required to prepare their own site specific OH&S plan and appropriate Safe Work Method Statements (SWMS) or similar as required.

3.5. Construction Considerations

The proposed venting trench will largely be constructed in natural ground along the north western site boundary, approximately 5 m from the property boundary. The trench is approximately 200m in length, 600mm wide and ~4m deep. Test pits excavated in the approximate alignment of the trench during previous site investigation works to delineate the edge of the former quarry pit, show the existing near surface fill is predominantly ‘Silty Sand / Clay’ and natural material is Brighton Group described as ‘dense to very dense Clayey Sand’ or ‘stiff to very stiff Sandy Clay’.

The trench will be excavated in 10m to 15m lengths and only open for one or two days before being backfilled. In this case, short term, undrained strength parameters apply. Typically, a Factor of Safety against slope instability (FoS) of 1.2 to 1.3 is adopted for short term operations/excavations.

Preliminary stability analysis for the trench has been undertaken using undrained strength parameters for the natural ground and fill materials. Figures 1 to 3 (**Attachment B**) show the stability analysis outputs which provide acceptable FoS for both sides of the trench (properties and pit sides). These results reflect the observed behaviour of the test pit trenches in the proposed location of the boundary venting trench in Zone 1, that were excavated as part of the site investigation works undertaken in June 2019 (i.e. the test pits / trenches remained open and did not collapse).

Trench excavation works would be conducted so that the excavator is working from one end of the trench on the “undisturbed” ground and that spoil will be placed at least 3m back from the edge of the trench. Placement of the geomembrane and backfill will be undertaken from the top of the trench. No trench entry is required during construction.

In considering the implications of potential underground geotechnical disturbance, historical sand quarry operations provide a good indication of the performance of the ground in this part of Melbourne which has historically been used extensively for sand mining. The sand quarry pits were typically excavated with very steep batters to depths of 15m or more with no movement or disturbance of the ground surrounding the pit. The existing open pit in the south west corner of the site (Zone 4) has stood in its current state for over 30 years with minimal surface erosion which provides a good indication of the strength of the natural soils.

The soils excavated during trenching works are expected to behave in a similar manner to underground service trench excavations in this area.

Based on these considerations it is considered unlikely that the trench construction (and operation) would result in any detrimental geotechnical impact to adjacent properties and structures.

4. Construction Quality Assurance

Whilst the boundary venting is only proposed as a temporary measure (required to be effective for the duration of the pre-load or until the permanent boundary venting system is installed) a robust construction quality assurance (CQA) process will be required to validate the boundary venting construction.

The proposed CQA process would incorporate the following:

- The alignment and depth of the trench will be surveyed by a licensed surveyor during construction (MGA and AHD) to ensure the position and depth is consistent with the approved design.
- Coffey staff would retain a site presence for the duration of the initial trench construction (at least three 10 m sections to be constructed) and undertake periodic inspections for the remainder of the trench construction to document the installation process and verify that works have been carried out to the agreed standards.
    - A specific inspection would be undertaken for the installation and subsequent backfilling of the vent risers.
- MQA certificates to be retained by the contractor and provided to Coffey for review.
- Designated hold points to be enforced where construction as per the agreed specification is not practicable to enable discussion and endorsement of the proposed design change from the auditor.
- Where any earthworks in the vicinity of the trench are proposed by the contractor approval would be required from the works Superintendent.
- Preparation of CQA report documenting the boundary venting construction for review by the auditor.

4.1. Environmental Auditor Verification

The Coffey Workplan (2019) for the boundary venting trench design was originally reviewed and verified by the appointed environmental auditor as part of the environmental audit of the site. Compliance with this workplan is a requirement of the SoEA.

The workplan must be implemented in conjunction with the CEMP (Coffey 2020) prepared for the site. With reference to the Zone 1 boundary venting trench, the CEMP includes the following requirements relating to environmental auditor verification:

- *An appointed environmental auditor must be engaged prior to construction of the temporary boundary venting system to review and verify the design and subsequent installation of the system.*
- *The boundary venting system must be installed in accordance with the Coffey workplan verified by the environmental auditor or a revised workplan subsequently verified by an appointed environmental auditor.*
- *Designated hold points to be enforced where construction of the trench as per the agreed design is not practicable to enable discussion and endorsement of the proposed design change from the auditor.*

Where any revisions to the CEMP (Including the Workplan For Zone 1 Temporary Boundary Venting Measures and Stage 1 Landfill Gas Monitoring Plan) are required, these must be verified by the appointed environmental auditor and provided to EPA.

Ken Mival of EHS Support Pty Ltd has been engaged by Huntingdale Estate to act as the EPA appointed environmental auditor to verify the revised workplan and construction of the Zone 1 temporary boundary venting trench and associated LFG monitoring.

5. Landfill Gas Monitoring

To confirm the effectiveness of the temporary boundary protection measures and assess the potential effect of the stockpiling works on landfill gas transport in Zone 1 further monitoring is proposed during the stockpiling works.

Where stockpiling will include existing gas bore and monitoring well locations the bores would be extended through the pre-load so as to remain accessible for sampling for the duration of the stockpiling works.

5.1. Monitoring Frequency

LFG monitoring will include all gas bores and surface emission surveys in Zone 1 as follows:

- Landfill gas monitoring to be conducted in general accordance with the CEMP (Coffey 2020) and EPA Victoria Publication 1684 (February 2018).
    - Extractive monitoring to be undertaken utilising a GFM430 landfill gas meter. Monitoring would include:
        - Atmospheric pressure at the time of monitoring;
        - Gas flow and differential borehole differential pressure;
        - Methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide concentrations for a minimum of three minutes or until steady state is reached. Where elevated methane concentrations (> 1% v/v) are recorded, gas concentrations would be measured for a 10-minute interval prior to sampling.
    - Surface emission surveys (including trench surface) to be conducted utilising a low level (laser diode) methane detector (e.g. Inspectra Laser).
- Full round of LFG monitoring (baseline) for Zone 1 to be undertaken immediately prior to any stockpiling works occurring.

- One round of LFG monitoring to be undertaken per week during initial stockpiling works (as stockpiling works are occurring) and pending review of results 1 event per month for primary settlement period following completion of stockpiling works.
    - At this stage it has been assumed that stockpiling works would be completed over a 2-month period with primary settlement occurring over a further 3-month period (11 events total). The frequency of the monitoring events would need to be coordinated with the stockpiling works.
    - Settlement monitoring data will be reviewed by Coffey during the stockpiling works to assess settlement rates. In conjunction with the landfill gas data collected during the stockpiling this would inform the requirements for on-going monitoring.
- Minimum of five landfill gas sampling events in first 3 months following stockpiling with further LFG sampling events provisionally at 3 monthly intervals for duration of stockpiling period. The requirement for weekly monitoring during primary settlement and this additional 3 monthly monitoring would be assessed based on the results of the initial monitoring and continuous monitoring data.

Where practicable monitoring should be undertaken during periods of falling atmospheric pressure.

An outline of proposed LFG sampling locations is provided in Figure 16 (**Attachment A**).

