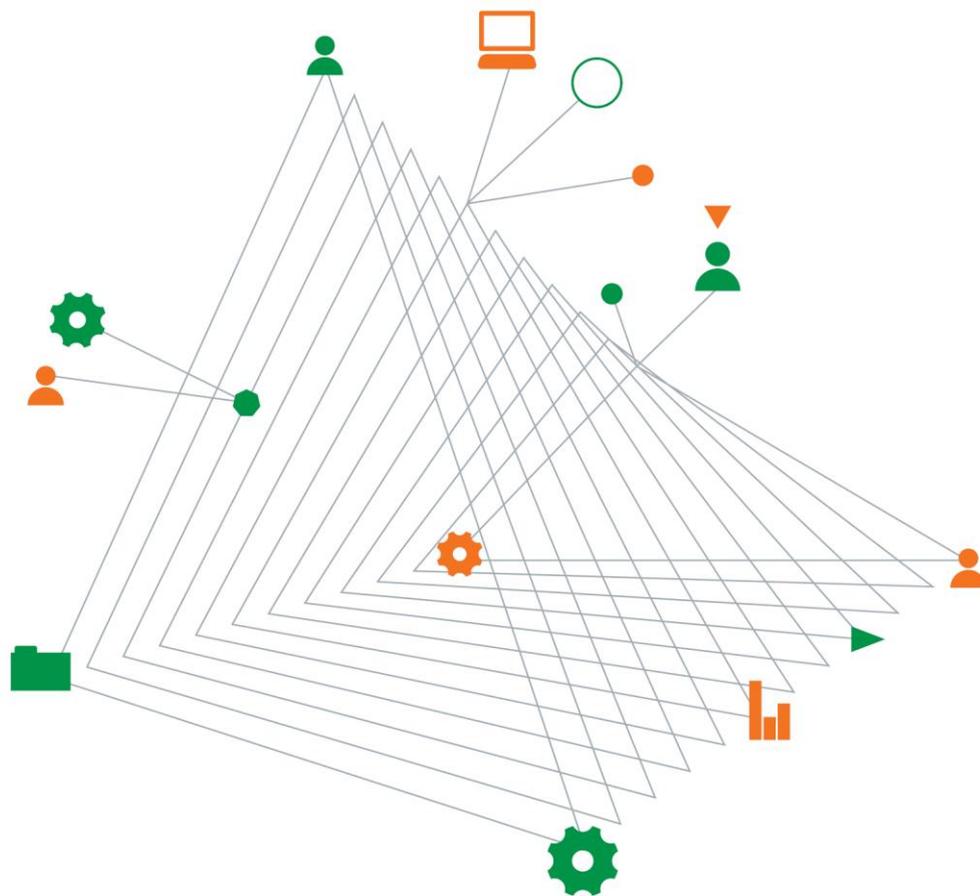


Norton Rose Fulbright Australia

Expert Witness Report of Ian Pedler

Re: Monash Planning Scheme Amendment C129

1 August 2017



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Expert Witness Report of Ian Pedler
Re: Monash Planning Scheme Amendment C129
Geotechnical issues related to the development

Expert Witness Report of Ian Pedler

Re: Monash Planning Scheme Amendment C129

Prepared for
Norton Rose Fulbright Australia

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1 August 2017

This letter presents my expert witness report for the above project.

If you have any questions, please contact the undersigned on 03 9290 7000.

For and on behalf of Coffey



Ian Pedler
Senior Principal Geotechnical Engineer

Coffey

1 August 2017

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1. Introduction

This report presents my expert evidence statement regarding geotechnical aspects related to Amendment C129 of the Monash Planning Scheme, to rezone land at 1221 -1249 Centre Road, Oakleigh South, to comprehensive development zone as requested by Norton Rose Fulbright Australia (NRF) on 26 July 2017. NRF is acting on behalf of the proponent for the development of the property, Sterling Global.

1.1. Background

On 2 August 2016, Urbis Pty Ltd (Urbis), on behalf of Sterling Global, submitted a planning scheme amendment request to the City of Monash to rezone the land at 1221 - 1249 Centre Road, Oakleigh South (the site) from Special Use Zone - Schedule 2 and General Residential Zone - Schedule 2 to Comprehensive Development Zone - Schedule 2, and to add an incorporated document to the planning scheme in the form of a comprehensive development plan (Amendment C129).

1.2. Instructions

This report has been prepared at the request of NRF with the following scope of works (based on the letter of instruction provided by NRF to me dated 26 July 2017 and attached in Appendix B.

1. Review background materials enclosed in the brief from Norton Rose Fulbright Australia;
2. Confer with instructing solicitors and counsel, where necessary;
3. Prepare an Expert Report which addresses:
 - a. Site geotechnical issues, including:
 - i. A summary of geotechnical investigations undertaken with respect to the Land to date;
 - ii. A summary of any geotechnical issues associated with the Land, and any recommendations made to address those issues;
 - iii. My opinion as to whether the Land can be made suitable to accommodate sensitive uses and, if so, what measures are required to be implemented;
 - b. Any other examples I am aware of involving development on landfill sites or other sites which required similar types of remediation and design measures to those required with respect to the Land;
 - c. My response to the submissions of agencies and other parties to the Council in respect of the Amendment, as relevant to my area of expertise; and
4. My attendance at the Public Hearing of this matter on 9 August 2017 for the purpose of presenting my expert opinion concerning these matters and my subsequent attendance at a site inspection with the Panel on 10 August 2017.

1.3. Form of report

Section 2 of the report provides a summary of the geotechnical investigations undertaken at the site. Section 3 provides a summary of the geotechnical issues related to the proposed development. Section 4 outlines the measures required to accommodate the sensitive uses proposed in the Amendment. Section 5 provides examples of other developments on landfills or similar sites. Section 6 presents my response to the submissions of agencies and other parties to the Council.

1.4. Qualifications and Experience

I am a Senior Principal Engineer of Coffey Geotechnics Pty Ltd in Melbourne which is located at Level 1, 436 Johnston Street, Abbotsford, Victoria, 3067.

I hold a Bachelor of Civil Engineering degree (1975) and a Master of Engineering Science degree (1977) from Melbourne University and I am a Fellow of the Institution of Engineers Australia. My Curriculum Vitae is presented in Appendix C.

I have worked as a geotechnical engineer for 41 years, the first 14 years with the former State Electricity Commission of Victoria and in recent years with Coffey. I have been involved with numerous geotechnical projects ranging from investigation and design of major power stations in the Latrobe Valley to industrial and residential developments around Melbourne. I have been involved with the development of landfills including development of a sports centre for Melbourne Grammar in Port Melbourne on landfill overlying Coode Island Silt, design of the landfill closure for Frank Hilton Reserve in Adelaide, geotechnical design of additional cell for environment approval for Benella Landfill, Victoria, and geotechnical advice and review for the construction of low level soil repository at former ammunition production ADI Limited, Footscray, site.

I have also assessed development plans and provided geotechnical design advice to Moonee Valley Council for the filling of a former large quarry for residential purposes at Valley Lake Niddrie which involved engineered fill up to 30m thick comprising boulders and overburden clay soils. I was the project manager for a 95 hectare residential Edgewater development at Maribyrnong since 1995 providing geotechnical and investigation design advice for lime treatment of potentially acid sulphate producing soft Coode Island Silt by including it in the building platform over highly compressible Coode Island Silt. I am currently advising Moonee Valley on development of Ascot Chase site that is to be constructed on controlled deep fill placed under Level 1 supervision over compressible Coode Island Silt.

1.5. Summary

In preparing this report I have:

- Reviewed the plans and documents provided with the brief;
- Reviewed the geotechnical reports prepared by Coffey for the site. Where these reports have been prepared by persons other than me, I have reviewed the report. I have also referenced information from other Coffey reports where required. The key assumptions made in preparing the Coffey reports are contained in each report.

In my opinion the various Zones across the development can be developed for the proposed mixed and sensitive uses subject to the undertaking and results of further site investigations, detailed design of appropriate foundation systems and service connections and close monitoring of the performance of the fill and building structures. The Zone 4 area provides greater scope to modify the uses with the remaining zones requiring additional measures to accommodate potential bearing pressure and settlement due to the land preparation activities and structures.

In my opinion, the geotechnical investigations and detailed design for Zone 4 of the proposed development (i.e. covering the filling of the south east pit area with engineered fill) are sufficient to permit the construction of the proposed mixed and sensitive uses including residential and light retail / commercial buildings. This assumes the detailed design of appropriate foundation systems and service connections and close monitoring of the performance of the fill and building structures are undertaken as required. Possible foundation system comprise rigid raft footings or piled foundations with particular attention given to the treatment across the natural / fill boundary.

In my opinion, further geotechnical investigations followed by detailed design are required for the other areas around the site including the former landfill in Zone 1 and the slimes filled pits in Zones 2, 3 and 5. These areas are located on compressible landfill or slimes and require systems to preload the site with fill or locate structures on piles founded in strata below the landfill or slimes. Particular attention must be given to collect and controlling any landfill gas and accommodating differential settlement in the fill areas and piled structures.

In my opinion, the Zone 4 area provides greater scope to modify the use. The other zones will require additional measures to accommodate potential bearing pressure and settlement issues associated with the land preparation activities and structures to achieve the proposed use.

1.6. Declaration

I have made all inquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

This expert report is based on application of geotechnical guidelines and standards which are commonly adopted by geotechnical practitioners. In preparing the report I have relied on my experience in providing geotechnical design and construction advice for major earthworks and building projects.

I have had regard to the Planning Panels Victoria *Guide to Expert Evidence* in preparing this report.

2. Summary of geotechnical investigations undertaken at the site

A number of environmental and geotechnical studies have been carried out at the site since the early 2000's by a range of consultants including AMAL Black, Golder Associates, AS James ,HLA Enviroscience, BFP Consultants as well as Coffey Environments and Coffey Geotechnics.