5.2. Continuous Monitoring

To provide an additional level of contingency during the Zone 1 stockpiling works installation of five continuous logging landfill gas monitors (AmbiSense GasFlux measuring gas and flow rates) with telemetry is proposed at GB17, GB47, GB53, GB67 and GB71 for the duration of stockpiling works (monitors to be installed immediately prior to works) and for the duration of the primary settlement period (or until the data supports that the continuous monitoring is not required as a contingency measure during the stockpiling).

5.3. Trigger Levels

In accordance with best practice, contingency measures have been developed to outline actions to be implemented if performance goals are exceeded and/or conditions at and around the site change.

A summary of the scenarios that could potentially warrant modification of the adopted approach is outlined in Table 2 below.

Table 2 – Triggers and Contingency Measures

Activity / Trigger	Contingency
Elevated methane concentrations recorded at boundary bores (during either extractive or continuous monitoring) result in a GSV with a Characteristic Situation of >1 (>1% v/v methane)	Stockpiling works must cease pending further review of the data and adequacy of the gas protection measures.
Increasing trend of LFG concentrations recorded at boundary bores (during either extractive or continuous monitoring)	

6. Reporting

The proposed deliverables for the works would comprise a CQA report for the construction of temporary boundary venting measures and a landfill gas assessment report outlining the findings of the monitoring works during stockpiling.

Should significant changes in gas migration occur such as gas concentrations are detected beyond the trench or as emissions from the surface, interim reporting is to be provided to inform the environmental auditor.

7. Closure

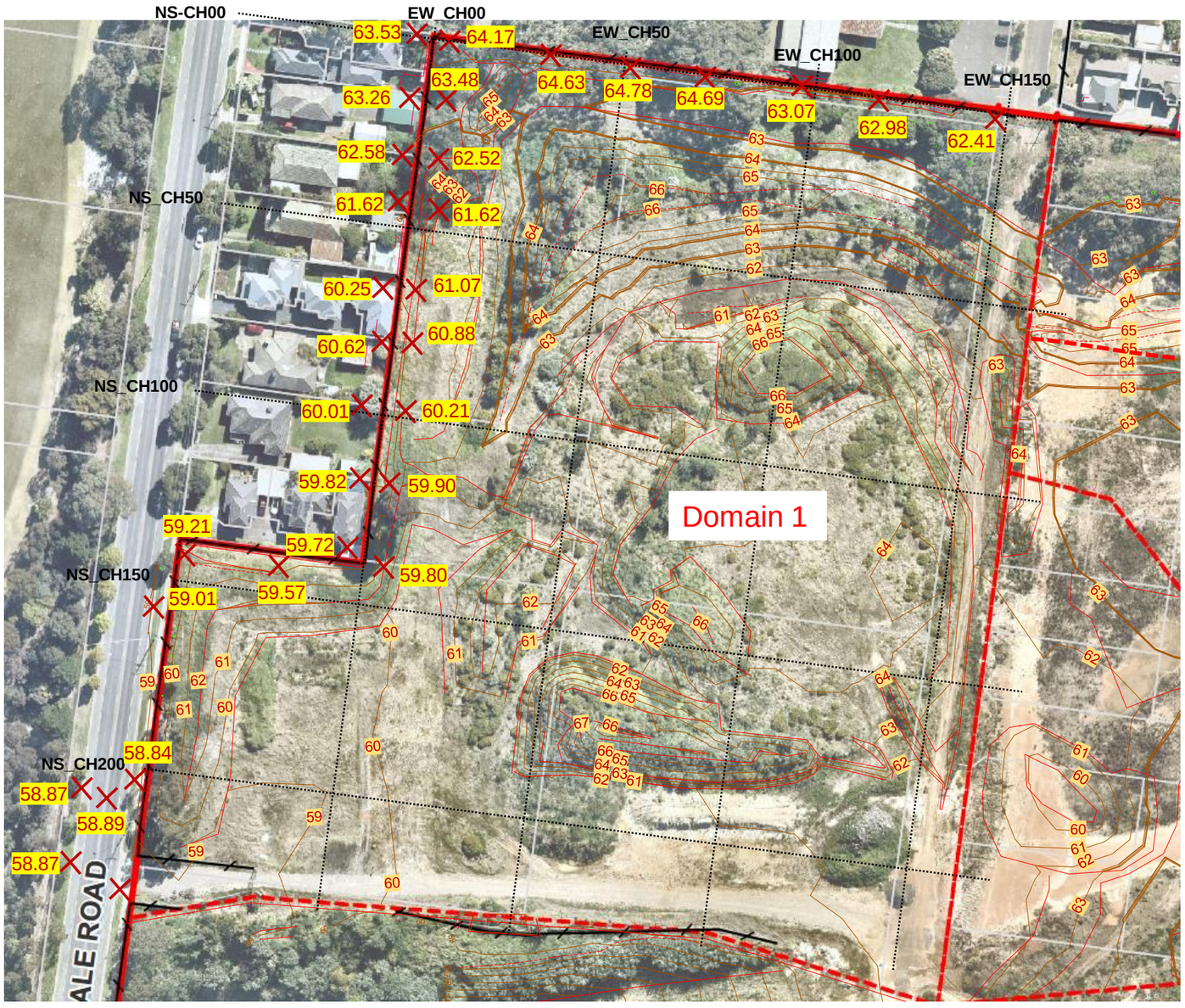
This workplan has been prepared in support of Stage 1 Construction Works to be completed at the site, as outlined in the CEMP (Coffey 2020).

Where the proposed pre-load design and/or temporary boundary venting trench design varies from that outlined in this document the design and associated monitoring program should be reviewed and verified by the appointed Environmental Auditor.

It is recognised that further LFG monitoring will be required for future development phases and/or where the scope of Stage 1 works varies from that outlined within the CEMP, in this case a revised LFG monitoring plan should be prepared and verified by the appointed Environmental Auditor.

This monitoring plan should be read in conjunction with the CEMP (Coffey 2020) and the attached Important Information About your Tetra Tech Coffey Report.

Attachment A - 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
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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

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

WEST

EAST

412 HUNTINGDALE ROAD TITLE BOUNDARY

TITLE BOUNDARY

5m OFFSET FROM BOUNDARY

CREST 9m FROM BOUNDARY

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

BOUNDARY FENCE

DOUBLE STOREY DWELLING

DOUBLE STOREY DWELLING

1.6M

CREST RL66 m

PRELOAD RL66 m

1(V):2(H)

RL65 m

RL63 m

See Note 2

RL63.6 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:

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

SINGLE STOREY DWELLING

1.6M

SHED

RL63.3 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 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

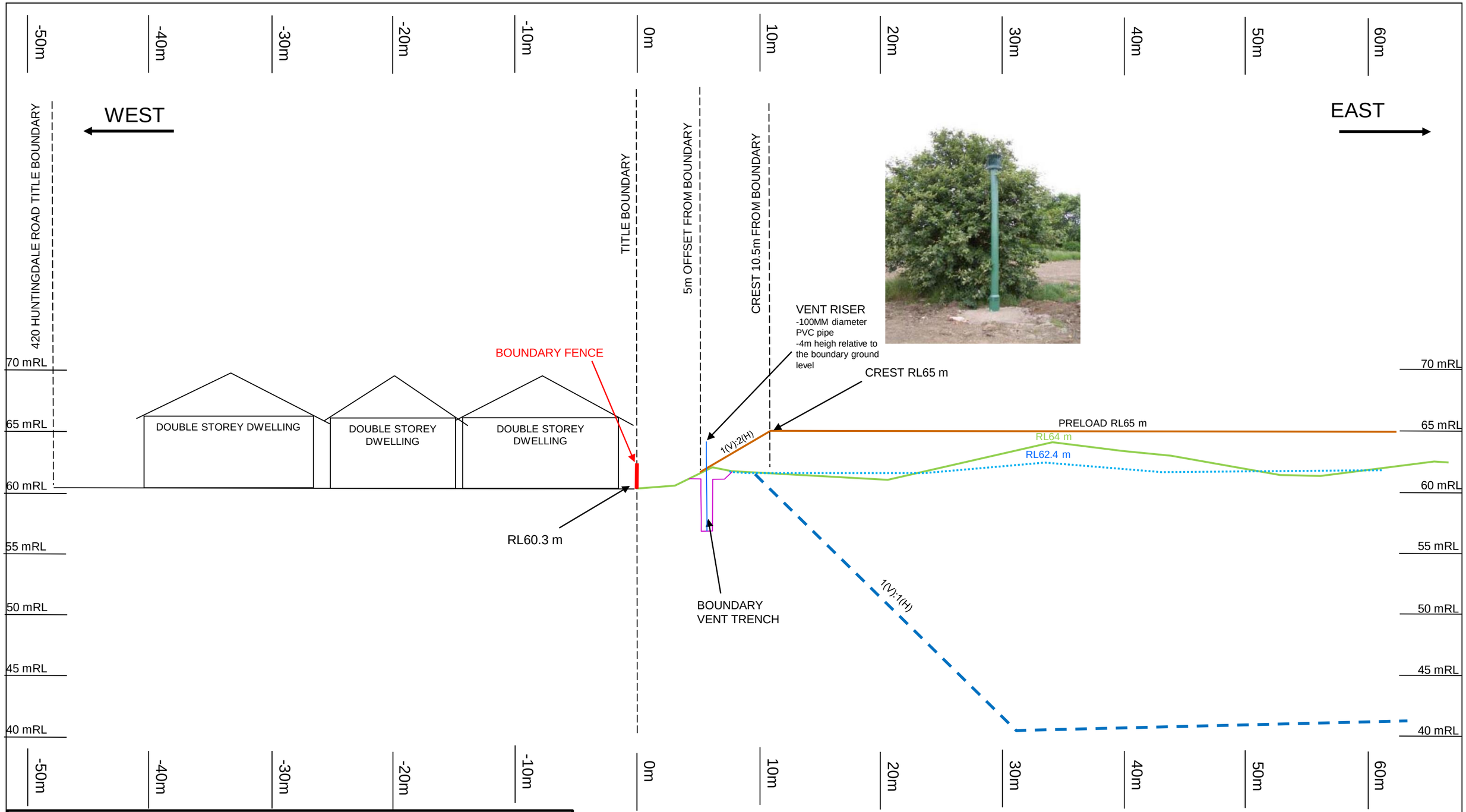
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 418 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 7



LEGEND

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

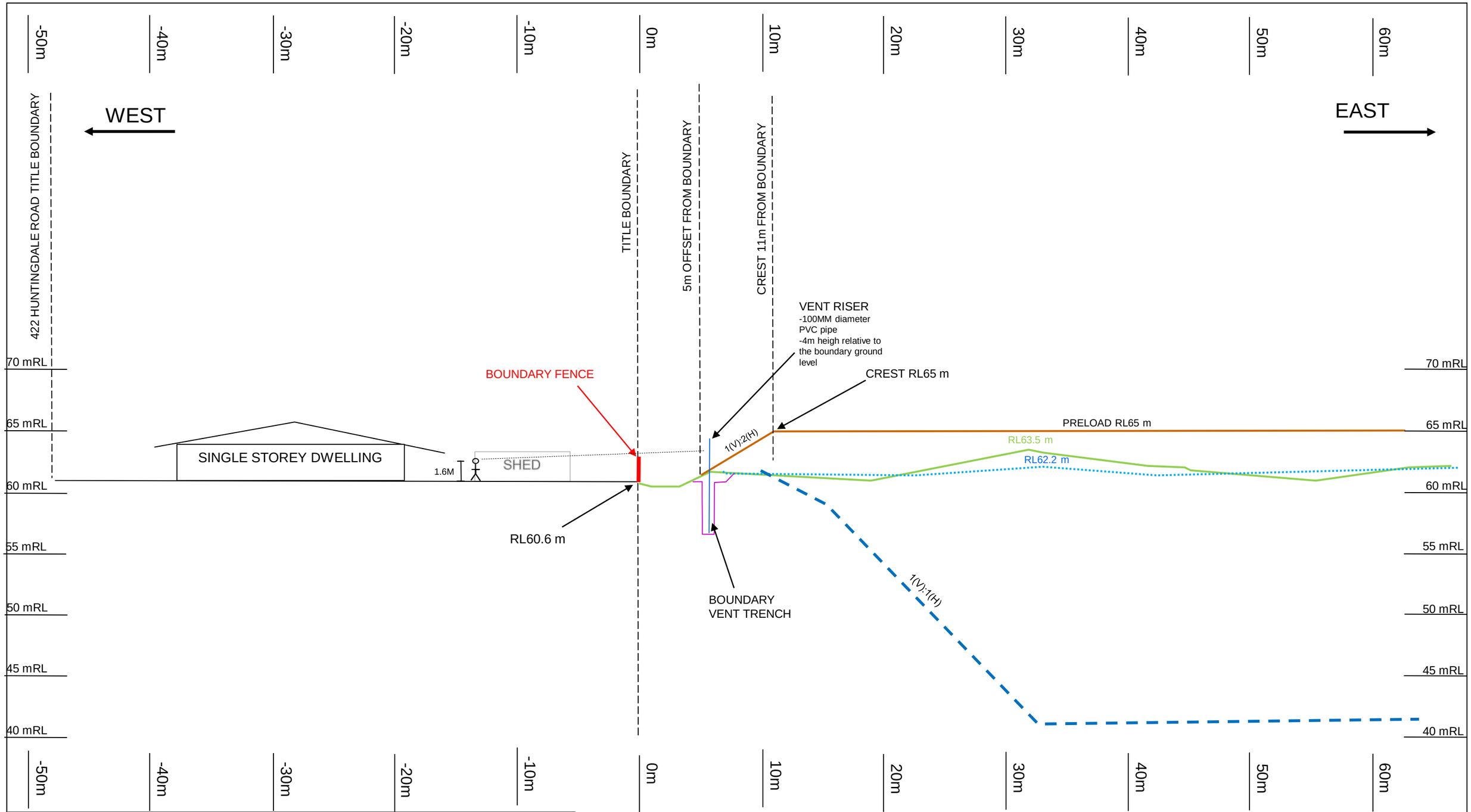
revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