Coffey's geotechnical studies at the site extend back to 2004 when we provided advice to Winslow Constructors. This was then continued for Jandaro Pty Ltd and involved preliminary conceptual design for the areas designated Zone 3, Zone 4 and Zone 5. The current studies have been for Sterling Global and included our report compiling the previous information into Coffey Geotechnics Report on Geotechnical Investigations Huntingdale Estate Coffey (December 2013a) (ref 9257AA-AD). The reports referred to in Coffey (December 2013a) were:

1. Golder Associates Pty Ltd "Report on Geotechnical Investigation, Talbot Avenue Quarry, South Oakleigh, Victoria." Reference No. 00612002/008 dated 17 February 2000. Report prepared for Pioneer International Ltd.
2. A.S. James Pty Limited "Proposed Elderly Persons Development, Part Volume 3645 Pioneer Site, Talbot Avenue, Oakleigh." Reference No. 100569 dated 20 June 2000. Report prepared for G.D.K. Financial Solutions.
3. AMAL Black Pty Ltd "Proposed Residential Development Ex Pioneer Quarry Property Talbot Avenue Oakleigh, Geochemical Assessment of Environmental Embankments." Reference No. V500R dated 10 May 2002 (Volume 1). Report prepared for W P Brown & Partners Pty Ltd.
4. Golder Associates Pty Ltd "Draft Report on Preliminary Geotechnical and Contamination Assessment, Former Pioneer Quarry Site, Cnr Centre and Huntingdale Road, Oakleigh South." Reference No. 03612069/001 dated 18 June 2003. Report prepared for WP Brown & Partners Pty Ltd.
5. HLA-Envirosciences Pty Limited, "Draft Environmental Site Assessment, Former Pioneer Quarry, Talbot Avenue, Oakleigh, VIC." Reference No. M4008202_RPT08apr04 dated 8 April 2004. Report prepared for Jandaro Pty Ltd.
6. HLA-Envirosciences Pty Limited, "Assessment of Risks Posed by Landfill Gas – DRAFT, Former Pioneer Quarry, Talbot Avenue, Oakleigh, VIC." Reference No. 4008208_RPT_18apr04.doc dated 13 May 2005. Report prepared for Jandaro Pty Ltd.
7. HLA-Envirosciences Pty Limited, Borehole Logs BH16 to BH19. Prepared for Jandaro Pty Ltd.
8. HLA-Envirosciences Pty Limited, "Groundwater Numerical Modelling, Former Quarry, Talbot Avenue, Oakleigh." Reference No. M4008208_RPT_110705 dated 11 July 2005. Report prepared for Jandaro Pty Ltd.
9. Coffey Geosciences Pty Ltd, "Geotechnical Advice Regarding Slimes, Former Pioneer Quarry Western Pit, Talbot Avenue, Oakleigh." Reference No. M5683/1-AF dated 25 October 2004. Report Prepared for Winslow Constructors Pty Ltd.
10. Coffey Geosciences Pty Ltd, "Engineered Filling Of Talbot Avenue Pit, Oakleigh, Digital Technology And Earthworks Supervision Preliminary Comments for Discussion Purposes" Reference No. M5683/1-AL dated 1 March 2005. Report Prepared for Jandaro Pty Ltd.
11. BFP Consultants Pty Ltd, Borehole Logs BH1 to BH6 drilled during the period from 26 to 27 July 2004.

Other reports that have been prepared by Coffey Geotechnics for Jandaro Pty Ltd include:

- Coffey (August 2005) Preliminary Conceptual Geotechnical Design, Controlled Filled Former Quarry Pit (Zone 3 and the Plant Zone), Proposed Residential Development, Talbot Avenue, Oakleigh South, dated 24 August 2005 (Ref: M5683/2-AI-Draft),
- Coffey (December 2005) Geotechnical Investigation, Zone 3 and the Plant Zone, Proposed Residential Development, Talbot Avenue, Oakleigh South, 2 December 2005 (ref: M5683/2-AN),
- Coffey (January 2006) Preliminary Conceptual Geotechnical Design, Controlled Filling of Former Quarry Pit (Zone 4), Proposed Residential Development, Talbot Avenue, Oakleigh South, 25 January 2006 (ref: 5683/2-AG).

The Coffey (December 2013 a) Report on Geotechnical Investigations Huntingdale Estate (ref 9257AA-AD dated 3 December 2013) was planned to be conducted in the following phases:

- Phase 1: Investigation and Assessment
- Phase 2: Conceptual Design Options & Feasibility
- Phase 3: Detailed Design, Implementation and Compliance
- Phase 4: Validation

The Coffey December 2013 a report was for the Phase 1 studies.

Concurrently with the Phase 1 investigation Coffey (August 2013) was prepared for the Phase 2 Concept Design Report on Controlled filling of Zone 4. (8257AA-AI dated 13 August 2013).

Coffey (December 2013 b) presented Conceptual Site Models (9257AA-AJ Rev 2 dated 3 December 2013) and described a number of options to develop the site while addressing the presence of the landfill in the North West area, slimes pits in the eastern part of the site and the unfilled pit along Huntingdale Road.

Coffey (September 2015) presented a report entitled Zone 4 Detailed Design (9257AA-AQ Revision 10). This report comprised the Phase 3 design of the filling process and subsequent treatment of the Zone 4 area. This report was peer reviewed by Golder Associates and their comments were included in the Revision 10 of the report.

Coffey (June 2015) Backfill Design Specification, Huntingdale Estate, Oakleigh South, VIC;

Coffey (November 2015) Construction Quality Assurance Plan, Huntingdale Estate, Oakleigh South, VIC;

In recent times Coffey has been acting as superintendent for the site filling for the Zone 4 area. Only limited preparatory works has been conducted as part of these services with no major filling works carried out.

Coffey has prepared proposals to conduct detailed designs for the other areas including:

- Design of Zones 2, 3 and 5 which have not been undertaken at this time.
- A report looking at preparation of Zones 1 and 2.
- A proposal for additional investigations of Zone 1 and Zone 2 which have not yet been undertaken.
- A letter describing a preloading strategy with estimated fill quantities. Some preloading has been conducted around the site but not to the degree outlined in this proposal at this stage.

Coffey (Environments): As part of the ongoing studies for the site Coffey Environments has prepared a number of environmental and planning reports which include some of the geotechnical borehole data and information.

2.1. Summary of conditions

Historical data indicates that the sand quarry was operational from the mid-1950s to at least until the 1960s. After completion of the quarrying operations, the site was filled with various fill materials until

1989. Previous geotechnical and environmental investigations by others indicate that subsurface conditions across the site generally comprise uncontrolled fill materials overlying varying thicknesses of soft to firm clay fill "slimes" overlying medium dense to dense natural sands known as the Brighton Group. Slimes are a waste product generated when the fine sand, clay and silt fractions are washed from natural sands during sand mining operations. Typically, the slimes are stored in a saturated state in former quarry pits, and comprise very soft clays and silts and very loose sands. The slimes are highly compressible, with insitu moisture contents higher than their liquid limit, giving the slimes fluid properties.

The site has been divided into the 5 zones shown on Figure 1 while Figure 2 shows the locations of boreholes, CPT and test pits that have been drilled on the site. Figure 2 also shows the location of a number of sub surface sections that have been produced In Coffey (December 2013a). Typical sections "CC" and HH' are presented in this statement as Figures 3 and 4.

The subsurface profile of each of the zones is described in the following sections.

2.1.1. Zone 1

This zone includes an old landfill that is understood to be producing methane gas. Based on the investigations undertaken in this area in the past indicate that the subsurface soils generally comprise uncontrolled fill and landfill materials extending to depths of up to 18m.

2.1.2. Zone 2, 3, and 5

The subsurface profile within zones 2, 3 and 5 comprises a sand and clay soil cover (uncontrolled fill), typically about 1.5m to 9.2m thick, overlying very soft to firm clay slimes and very loose silty sand fill. It is noted that the test pits undertaken as part of previous investigations describe the uncontrolled fill materials to include portions of refuse materials, such as paper, fabric, rubble and wire at some locations. Based on the presence of methane gas within the Zone 2, there is potential for methane generating waste to also be present in Zone 2. The fill and slimes materials extend to depths ranging from between 1.5m and 19.6m at the boreholes and CPTs located within the former quarry pit, but may extend deeper elsewhere. The CPT results within the clay slimes indicate the presence of layers of sand and coarse materials. Based on the available information, it appears that the former quarry pit extends close to the boundaries of Zone 2 and 3. The western portion of Zone 5 formerly supported the processing plant used as part of the sand mining operations. Mining operations and slimes are understood to have been more limited in this area. The clay slimes appear to be thinnest or absent within the south western portion of Zone 5, and thickest within the northern portion of Zone 3 and the central portion of Zone 2. The subsurface profile within these zones varies significantly over relatively short horizontal distances, particularly in the areas where the clay slimes are thicker.

2.1.3. Zone 4

The northern part of Zone 4 has been partially filled with clay slimes and unknown fill materials. Based on the results of Coffey's 2005 investigations, the clay slimes are understood to be approximately 5m deep. The depth of the fill materials are not known. It is understood that in the past, concrete had been placed within the Zone 4 quarry. The volume and extent of the concrete is not known.

3. Summary of any geotechnical issues associated with the Land, and any recommendations made to address those issues

3.1. Geotechnical issues identified

The geotechnical investigations and historical records indicate the site has been backfilled with slimes from the former sand mining operations investigations. The extent of the former sand pits, slimes location and covering fill is presented in the subsurface sections in Coffey (December 2013) Report on Geotechnical Investigations.

As mentioned in Section 2.1, the slimes exhibit high moisture content, low strength and are highly compressible with low load bearing properties to support construction equipment or buildings. The slimes are normally capped with higher strength sand or clay fill which bridges over the slimes but causes consolidation settlement of the slimes as the excess water in the slimes is expelled by the additional load exerted by the applied fill.

Significant total settlement (up to many hundreds of mm) and associated differential settlement will occur and can vary laterally across the site due to the variable nature of the composition and thickness of the slimes and thickness of the fill layers. One method to reduce the magnitude and variations in settlement that buildings have to accommodate is to preload the site with excess fill to accelerate the settlement prior to any building construction. This causes the slimes to undergo primary consolidation associated with the expulsion of excess water from the slimes. Primary consolidation is followed by secondary consolidation or creep settlement which occurs with constant applied loads established during the primary consolidation phase. The subsequent addition of extra surcharge to the site can restart primary consolidation. The magnitude of secondary settlement is significantly smaller than the primary consolidation but can continue for many years. With field and laboratory testing and close monitoring of the settlement performance including test trial embankments, predictions can be made of ongoing settlement. Buildings and services can be designed to account for the predicted settlement.

Another method to reduce large total settlement of any building or surface works is to employ piled footing systems to transfer the building loads through the weaker slimes material to the underlying stronger soils. This results in relatively small settlement of the piled structures typically in the order of 10mm to 20mm. Careful design and detain of services entering the building is required to allow for differential settlement between the ongoing fill/slimes and the relatively rigid pile system. The consolidating fill/slimes can create down drag loads on piled foundations additional to the building loads.

These approaches were described in the Conceptual Site Models Coffey (December 2013 b) which outlined the preloading and piling options for the development.

The landfill located in the Zone 1 has some similarities to the characteristics of the sand slimes. In this case, the landfill is less dense than typical soils and is subject to large settlement due to applied loads as well as decomposition of the putrescible wastes. Again, preloading of the site can be employed as well as piled foundations. On some other sites, heavy compaction involving dynamic compaction or impact rolling has been conducted. For example, dynamic compaction methods were employed for during the construction of the circuit for the Grand Prix in Albert Park over landfill material.

3.2. Recommendations made to address geotechnical issues

The footing system and site development methods described above have been considered in the design of measures to develop the Talbot Avenue site as follows:

Zone 4. Large void with some shallow slimes areas and groundwater near the base of the pit. It is proposed to remove and dry the slimes and then replace back into the pit. The site will then be filled with engineered fill placed in the thin layers and tested to comply with Australian Standards as shown in Figure 8. The final filled surface will be monitored and provided the settlement is within the design criteria, the site will be allowed to commence development. Layers of permeable sand will be included through the fill to provide flow paths for groundwater across the site to reduce the potential of changes to the regional groundwater flows. Particular attention will be given to services and buildings which are located close to the natural ground / fill boundary as shown in the layout in Figure 8.