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

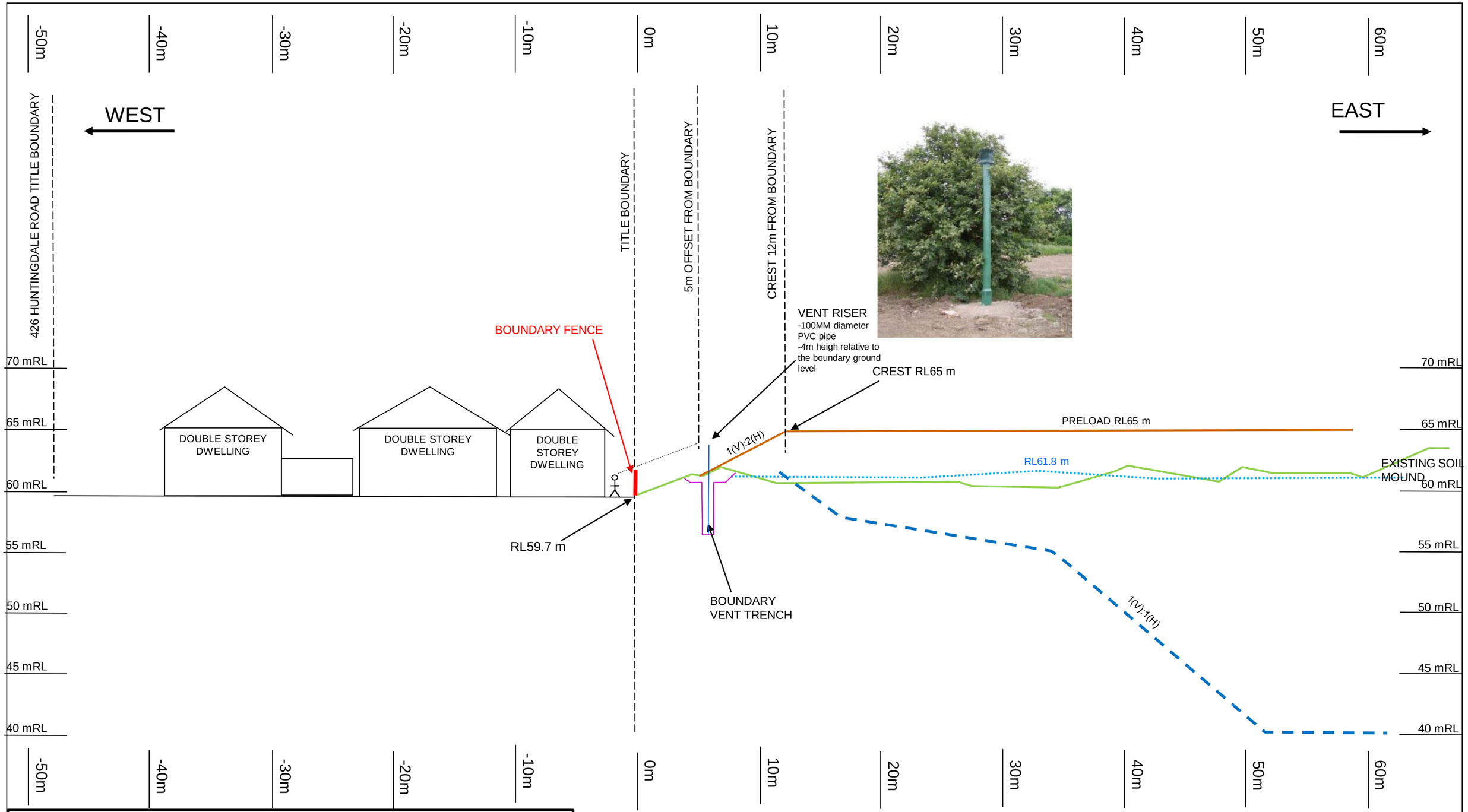
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

project: TALBOT AVENUE, OAKLEIGH SOUTH

title: CROSS SECTION 424 - HUNTINGDALE RD

project no: GEOTABTF092574AA

figure no: 10



LEGEND

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

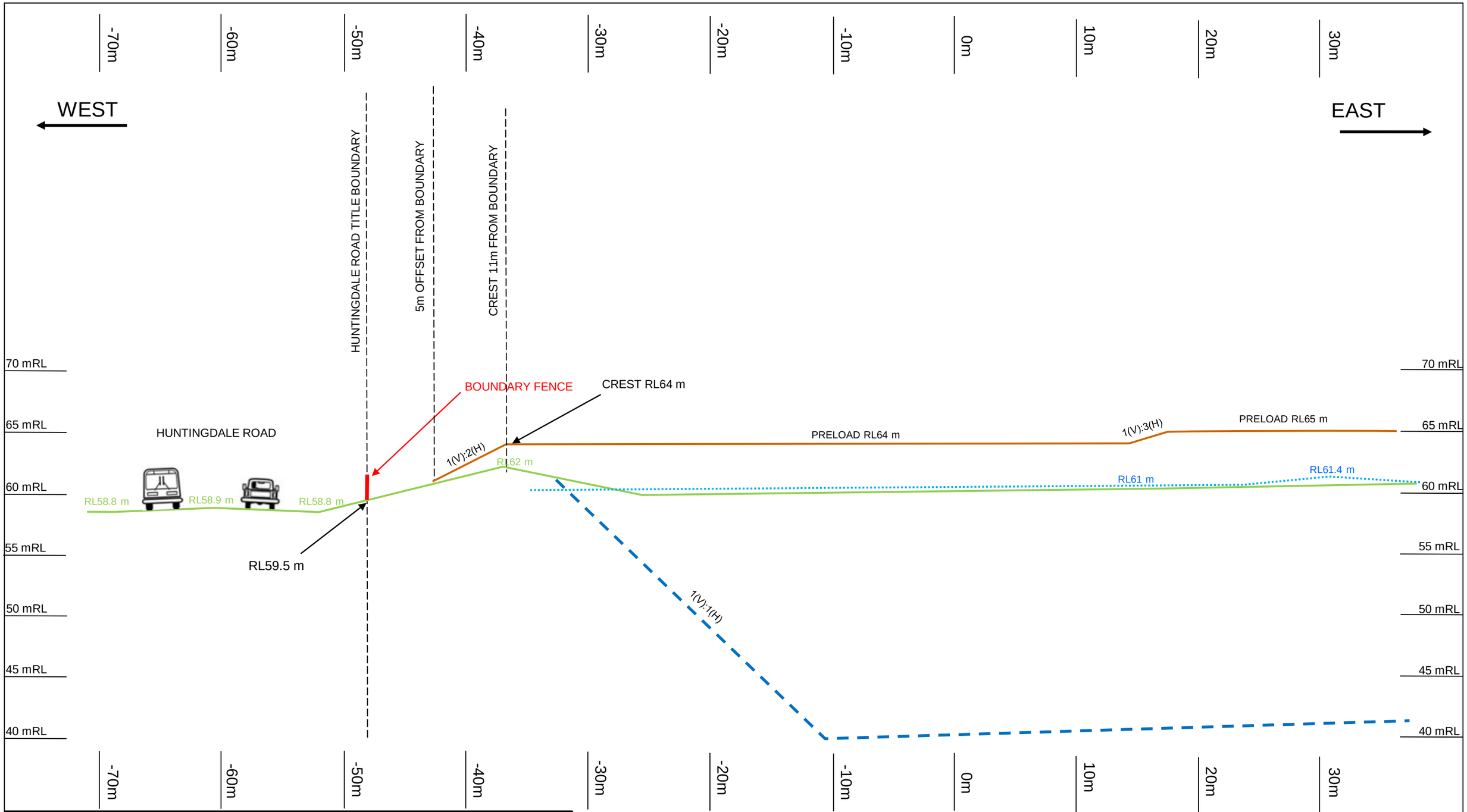
revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21
	V1	FK	IP	11.10.21