Zone 1. Former landfill site will be preloaded and monitored with structures supported on piled foundations as shown on Figure 6. Any building will include gas collection systems and a potential side interception system may be employed depending on gas readings to be collected from subsequent studies.

Zones 2, 3 and 5 are located on the filled slimes pit with a former landfill to the south. A combination of preloading and piled footing systems are proposed in this area to account for potential total and differential settlement as shown on Figure 7. Further investigation and detailed design is proposed for these areas to assess the appropriate construction measures.

In my opinion, if the above recommendations are implemented, all of the zones can be made suitable for development of the proposed mixed and sensitive uses including residential and light retail/commercial buildings.

4. Examples of development on landfill sites involving similar geotechnical challenges

4.1. Geotechnical options available

Development on landfill sites, repository systems of soft slimes or mine tailings or natural soft soils such as Coode Island Silt requires particular attention to be given to the low bearing capacity of the soft sediments and the potential for large total and differential settlement that can occur over many years as the soils consolidate or decompose. To account for these issues, these sites are generally preloaded to accelerate the settlement or, any buildings and structures are supported on piles founded below the soft materials. Some examples of these systems are described in the following sections.

4.2. Piled solutions

A piled foundation solution was employed in the 1970s for the Footscray Institute of Technology building in Farnsworth Avenue Footscray (now called Footscray Secondary College). This included piled footings through the landfill to found on the underlying basalt rock. The footing system also include a gas ventilation layer to collect and discharge any gas generated from the decomposing waste. This building is still in current use.

Additionally, a McDonalds store was constructed in North Geelong in the 1970's on a former landfill. I recall that excessive settlement of the carpark occurred after a few years which lead to the regrading and surfacing of the carpark area. I am not aware of any further repairs being undertaken.

In the early 1970's, a number of landfill sites were developed using rigid raft footing systems which were developed and reported by Dr John Holland.

More recently, a piled footing system and gas control layers has been used for residential buildings on a former landfill in Cavanagh Street, Cheltenham.

4.3. Preloading and/or settlement monitoring

Construction on highly compressible Coode Island Silt has become more prominent since the large residential redevelopment of the former stockyards at the Kensington Banks in the 1990's. This was accomplished by using heavily reinforced rigid raft slab foundations and in some areas deep piles through the Coode Island Silt. A set of building guidelines were developed for the site which described the complex geological conditions associated with the Coode Island Silt and provided guidance on footing design to foundation designers and information to prospective owners. The higher, more heavily loaded tower complex near the Maribyrnong River was founded on piles.

This approach was extended to the Edgewater Residential Development site on the western side of the Maribyrnong River opposite Flemington racecourse. It was necessary to build a fill platform above the 100 year flood level. This fill platform surcharged the underlying Coode Island Silt which varied from being absent to 8m thick, resulting in significant settlement up to several hundreds of millimeters. A set of building guidelines was also developed for this site. In addition, the Council required that a verification of fill report and verification of settlement report be prepared by Coffey before infrastructure and dwelling construction could commence.

The Edgewater site included stabilisation of the Coode Island Silt within the fill platform. Frequent monitoring of over 80 deep settlement plates and subsequently over 150 settlement pins for periods of up to 10 years occurred. The close monitoring of the filled zones allowed progressive release of the land for development. Details of the project and innovative approach to development are described in the ACEA judge's award in Appendix D.

A preload approach was adopted for the Ascot Chase Development at the former Orica site in Ascot Vale which is also located on Coode Island Silt. I provided advice to Moonee Valley City Council on

the proposed engineered fill platform and preloading strategy. I reviewed the settlement monitoring results and advised Council when the preload could be considered finished and construction could commence. I also reviewed the settlement monitoring results and impacts on services. The site is now proceeding to the final Stage.

Valley Lake is a large reclamation of the former quarry site in Niddrie. I provided geotechnical advice to Moonee Valley City Council on cliff stability protection works and placement of fill up to 30m deep for future residential development. A settlement monitoring program was implemented to monitor the settlement of the completed fill platform. Most of the site has now been developed for residential and medium density housing.

5. The Land can be made suitable to accommodate sensitive uses

Geotechnical investigation and design (which has been peer reviewed by Golder Associates) have been carried out for Zone 4. The proposed controlled filling will be carried out under appropriate supervision with monitoring of settlement to ensure the fill is performing as expected before being released for infrastructure works and subsequent residential development. Design criteria for services and building works has been described in Coffey (June 2015) Backfill Design Specification. This process is similar to filling works that Coffey has been involved with in respect to the backfilling of the former quarry at Valley Lake Niddrie, Edgewater Development in Maribyrnong and Ascot Chase in Ascot Vale. Development will be permitted when settlement records indicate the settlement of the fill area is within the predicted values.

Zone 1 is located on a landfill and controls are proposed to monitor and control the migration of gas and ongoing settlement. I understand that the SESP that has been prepared outlines the process and technical details required to ensure that the site is rehabilitated to a standard which will allow staged Section 53X Environmental Audits to be completed and allow the redevelopment of the site in accordance with the proposed masterplan. Further investigation and studies are also proposed to assess the design approach and establish geotechnical design criteria. Development of this area will follow procedures developed for building on landfill and will involve a combination of piled footings or preloaded areas combined with rigid raft footing systems to permit the construction of the proposed mixed and sensitive uses including residential and light retail / commercial buildings. Suitable systems to accommodate services and infrastructure connections will be required together with close settlement monitoring to allow design and construction of the site. The final design solution will take account of the results of additional investigations.

Zones 2, 3 and 5 are located on capped zones of slimes. The thickness of fill and slimes varies across the site. In some areas the fill is suitable to support large construction equipment. In other areas the fill cover is relatively thin and further filling is required to provide a suitable capping layer. Further investigations, including preloading, and design has been proposed for these areas. Based on these further studies, the final foundation design system will be selected to account for settlement during and post construction. The use of piled foundations is proposed under buildings for support. This method of construction has been used in recent times on a landfill in Cheltenham. Again appropriate design for connection of services will be carried out to account for potential differential settlement across the site similar to the approach adopted at Edgewater, Ascot Chase and Cheltenham.

The concept plans that have been developed (Coffey, December 2013 b) recognise the potential total and differential settlements that need to be addressed. The proposed additional investigations and design activities will refine the design and construction methods. This information will be used as a basis for the rehabilitation and development of the site using preloading or piling solutions and to also support the Certificate or Statement of Environmental Audit.

In my opinion the various Zones across the development can be developed for the proposed mixed and sensitive uses subject to the undertaking and results of further site investigations, detailed design of appropriate foundation systems and service connections and close monitoring of the performance of the fill and building structures. The Zone 4 area provides greater scope to modify the uses with the remaining zones requiring additional measures to accommodate potential bearing pressure and settlement due to the land preparation activities and structures.

6. Response to other submissions

A number of submissions have been made to council relating to the geotechnical issues associated with the site. My opinion in relation to these submissions is presented in the following sections.

6.1. EPA submission

In its letter to Council dated 10 March 2017, the Environment Protection Authority stated:

The site at 1221-1249 Centre Road, Oakleigh South was formerly used as a quarry and a landfill and therefore is considerably contaminated. Council previously commissioned a Review of Environmental Matters at the site prepared by Senversa to provide an assessment of the environmental reports and arrangements to date. This report provides a useful overview to demonstrate the environmental risks of the development. The report highlights a number of environmental risks and longer term logistical risks at the site. These being and not limited to:

- *In-ground infrastructure to manage landfill gas and leachate and the responsibility and payment for the ongoing management of these*
- *Restrictions suggested managing risks to residents vs Housing density plans (i.e. limiting digging past a defined depth).*

EPA emphasises to Council that this land rezoning proposal presents the above risks. It is imperative that these risks associated with development of landfill sites are appropriately managed through the rezoning and development approvals to protect future land uses, human health and safety.

EPA understands that the proposed amendment will apply the existing Environmental Audit Overlay to incorporate the whole of the land within the Overlay and includes the land shown in the 'Former Talbot Quarry and Landfill Comprehensive Development Plan 2016' map as exhibited as an Incorporated Document within the Monash Planning Scheme.

The EPA advises Council that it is generally supportive of the proposed Planning Scheme Amendment and application of the Comprehensive Development Zone (COI) applied to 1221-1249 Centre Road, Oakleigh South.

EPA supports the staged approach to the environmental audit of the Development Site, allowing the site to be rezoned with the support of an Environmental Site Assessment (ESA) and Site Environmental Strategy Plan (SESP), and requiring a section 53X Audit as a condition of any future planning permit for a sensitive use.

However, EPA wishes to advise Council that this approach may send a false message to Developers/Land Owners that contaminated land sites can eventually be developed for a sensitive use, which may not be the case depending on the findings of the section 53X audit. EPA reinforces this message to Council to ensure that the COI does allow for consideration of a range of commercial and other non-sensitive uses, as Council proposes.

Application of Ministerial Direction No. 1:

It is EPA's view that addressing the requirements of Ministerial Direction No.1 through a staged approach of applying the CDZ through a land rezoning process is appropriate, on the basis that a section 53X audit will be required as part of any future planning permit condition allowing sensitive uses on the Development Site.

As this approach is not strictly in accordance with Ministerial Direction No.1, EPA wishes to emphasise to Council that the General Practice Note requires responsible authorities to be satisfied that the level of contamination will not prevent the use of the site, if they make the decision to not require an environmental audit as early as possible in the planning process.

The Edgewater Development in Maribyrnong I was involved with clearly identified the risks on obtaining approval to commence works and the building guidelines which were provided to land owners and their builders and noted the special geotechnical issues that had to be considered in construction on that site. These risks have been identified in the reports that Coffey has prepared and the concept design options provide measures to deal with them (refer Coffey December 2013 b).

6.2. Valente Submission

In its letter to Council dated 3 March 2017, A & S Valente And Associates Pty Ltd stated:

2. THE LAND CURRENTLY ZONED GRZ2 SHOULD NOT BE REZONED

That part of the land zoned General Residential Zone Schedule 2 should not be rezoned as Comprehensive Development Zone. The current zoning already allows residential uses provided that an environmental audit certifies that it is permissible. As can be seen from the adjoining property at 1213-1217 Centre Road Oakleigh South, Council has already issued a planning permit for a multi-level apartment building in the same zoning namely GRZ2.

Accordingly, there is no planning impediment for residential development on this part of the land, as long as the last open quarry pit situated on the south west side of the site, (currently filled with water), being remediated and filled and then signed off by the Environmental Auditor.

The owner of the land already has a planning permit issued in May 2015 for remediation works for the land. The owner's representative consulted with the community extensively at that time and published a brochure that it delivered to all the households in the area which gave undertakings that the remediation works would commence in 2015 and finish within 24 months by the end of 2017. However, from our understanding, the owner has not even commenced the remediation works.

The Planning Officer's report to Council at its meeting on 27 September 2016 supporting this Amendment application stated that:

"However, the owner has indicated that undertaking an audit prior to the rezoning does not provide sufficient certainty to warrant the expense and effort of remediating the site and is not the process undertaken for rezoning more recently for several sites in metropolitan Melbourne, including the Amcor paper mill site in Alphington".