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

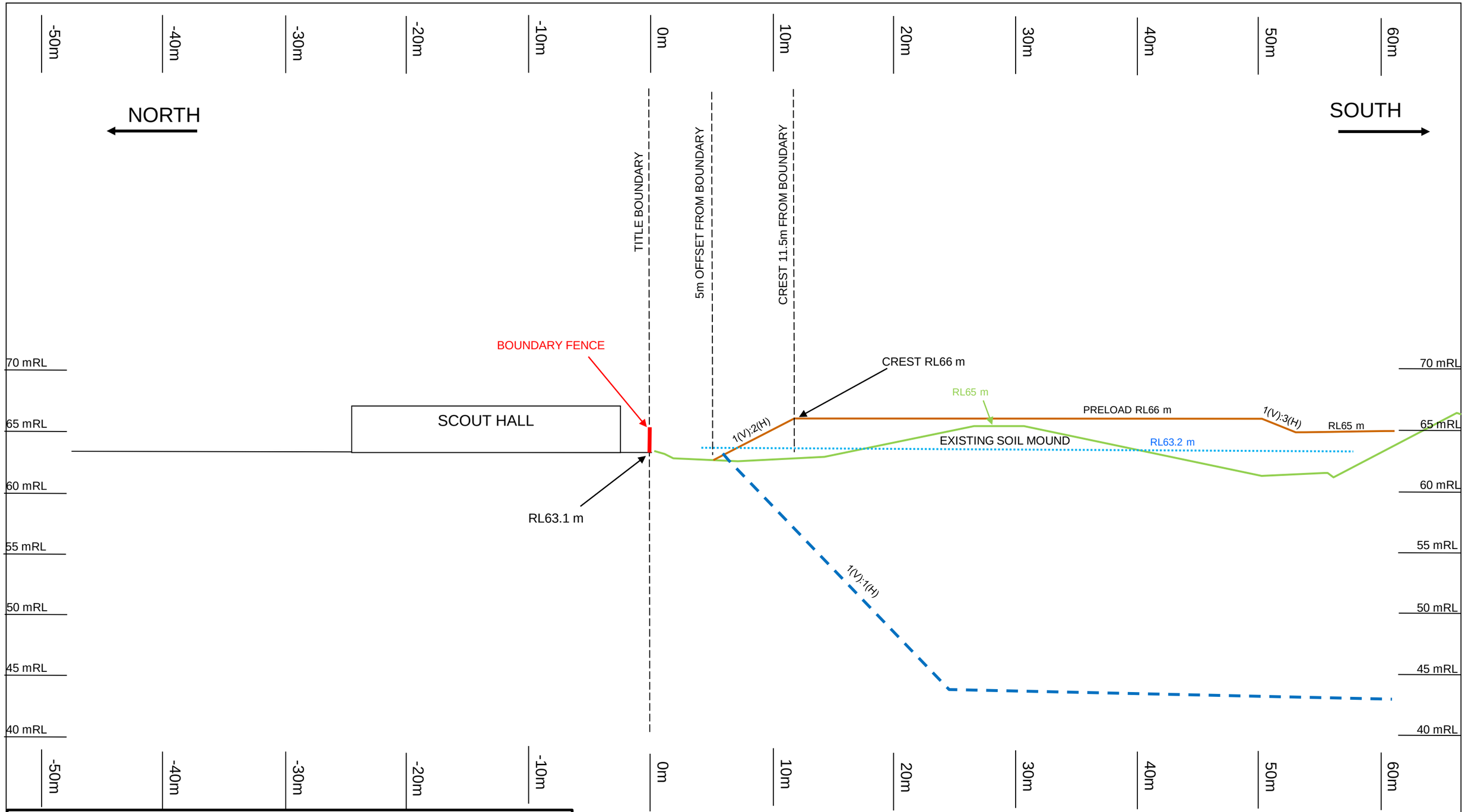
revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21

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

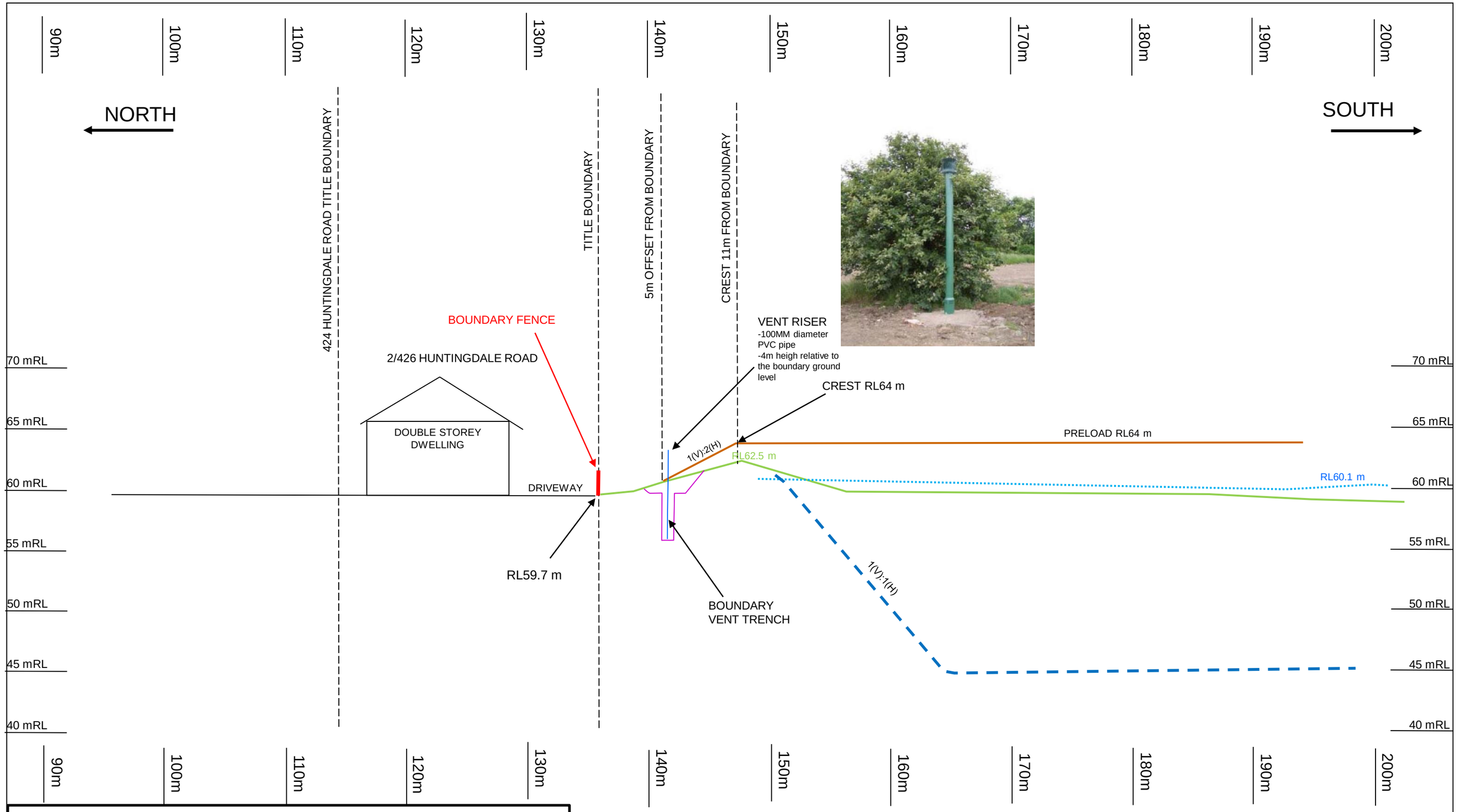
revision	description	drawn	approved	date
	DRAFT	FK	IP	23.07.21
	DRAFT	FK	IP	07.09.21
	V0	FK	IP	21.09.21