We have the following concerns with the above comment and the Planning Officer's Report:-

- the Amcor paper mill site is not a former sand quarry and therefore the analogy to this land is not relevant;*
- the above comment suggests to us that the owner of the land is exercising undue influence on the Council by stating that it will not remediate the land unless it obtains the rezoning;*
- the Planning Officer's report to Council did not inform the Councillors nor the community that the s.173 Agreement was registered on the titles to the land to protect the interests of the local community.*

Even if the rezoning were to be approved by the Minister, there is a real risk that the current owner will simply obtain planning permits for high density residential development and Mixed Use development and then sell the property with lucrative planning permits without undertaking any remediation of the land. They will waste the time of the Council and the community with more consultations regarding planning permit applications without any certainty regarding whether the remediation works will be undertaken nor whether an Environmental Auditor after remediation will allow the type of residential development proposed.

Our view is that given that the current owner has not remediated the land in accordance with the current planning permits, that Council should be pro-active and exercise the power that is has pursuant to clause 4.2.11 of the s.173 agreement to allow the clean fill of the last open quarry pit so that this blight on the neighbourhood can be removed. As previously stated, the Council should also consider purchasing the whole site and allow the establishment of a number of sporting facilities all in the one area.

Another reason why this land should not be rezoned to CDZ to accommodate high density development is because three quarters of this land has already been filled with non-engineered fill. The one quarter that remains to be filled is now bounded to the south by a new multi-level apartment building which is currently under construction. The community should not be exposed to any level of risk whether from embankment failure or exposure to waste material through the remediation of land other than by allowing clean fill of the last open quarry pit.

The community has already experienced land slip and subsidence issues impacting adjoining properties recently at 170-174 Highbury Road Mount Waverley. In addition, a major land slip of a former clay quarry also occurred after dwellings were constructed at "Sienna Falls" in Highbury Road Glen Waverley.

Unlike the Highbury Road sites which have clay soils, the stability of soil batters are more critical in sandy soils such as this old sand quarry site.

Therefore it is vitally important that the total history of this site is considered in any decision being made regarding the rezoning of the land by a Planning Panel and ultimately the Minister for Planning. The history of the land culminating with the registration on all the titles of this land with the s.173 Agreement has not been advertised with Amendment C 129 nor was it brought to the attention of the Councillors in the Planners Report to Council on 2ih September 2016.

Finally, it should be noted that the majority of the old sand quarry sites in the City of Kingston were filled and then either converted to public open space or rezoned from SUZ to the Green Wedge Zone which only permits low density use. In our view, should the Council not seriously consider purchasing this land, then the most appropriate zone should be Green Wedge Zone. This zoning would protect future generations from constructing buildings on this problematic land, which may result in future sink holes or land slips.

I was involved with conducting proof engineering (design checking) of the remedial works at "Sienna Falls" site. The main failure occurred in the reinforced earth retaining wall after a very heavy rainfall event and was associated also with the standard of construction of the wall. The reconstructed wall, with additional structural capacity in some areas, has performed satisfactorily since.

I am also involved with rehabilitation of a number of sand pits at Heatherton Road and Henry Street in Heatherton. These former sand pits were often 15m to 20m deep and were excavated with near side vertical walls due to the dense consistency and cementation of the sandy soils.

In the case of the Zone 4 south west pit at the Talbot Avenue site, Coffey has analysed the stability of the existing batters which have stood for many years with only minor fretting in Section 4.2.5 of Coffey (September 2015). The results of the stability assessment show that the existing batters have an FOS for global stability of approximately 1.3 or greater. The results also show an appropriate FOS exists for instability at Huntingdale R. Along Talbot road there are localised parts of the batters which are steeper than 45° and have exhibited signs of fretting. In these areas it was recommended that the batters be excavated back to achieve a maximum slope angle of 45°. Our design has nominated appropriate setbacks from the crest during construction and once the site is filled the stability issue is completely removed.

Mr Valente's concerns regarding slope stability are one of the major geotechnical issues to be addressed. I consider the stability of the side walls has been suitably addressed by the proposed remedial works to fill Zone 4 with engineered fill.

7. References

- AMAL Black, (May 2000). *Proposed Residential Development Ex Pioneer Quarry Property Talbot Avenue Oakleigh, Geochemical Assessment of Environmental Embankments. (Ref No. V500R Volume 1)*. AMAL Black Pty Ltd
- AMAL Black. (September 2002c). *Hydrogeological Assessment, Ex Pioneer Quarry Property, Talbot Avenue, Oakleigh, VIC*. AMAL Black Pty Ltd.
- A.S. James (June 200). *Proposed Elderly Persons Development, Part Volume 3645 Pioneer Site, Talbot Avenue, Oakleigh.* (Ref No. 100569) A.S. James Pty Limited
- BFP Consultants (July 2004). *Borehole Logs BH1 to BH6 drilled during the period from 26 to 27 July 2004*. BFP Consultants Pty Ltd.
- Golder Associates (February 2000). *Report on Geotechnical Investigation, Talbot Avenue Quarry, South Oakleigh, Victoria.* (Ref No. 00612002/008) Golder Associates Pty Ltd
- Golder Associates (June 2003). *Draft Report on Preliminary Geotechnical and Contamination Assessment, Former Pioneer Quarry Site, Cnr Centre and Huntingdale Road, Oakleigh South.* (Ref No. 03612069/001) Golder Associates Pty Ltd.
- Coffey (October 2004). *Geotechnical Advice Regarding Slimes, Former Pioneer Quarry Western Pit, Talbot Avenue, Oakleigh.* (Ref No. M5683/1-AF), Coffey Geosciences Pty Ltd.
- Coffey (August 2005), *Preliminary Conceptual Geotechnical Design, Controlled Filled Former Quarry Pit (Zone 3 and the Plant Zone), Proposed Residential Development, Talbot Avenue, Oakleigh South,* (Ref: M5683/2-AI-Draft), Coffey Geosciences Pty Ltd.
- Coffey (August 2005) *Preliminary Conceptual Geotechnical Design, Controlled Filled Former Quarry Pit (Zone 3 and the Plant Zone), Proposed Residential Development, Talbot Avenue, Oakleigh South,* Coffey Geotechnics Pty Ltd.
- Coffey (December 2005) *Geotechnical Investigation, Zone 3 and the Plant Zone, Proposed Residential Development, Talbot Avenue, Oakleigh South,* (Ref: M5683/2-AN), Coffey Geotechnics Pty Ltd.
- Coffey (January 2006) *Preliminary Conceptual Geotechnical Design, Controlled Filling of Former Quarry Pit (Zone 4), Proposed Residential Development, Talbot Avenue, Oakleigh South,* (ref: 5683/2-AG). Coffey Geotechnics Pty Ltd.
- Coffey (August 2013) *Concept Design Report on Controlled filling of Zone 4* (ref 8257AA-AI), Coffey Geotechnics Pty Ltd.
- Coffey. (December 2013 a). *Report on Geotechnical Investigations, Huntingdale Estate, 1221 – 1249 Centre Road, Oakleigh South.* Coffey Geotechnics Pty Ltd.
- Coffey (December 2013 b) *Concept Design Models, Huntingdale* (ref 9257AA-AJ Rev 2) Coffey Geotechnics Pty Ltd.
- Coffey. (June 2015). *Zone 4 Backfill Design Report, Huntingdale Estate, Oakleigh South, VIC.* Coffey Geotechnics Pty Ltd.
- Coffey (September 2015) *Zone 4 Detailed Design* (9257AA-AQ Revision 10) Coffey Geotechnics Pty Ltd.
- Coffey. (November 2015). *Zone 4 Construction Quality Assurance Plan, Huntingdale Estate, Oakleigh South, VIC.* Coffey Geotechnics Pty Ltd.
- HLA. (January 2005a). *Environmental Site Assessment – Phase 3, Former Pioneer Quarry, Talbot Avenue, Oakgh, VIC.* HLA-Envirosciences Pty Ltd.
- HLA. (January 2006). *Assessment of Risk Posed by Landfill Gas - Former Quarry, Talbot Avenue, Oakleigh.* HLA-Envirosciences Pty Ltd.
- HLA. (July 2004b). *Environmental Site Assessment – Stage 2, Former Pioneer Quarry, Talbot Avenue, Oakleigh, VIC.* HLA-Envirosciences Pty Ltd.
- HLA. (July 2005c). *Groundwater Numerical Modelling - Former Quarry, Talbot Avenue, Oakleigh.* HLA-Envirosciences Pty Ltd.

URS. (November 2014). *Proposed Redevelopment of Talbot Road Landfill Sites at 1221 to 1249 Centre Road, Oakleigh, City of Monash, Victoria – Site Environmental Strategy Plan*. URS Australia Pty Ltd.

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Appendix A – Figures



FIGURE 1

drawn	DBA	 <p>coffey geotechnics SPECIALISTS MANAGING THE EARTH</p>	client:	TALBOT ROAD FINANCE PTY LTD		
approved			project:	GEOTECHNICAL INVESTIGATION HUNTINGDALE ESTATE, OAKLEIGH SOUTH		
date	17 July 2013		title:	SITE LAYOUT PLAN		
scale	NTS		project no:	GEOTABTF09257AA-AD	figure no:	FIGURE 1
original size	A4					

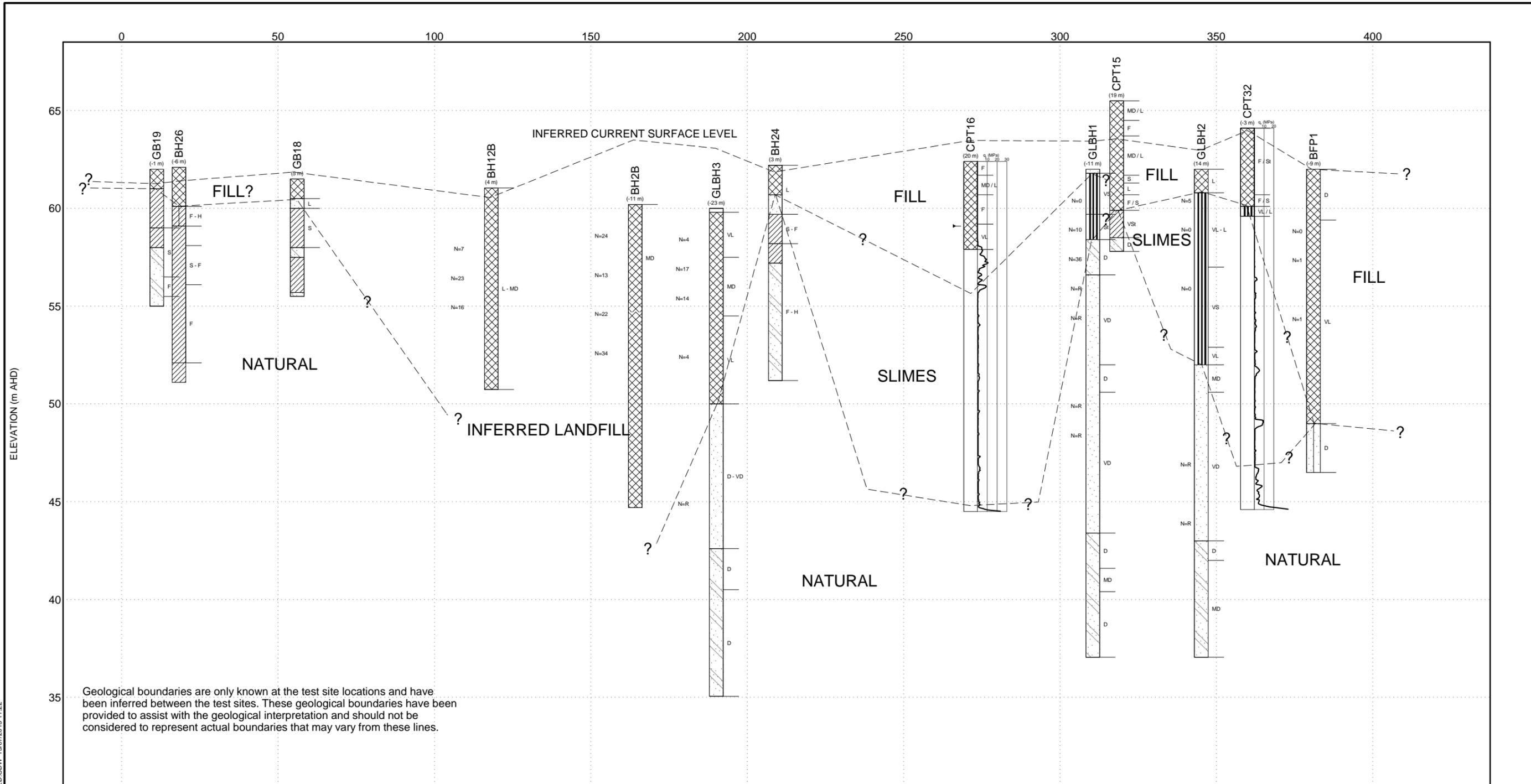


SOURCE: TAYLORS DEVELOPMENT STRATEGISTS, DETAIL SURVEY PLAN, 1221 OAKLEIGH ROAD, REF: 1808/S, REV A, 12/06/2013

revision	description	drawn	approved	date	drawn	MS/KJ	client:	TALBOT ROAD FINANCE PTY LTD
					approved	-	project:	GEOTECHNICAL INVESTIGATION HUNTINGDALE ESTATE, OAKLEIGH SOUTH
					date	12/07/2013	title:	BOREHOLE AND CPT LOCATION PLAN
					scale	1:2000	project no:	GEOTABTF09257AA-AD
					original size	A3	figure no:	FIGURE 2



FIGURE 2



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.

CDF_0.9_05AA.GLB_Fence_COFFENCEA3L_GEOTABTF09257AA.GPJ_DD_EXTENDED.GDW 15/07/2013 11:22

POST LEGEND

BH #

- Baseline Offset
- Weathering EW - DW
- Vane Shear VS=50/23kPa
- SPT N Value N=4
- Drilling Water Info
- Pocket Penetrometer (kPa) PP=50

MATERIAL GRAPHIC

	FILL		SAND		CLAYEY SAND		CONCRETE
	SILTY SAND		CLAY		SLIMES		SANDY CLAY
	ASPHALT		SILTY CLAY				

Piezometer

Min mbgl Date

Max mbgl Date

Top Response Zone

Bottom Response Zone

CPT #

0 15 30 45 60 75m

H 1:1250

V 1:200

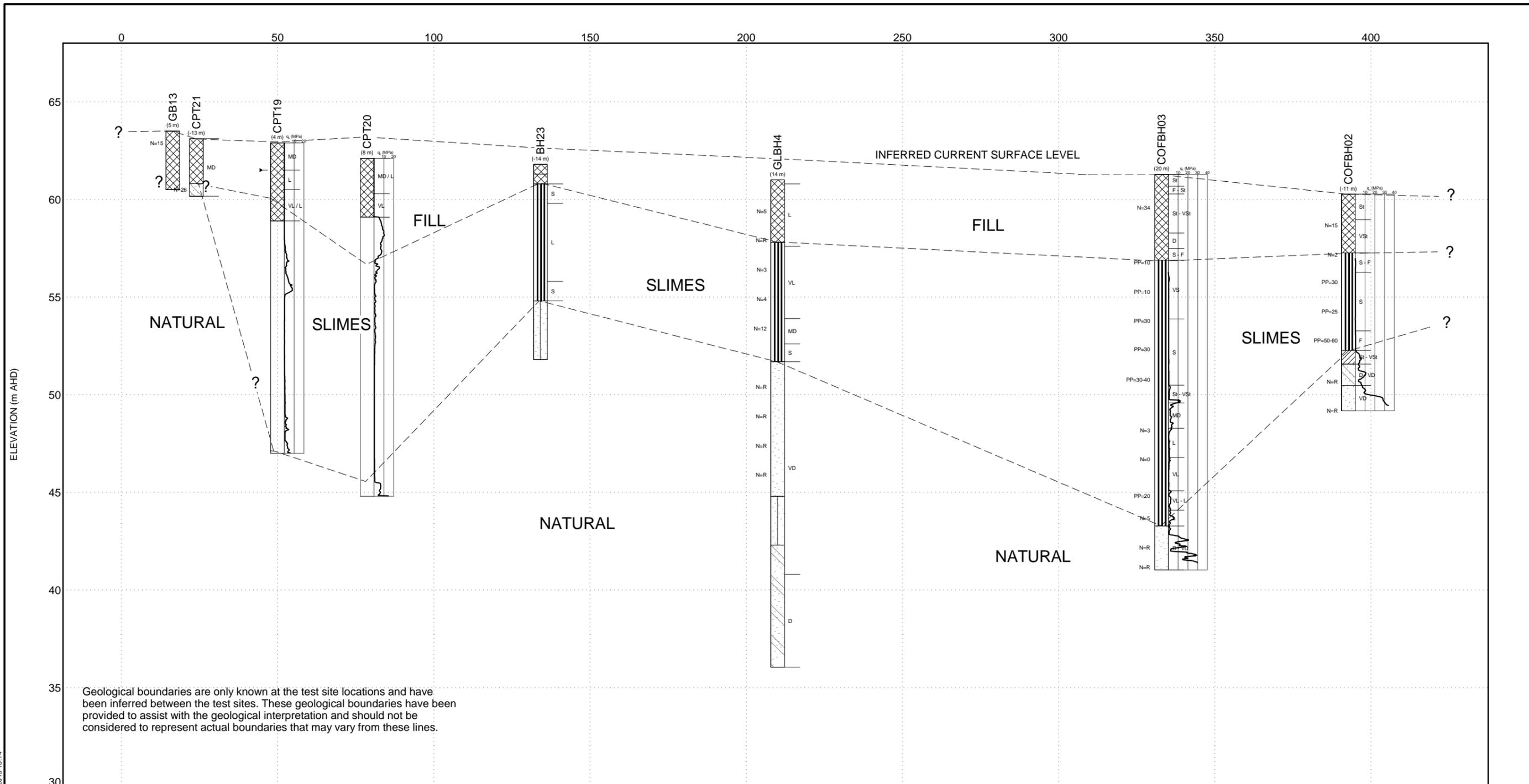
Coord.System: MGA94 Zone 55 Height Datum: AHD

drawn	CY
approved	
date	15/07/2013
scale	H 1:1250 V 1:200
original size	A3

coffey
geotechnics
SPECIALISTS MANAGING
THE EARTH

client:	Talbot Rd Finance Pty Ltd		
project:	Residential Development, Talbot Avenue, Oakleigh South		
title:	SECTION CC'		
project no:	GEOTABTF09257AA-AD	fig no:	5
rev:			

FIGURE 3



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.

CDF_0.9_MAL/CLB_Fence_COFFENCE_A3L_GEO/TABTF09257AA_GPJ_JJGDW_01/07/2013_15:14

POST LEGEND

BH #

- Baseline Offset
- Weathering EW - DW
- Vane Shear VS=50/23kPa
- SPT N Value N=4
- Drilling Water Info
- Pocket Penetrometer (kPa) PP=50
- Consistency

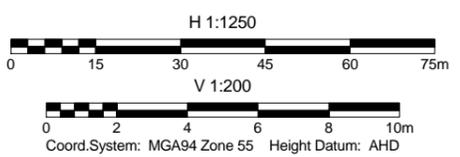
CPT #

Piezometer

- Min mbgl Date
- Max mbgl Date
- Top Response Zone
- Bottom Response Zone

MATERIAL GRAPHIC

- FILL
- SAND
- SANDY CLAY
- SLIMES
- CLAYEY SAND
- SILTY SAND

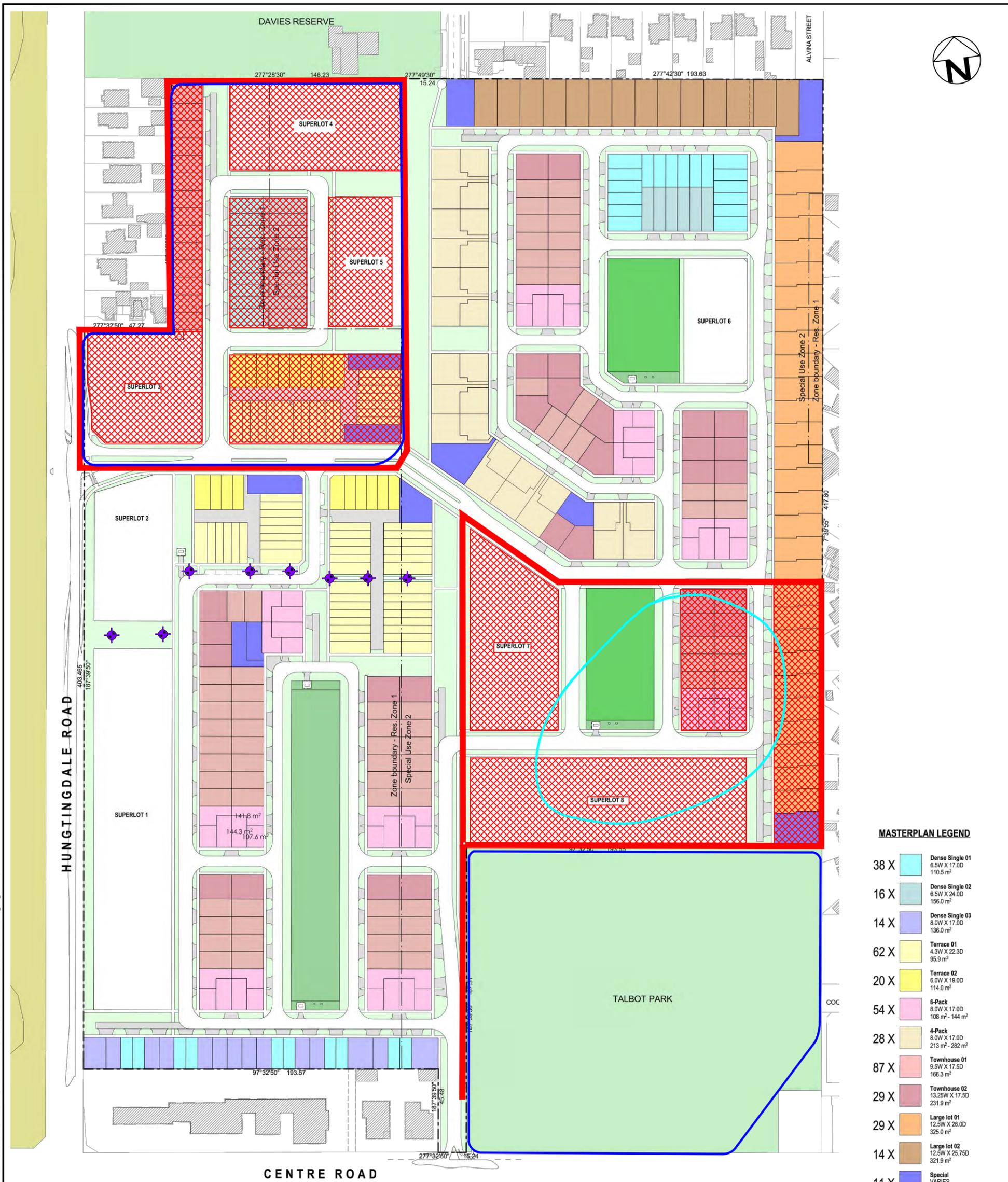


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approved	
date	1/07/2013
scale	H 1:1250 V 1:200
original size	A3