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



LEGEND

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

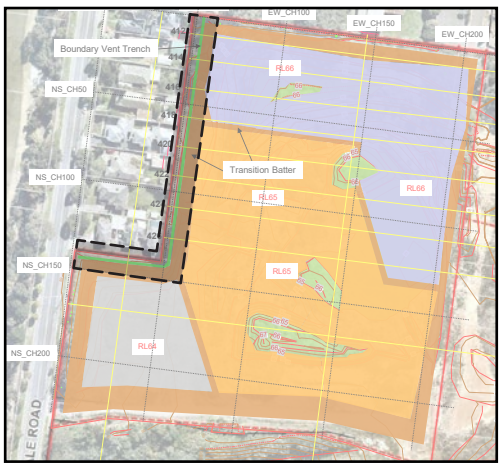
client: HUNTINGDALE ESTATE NOMINEES PTY LTD

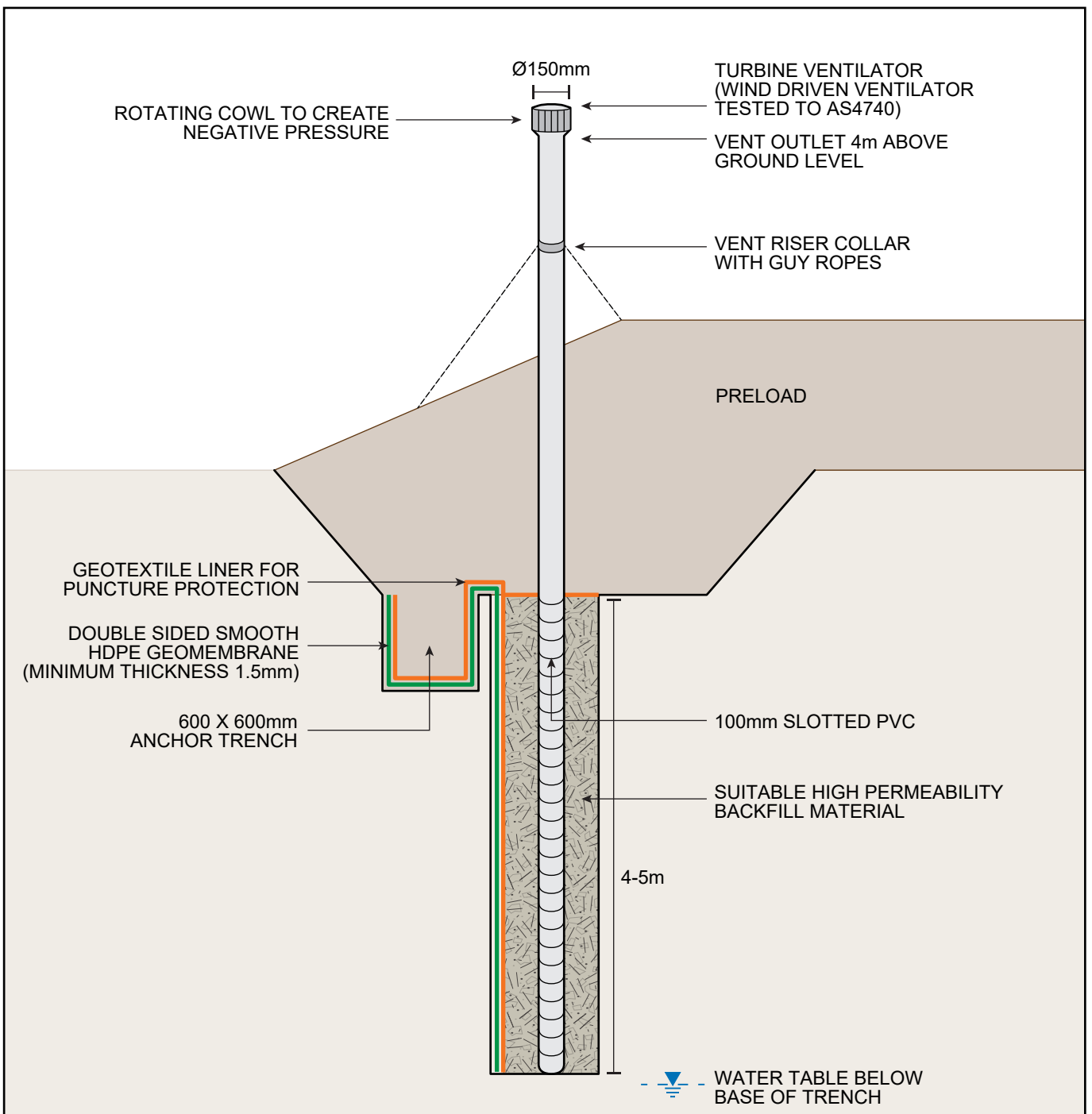
project: TALBOT AVENUE, OAKLEIGH SOUTH

title: 2/426 HUNTINGDALE ROAD CROSS SECTION

project no: GEOTABTF092574AA

figure no: 14





NOTE:
1. VENT RISERS INSTALLED AT MINIMUM 20m SPACING
2. HDPE GEOMEMBRANE INSTALLED ON BOUNDARY SIDE OF TRENCH
3. MANUFACTURER TO PROVIDE MQA CERTIFICATES TO DEMONSTRATE THE HDPE ROLLS PROVIDED MEET THE REQUIREMENTS OF GR1-GM13
4. GEOTEXTILE TO BE A NON-WOVEN POLYESTER OR POLYPROPYLENE WITH A G RATING ≥ 3000 IN ACCORDANCE WITH VICROADS STANDARD RC 381.01. MANUFACTURER TO PROVIDE MQA CERTIFICATES FOR THE ROLLS DELIVERED TO SITE.