coffey
geotechnics
SPECIALISTS MANAGING
THE EARTH

client:	Talbot Rd Finance Pty Ltd		
project:	Residential Development, Talbot Avenue, Oakleigh South		
title:	SECTION HH'		
project no:	GEO/TABTF09257AA-AD	fig no:	10
rev:			

FIGURE 4



MASTERPLAN LEGEND

- 38 X Dense Single 01
6.5W X 17.0D
110.5 m²
- 16 X Dense Single 02
6.5W X 24.0D
156.0 m²
- 14 X Dense Single 03
8.0W X 17.0D
136.0 m²
- 62 X Terrace 01
4.5W X 22.3D
95.9 m²
- 20 X Terrace 02
6.0W X 19.0D
114.0 m²
- 54 X 6-Pack
8.0W X 17.0D
108 m² - 144 m²
- 28 X 4-Pack
8.0W X 17.0D
213 m² - 282 m²
- 87 X Townhouse 01
9.5W X 17.5D
166.3 m²
- 29 X Townhouse 02
13.25W X 17.5D
231.9 m²
- 29 X Large lot 01
12.5W X 26.0D
325.0 m²
- 14 X Large lot 02
12.5W X 25.75D
321.9 m²
- 11 X Special VARIES
136.0 m²

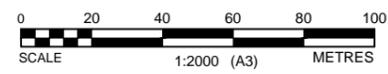
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LEGEND

- LEACHATE TREATMENT WELLS (IF REQUIRED)
- APPROXIMATE EXTENT OF LANDFILL WASTE (EXTENT TO BE FULLY DEFINED)
- APPROXIMATE EXTENT OF POTENTIALLY LANDFILLED AREA (EXTENT TO BE FULLY DEFINED)
- VERTICAL GAS VENTING SYSTEM
- HIGH GAS PROTECTION MEASURES FOR BUILDINGS
- OPEN SPACES/STORMWATER BASINS

SOURCE: MASTERPLAN (SITE PLAN) FROM SITE SERIES, DKO, 10831, TP.00.10.04 25/11/2014



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approved	IVP
date	27/07/2017
scale	AS SHOWN
original size	A3

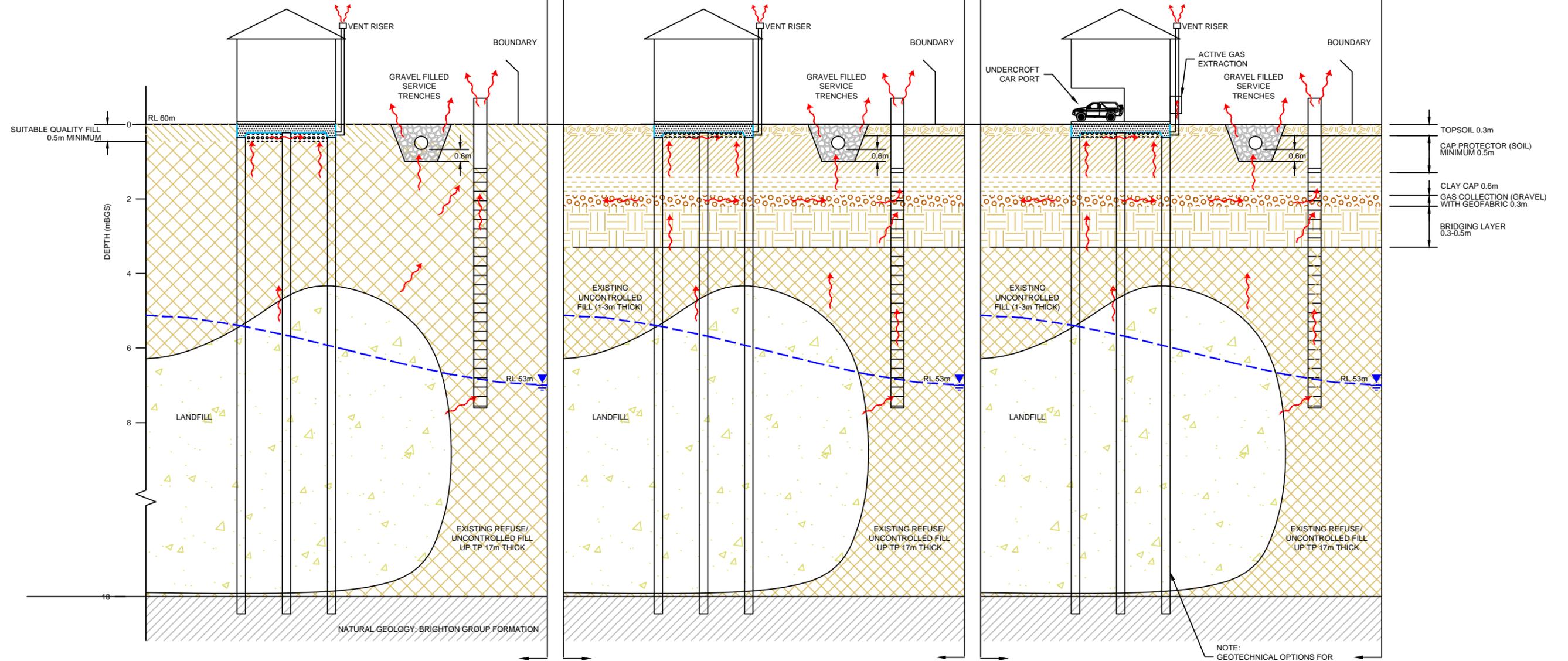


client:	NORTON ROSE FULBRIGHT AUSTRALIA		
project:	MONASH PLANNING SCHEME AMENDMENT C129		
title:	REMEDIAL OPTIONS FOR MASTERPLAN		
project no:	ENAUABT00751AC- RO2	figure no:	FIGURE 5
rev:	A		

CONCEPT DESIGN FOR
'LOW' GAS HAZARD POTENTIAL

CONCEPT DESIGN FOR
'MODERATE' GAS HAZARD POTENTIAL

CONCEPT DESIGN FOR
'MODERATE TO HIGH' GAS HAZARD POTENTIAL



- TOPSOIL 0.3m
- CAP PROTECTOR (SOIL) MINIMUM 0.5m
- CLAY CAP 0.6m
- GAS COLLECTION (GRAVEL) WITH GEOFABRIC 0.3m
- BRIDGING LAYER 0.3-0.5m

NOTE: GEOTECHNICAL OPTIONS FOR ZONE 1 BUILDINGS INCLUDE PILES

LEGEND

- LANDFILL GAS MIGRATION
- GROUNDWATER LEVEL (PREDICTED)
- TOPSOIL
- CAP PROTECTOR (SOIL)
- CLAY CAP
- GAS COLLECTION (GRAVEL) WITH GEOFABRIC
- STRUCTURAL FILL
- EXISTING UNCONTROLLED FILL
- LANDFILLED WASTE
- PROPRIETARY GAS MEMBRANE WITH VENTING LAYER
- VENTING LAYER

NOTES:
1. CONCEPT DESIGN FOR MODERATE GAS HAZARD POTENTIAL MAY ALSO BE ADOPTED AS PART OF BOUNDARY PROTECTION MEASURES WHERE GAS HAZARD POTENTIAL IS LOW

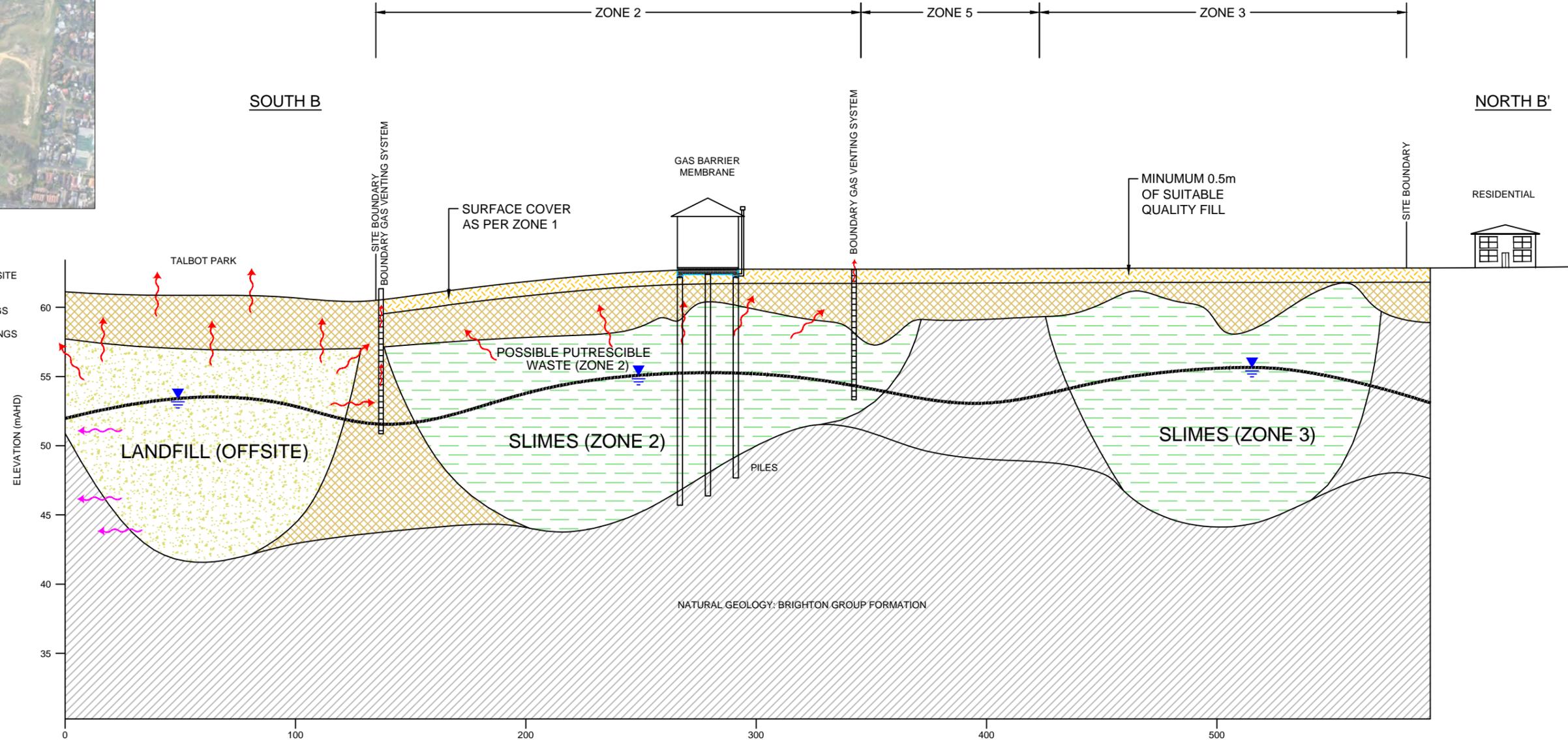
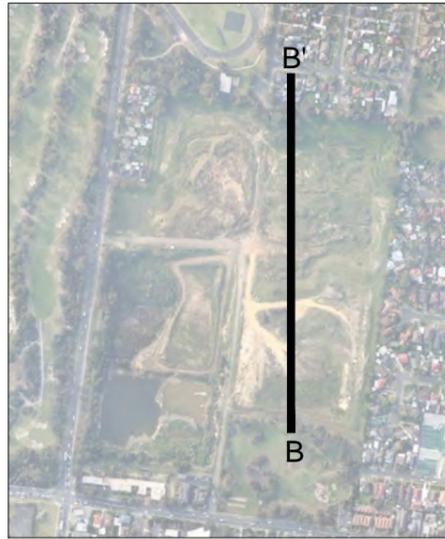
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original size	A3



client:	NORTON ROSE FULBRIGHT AUSTRALIA		
project:	MONASH PLANNING SCHEME AMENDMENT C129		
title:	ZONE 1 CONCEPTUAL DESIGN GAS MITIGATION		
project no:	ENAUABTF00751AC-R01	figure no:	FIGURE 6
rev:	A		

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- LANDFILL GAS TREATMENT OPTIONS:**
1. REMOVE LANDFILL WASTE FROM SITE
 2. AREA-WIDE GAS BARRIER AND BOUNDARY VENTING
 3. VOID VENTING BENEATH BUILDINGS WITH BOUNDARY VENTING
 4. GAS MEMBRANE BENEATH BUILDINGS WITH BOUNDARY VENTING

LEGEND

- EXISTING UNCONTROLLED FILL
- LANDFILLED WASTE
- SLIMES
- GROUNDWATER LEVELS
- POTENTIAL LANDFILL GAS MOVEMENT
- POTENTIAL LEACHATE MOVEMENT
- PROPRIETARY GAS MEMBRANE WITH VENTING LAYER

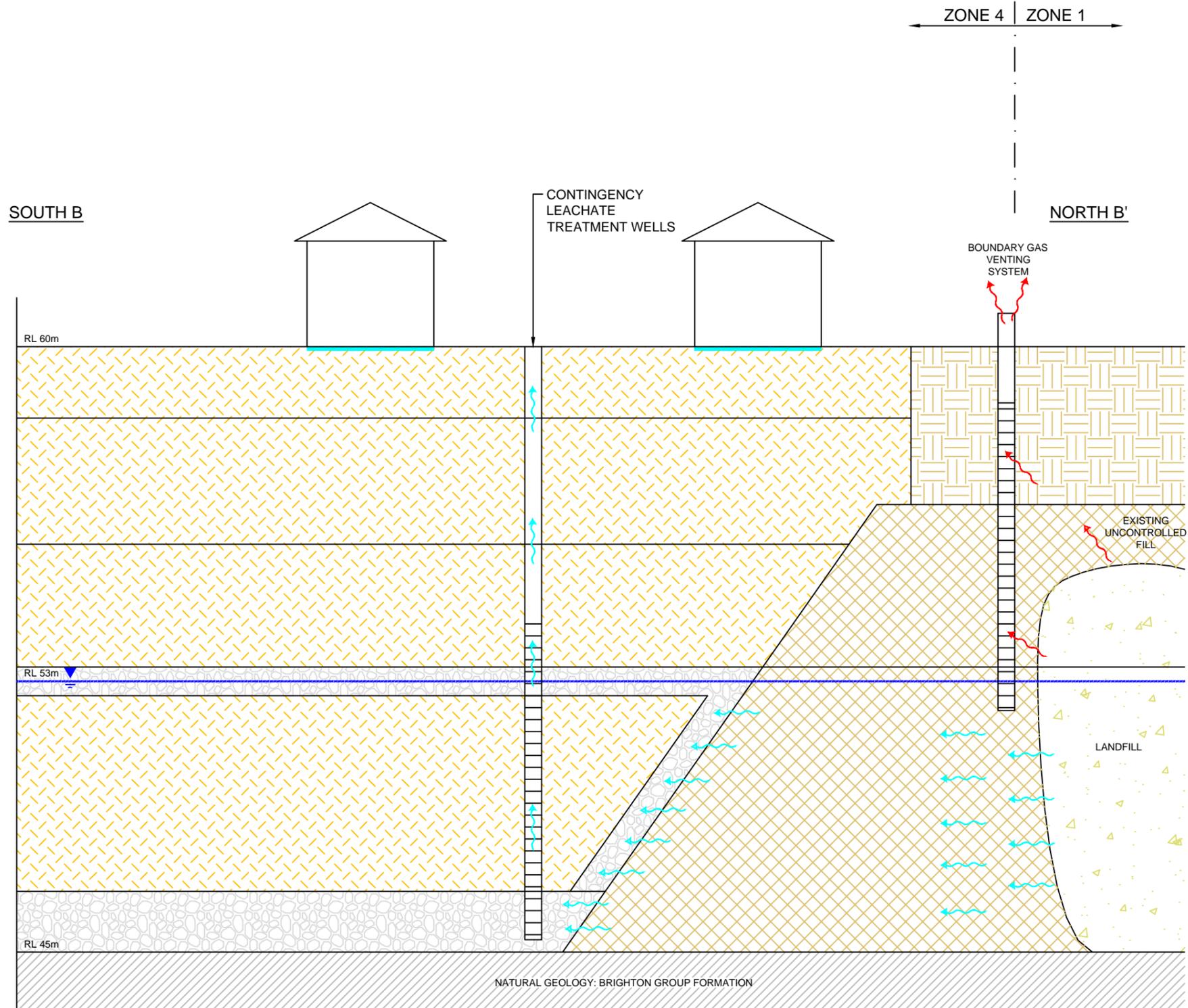
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approved	IVP ;
date	27/07/2017
scale	AS SHOWN
original size	A3



client:	NORTON ROSE FULBRIGHT AUSTRALIA		
project:	MONASH PLANNING SCHEME AMENDMENT C129		
title:	ZONES 2, 3 & 5 CONCEPTUAL DESIGN GAS MITIGATION		
project no:	ENAUABTF00751AC-R02	figure no:	FIGURE 7
rev:	A		



ENGINEERING BACKFILL OF ZONE 4 QUARRY VOID
(REFER TO ZONE 4 BACKFILL DESIGN REPORT)
SOIL QUALITY TO MEET SITE CRITERIA
AS DETAILED IN BACKFILL PROTOCOL

DRAINAGE LAYER (REFER TO
ZONE 4 BACKFILL DESIGN REPORT)

LEGEND

- LANDFILL LEACHATE
- LANDFILL GAS
- STABILIZED GROUNDWATER LEVEL
- AS PER ZONE 1 DESIGN (FIGURE 12)
- EXISTING UNCONTROLLED FILL
- LANDFILLED WASTE
- ENGINEERED BACKFILL
- DRAINAGE LAYER
- GAS MEMBRANE - DEPENDANT ON RESIDUAL GAS RISK

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date	27/07/2017
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client:	NORTON ROSE FULBRIGHT AUSTRALIA		
project:	MONASH PLANNING SCHEME AMENDMENT C129		
title:	ZONE 4 CONCEPTUAL DESIGN GAS MITIGATION		
project no:	ENAUABTF00751AC- R02	figure no:	FIGURE 8
rev:	A		

Appendix B – Letter of Instruction

2 Your engagement

2.1 Our client wishes to engage you to:

- (1) review the background materials in the enclosed brief;
- (2) confer with instructing solicitors and counsel, Joanne Lardner, where necessary;
- (3) prepare an expert report which addresses:
 - (a) site geotechnical issues, including:
 - (i) a summary of geotechnical investigations undertaken with respect to the Land to date;
 - (ii) a summary of any geotechnical issues associated with the Land, and any recommendations made to address those issues;
 - (iii) your opinion as to whether the Land can be made suitable to accommodate sensitive uses and, if so, what measures are required to be implemented;
 - (b) any other examples you are aware of involving development on landfill sites or other sites which required similar types of remediation and design measures to those required with respect to the Land;
 - (c) your response to the submissions of agencies and other parties to the Council in respect of the Amendment, as relevant to your area of expertise; and
- (4) appear at the Public Hearing of this matter on 9 August 2017 for the purpose of presenting your expert opinion concerning these matters and attend a site inspection with the Panel on 10 August 2017.

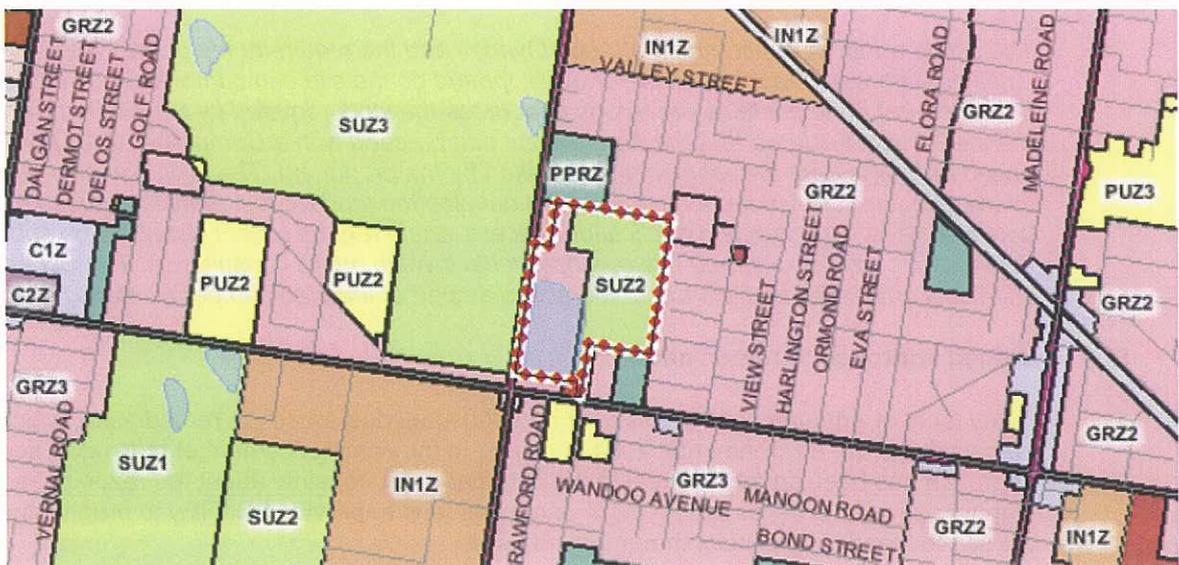
2.2 The Panel has requested the circulation of expert reports relating to environmental matters by 28 July 2017.