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	JO	RG	22/09/21

drawn	JO
approved	RG
date	22/09/21
scale	NOT TO SCALE
original size	A3

coffey
A TETRA TECH COMPANY

client: TALBOT ROAD FINANCE PTY LTD

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

title: ZONE 1 - TEMPORARY BOUNDARY VENTING DESIGN - DETAIL

project no: ENAUABTF00751AB-R11 | figure no: FIGURE 15 | rev: A

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	XA	RG	15.09.21

LEGEND

- Gas bore
- Continuous monitoring location
- Gas bore to be sampled during stockpiling works
- Fence
- Site boundary
- Zone boundary
- Cadastre

IMAGERY SOURCE: Nearmap (Capure date: 11-09-2019).

0 22.5 45 67.5 90
SCALE 1:2,250 (A3) METRES

Projection: GDA 1994 MGA Zone 55

drawn	XA
approved	RG
date	15.09.2021
scale	1:2,250
original size	A3

coffey
A TETRA TECH COMPANY

client: TALBOT ROAD FINANCE PTY LTD

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

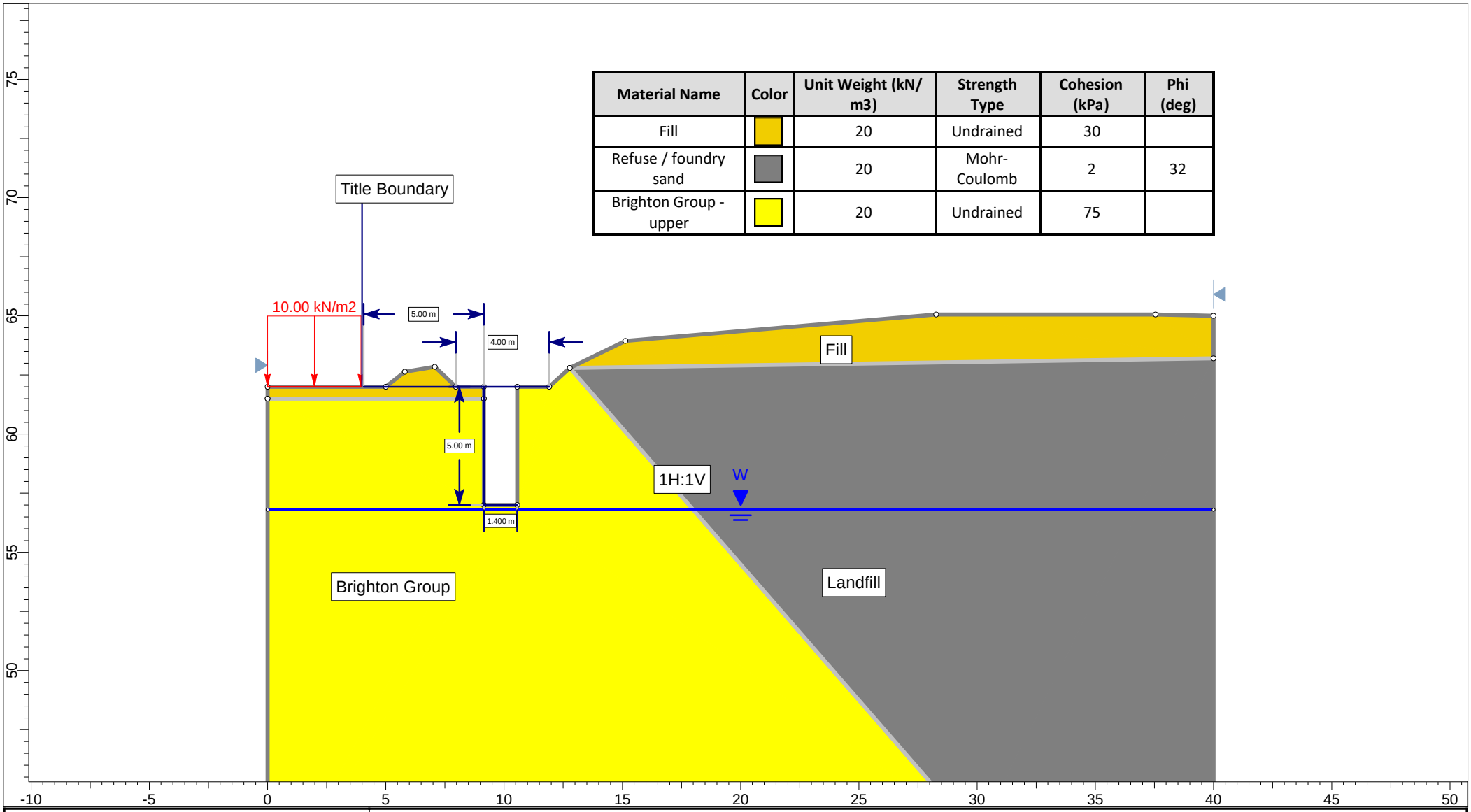
title: LANDFILL GAS MONITORING LOCATIONS

project no: ENAUABTF00751AB-R11 | figure no: FIGURE 16 | rev: A

MXD Template Reference: ENAUABTF00751AB_R11_GIS002_v0_3

Attachment B – Preliminary Stability Analysis

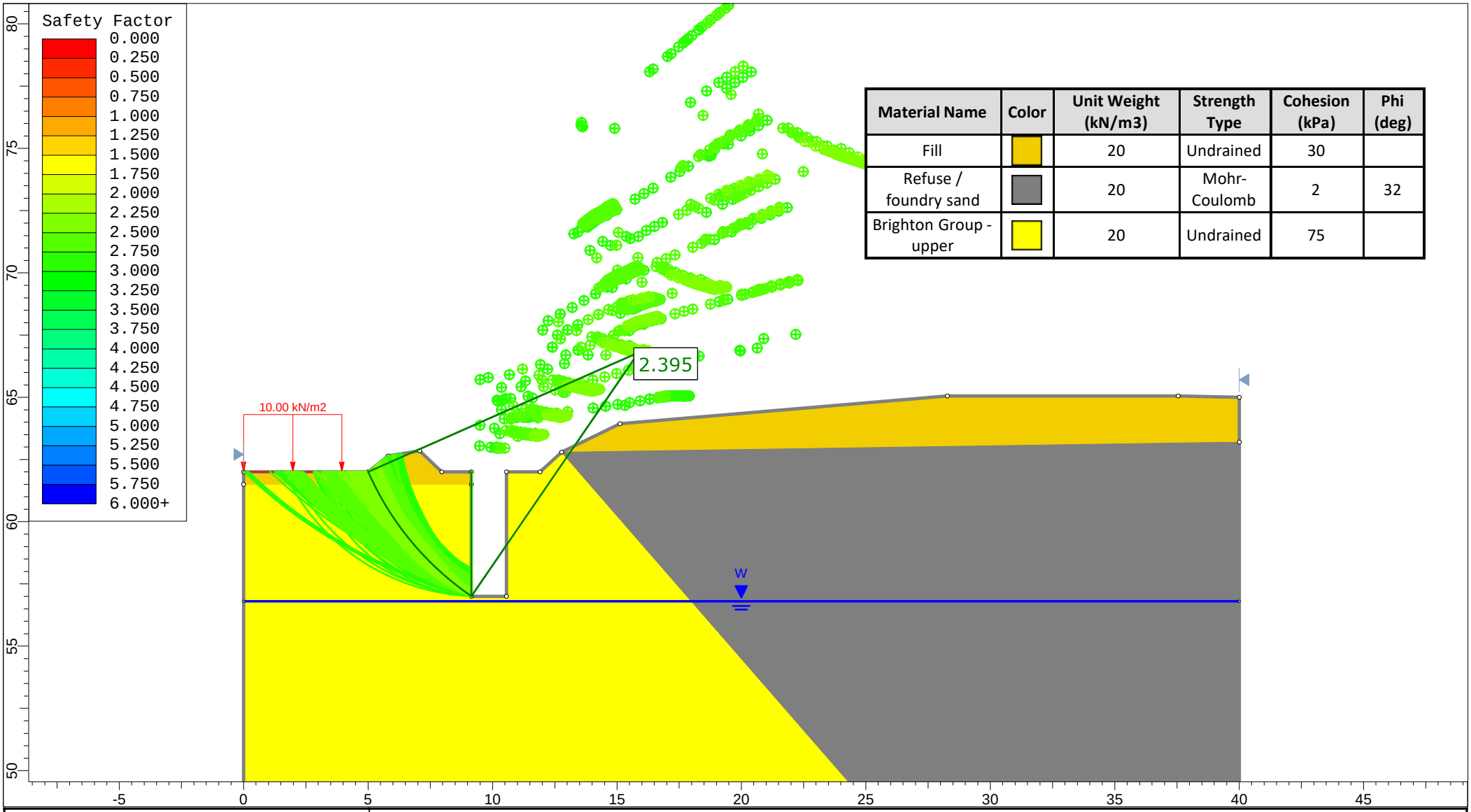
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Fill		20	Undrained	30	
Refuse / foundry sand		20	Mohr-Coulomb	2	32
Brighton Group - upper		20	Undrained	75	



rocscience

SLIDE 9.008

Project	Talbot Quarry - Zone 1 Vent Trench		
Group	Group 1	Scenario	Master Scenario
Drawn By	F. Khayyer	Company	Coffey
Date	16/01/2021, 2.07 PM	File Name	Figure 1: Venting Trench - during construction



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Fill		20	Undrained	30	
Refuse / foundry sand		20	Mohr-Coulomb	2	32
Brighton Group - upper		20	Undrained	75	

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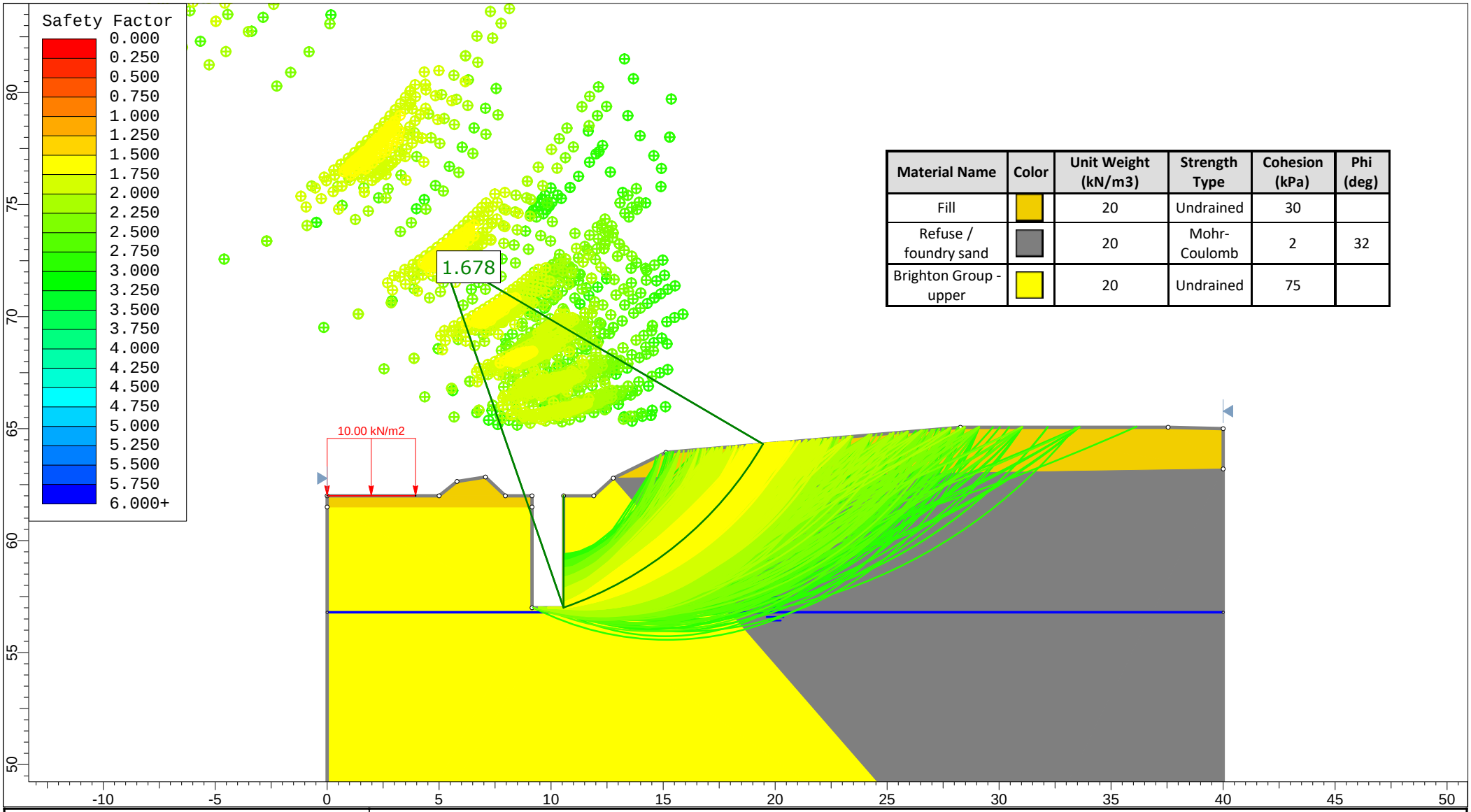
SLIDEINTERPRET 9.008

Project	Talbot Quarry - Zone 1 Vent Trench		
Group	Group 1	*Scenario*	Master Scenario
Drawn By	F. Khayyer	*Company*	Coffey
Date	16/01/2021, 2.07 PM	*File Name*	Figure 2: Venting Trench - during construction



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Fill		20	Undrained	30	
Refuse / foundry sand		20	Mohr-Coulomb	2	32
Brighton Group - upper		20	Undrained	75	

rocscience

SLIDEINTERPRET 9.008

Project	Talbot Quarry - Zone 1 Vent Trench		
Group	Group 1	*Scenario*	Master Scenario
Drawn By	F. Khayyer	*Company*	Coffey
Date	16/01/2021, 2.07 PM	*File Name*	Figure 3: Venting Trench - during construction

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different 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, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

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, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.