3 The Land

3.1 The Land is:

- (1) partly in in the General Residential Zone – Schedule 2 (**GRZ2**) and partly in the Special Use Zone – Schedule 2 (**SUZ2**);
- (2) subject to the Environmental Audit Overlay (**EAO**);
- (3) located on the north-eastern corner of Huntingdale Road and Centre Road, Oakleigh South;
- (4) comprised of an irregularly shaped parcel, approximately 18.79 hectares in area;
- (5) currently accessed from Huntingdale Road and Centre Road, with no connections in place to the surrounding local street network;
- (6) the site of the former Talbot Avenue Quarry. Historically, sand quarrying operations on the land have been accompanied by associated uses, including concrete batching in the 1960s, and landfill operations during the 1970s and 1990s. The Land has been inactive for several decades. The quarry void is located in the southwest portion of the Land;
- (7) subject to a degree of soil, landfill gas, groundwater, quarry surface water and quarry sediment contamination, as set out in the Site Environmental Strategy Plan prepared by Coffey, a copy of which is included in the enclosed brief of documents;

- (8) subject in part to Covenant 1909682 (Lot 1 TP 803687U) requiring that no extractive activities be undertaken within 10 feet of the southern boundary of the lot;
- (9) subject to a number of Section 173 Agreements regarding the cessation of quarrying activities on various parts of the Land;
- (10) located within the Monash National Employment and Innovation Cluster as defined in Plan Melbourne;
- (11) surrounded by the following interfaces:
- North – the Land is directly abutted by Davies Reserve, including an athletics track and local pavilion. The northern boundary of the Land also abuts the rear boundary of residential allotments fronting Sinclair Street. The residential allotments are within an established GRZ1 residential area;
 - East – the Land abuts an existing residential area characterised by single and double-storey brick dwellings with landscaped local streets. The former Clayton West Primary School, recently zoned for residential purposes, is to the northeast of the land;
 - South – the Land abuts an existing townhouse development which fronts Centre Road. The Land also abuts a site on the corner of Huntingdale Road and Centre Road over which a permit for a five-storey apartment complex has been granted. Clarinda Primary School is also to the south of the site on the opposite side of Centre Road;
 - West – Huntingdale Road lies to the immediate west of the Land. The Huntingdale Golf Club lies opposite the Land on the other side of Huntingdale Road. Further along Centre Road to the west is a Bunnings and which is located alongside a larger employment precinct.



4 Amendment C129

4.1 As per the Explanatory Report, Amendment C129 seeks to make the following changes to the Monash Planning Scheme:

- (1) *'Rezones the land at 1221-1249 Centre Road, Oakleigh South from part Industrial 1 Zone Schedule 2 and General Residential Zone Schedule 2 to the Comprehensive Development Zone Schedule 2.*

- (2) *Introduces Schedule 2 of the Comprehensive Development Zone to the Monash Planning Scheme.*
- (3) *Makes a minor correction to the boundary of the existing Environmental Audit Overlay to incorporate the whole of 1221-1249 Centre Road, Oakleigh South, within the Overlay.*
- (4) *Amends Clause 21.04 and Clause 22.04 within the Local Planning Policy Framework to refer to urban renewal sites, including the subject land.*
- (5) *Amends Schedule 81.01 (Incorporated Document) to include the Comprehensive Development Plan.'*

4.2 The Explanatory Report details the reasons for Amendment C129 as follows:

'The Amendment is required because the use of the land for extractive industry and landfill purposes ceased over 20 years ago. The site has remained dormant since that time, and is in need of rehabilitation to improve the environmental condition of the site and enable a new urban use to be established. The current Special Use Zone – Earth and Energy Resources Industry - is no longer an appropriate zone for the site. Similarly the existing current residential zoning of the western part of the site should be changed to allow the environmental issues and constraints to be planned and managed in an appropriate way across the whole of the site.

However, until a full environmental assessment is undertaken, it cannot be confirmed whether the preferred use of the site – as a residential precinct with some mixed uses, and open space areas – is appropriate.

The rezoning to a Comprehensive Development Zone (CDZ) will allow the site to be considered for residential or other suitable urban uses. The CDZ will provide sufficient confidence to the land owner that the land can be used for some form of urban use. This will enable the completion of the environmental assessments and the undertaking of required levels of environmental works appropriate to the potential future uses. The proponent has prepared a Comprehensive Development Plan that identifies opportunities for an integrated residential development on the site.

The site is within an Environmental Audit Overlay and the requirements of the Overlay will need to be satisfied before any residential use or development on the site can commence. The Comprehensive Development Zone contains provisions to address the work required by the EAO in a staged manner. It is considered that the Amendment can proceed with a Comprehensive Development Plan based on preliminary assessments undertaken by the proponent. The proposal also provides for alternative uses should it not be possible to develop the land for residential purposes or other sensitive uses. The planning application process would require further details to be submitted to Council for consideration and this process would involve public consultation. The Schedule to the CDZ sets out issues that are to be addressed as part of the planning permit stage.'

5 Staged approach to remediation

- 5.1 A key facet of Amendment C129 is the proposed staged approach to remediation, which delays the completion of the environmental audit until prior to the commencement of redevelopment. This approach has been sought to provide the Applicant with certainty about the rezoning, and to allow planning permits to be issued for a range of uses, and to provide flexibility to progressively remediate the site to standard that suits the proposed uses.
- 5.2 To that end, the exhibited Schedule 2 to the Comprehensive Development Zone provides triggers for the provision of an SESP and ESA for permit applications for a sensitive use or for buildings and works to facilitate a sensitive use:

'3.2 Application requirements

Planning applications must include the following steps:

- *A Site Environmental Strategy Plan (SESP): An application must include a Site Environmental Strategy Plan (SESP) for assessment by the responsible authority.*
- *Environmental Site Assessment: An application must include an Environmental Site Assessment (ESA) by a suitably qualified environmental consultant. This must be endorsed by an environmental auditor appointed under the Environmental Protection Act 1970. The endorsement must confirm that the ESA and SESP are consistent and adequately seek to address and manage the residual site contamination issues from the past land uses.*

Planning applications can be staged across the site and must include an SESP for the site and an ESA pertaining to the relevant stage.'

...

3.4 Permit Conditions

A planning permit for a sensitive use (residential use, child care centre, pre-school centre or primary school) must contain the following conditions.

- *Before the use permitted commences, the owner of the land must provide either:*
 - *A certificate of environmental audit must be issued for the land in accordance with Part IXD of the Environment Protection Act 1970, or*
 - *An environmental auditor appointed under the Environment Protection Act 1970 must make a statement in accordance with Part IXD of that Act that the environmental conditions of the land are suitable for the sensitive use.*
- *Before the use permitted commences the owner of the land must enter into and execute a Section 173 Agreement for the ongoing management of the site in accordance with the requirements of the certificate of environmental audit or the statement of audit and any conditions of permit use/operations.*

...

5.4 Permit Conditions

Requirement

A planning permit for development that facilitates a sensitive use (residential use, child care centre, pre-school centre or primary school) must contain the following conditions.

- *Before the construction or carrying out of buildings and works in association with a sensitive use commences, the owner of the land must provide either:*
 - *A certificate of environmental audit must be issued for the land in accordance with Part IXD of the Environment Protection Act 1970, or*
 - *An environmental auditor appointed under the Environment Protection Act 1970 must make a statement in accordance with Part IXD of that Act that the environmental conditions of the land are suitable for the sensitive use.*
- *Before the construction or carrying out of buildings and works in association with a sensitive use commences the owner of the land must enter into and execute a Section 173 Agreement for the ongoing management of the site in accordance with the requirements of the certificate of environmental audit or the statement of audit and any conditions of permit use/operations.'*

- 5.3 Under the exhibited Schedule 2 to the Comprehensive Development Zone, decision guidelines for permit applications for the use of land, subdivision and buildings and works also require consideration to be given to any SESP and ESA.

6 Submissions

- 6.1 The following submissions were received in response to the public exhibition of Amendment C129 between 2 February 2017 and 3 March 2017:

- (1) Victorian Planning Authority;
- (2) Environmental Protection Authority;
- (3) South East Water;
- (4) City of Kingston;
- (5) Michael Bunter;
- (6) Angelo Valente;
- (7) Colin David Owen; and
- (8) Anthony Phillip Sammut.

- 6.2 The submissions from the VPA and EPA addressed issues relating to site contamination, environmental assessment and remediation, and are discussed in further detail below.

- 6.3 We also note that the submission of Angelo Valente raises issues relating to potential disruption to surrounding residents as a result of remediation activities, and risks relating to future development on the Land as a consequence of the use of fill.

7 VPA Submission

- 7.1 The VPA's submission provides in-principle support for the Proposal, subject to certain recommendations. Among other things, the VPA's submission recommends that the Site Environmental Strategy Plan (**SESP**) and the Environmental Site Assessment (**ESA**) be required to be conducted and approved prior to the lodgement of a planning permit.

- 7.2 The VPA's submission states the following in relation to contamination, environmental assessment and remediation:

'The VPA supports a staged approach to planning and developing the site to manage the complexities and issues associated with contaminated land. From a process point of view the VPA submits that the following approaches may enhance the function of the draft provisions and achieve a coordinated approach:

- *The Overall Development Plan (ODP) requirement within sub-clause 2.0 of the proposed Schedule 2 to the Comprehensive Development Zone (CDZ) should include the mandatory information under each of the sub-headings listed in Appendix A to this correspondence. This approach would reduce the ambiguity of the requirements and ensure the information necessary to assess the suitability of ODP;*
- *That the ODP should be sequenced to occur prior to the preparation of any planning application. Thus wording to the effect of '...the ODP must be approved prior to lodging an application for a planning permit'. This would ensure that an agreed development plan is in place before planning applications are prepared to provide more certainty. The VPA recommends that a time frame for considering the ODP should be included in this provision;*

- *The Site Environmental Strategy Plan (SESP) and the Environmental Site Assessment (ESA) should be conducted prior to the planning permit application stage. All references to 'applications' or 'planning applications' within sub-clause 3.2 should be amended so that the text refers to 'the Overall Development Plan'; and*

...'

8 EPA Submission

8.1 The EPA submission records that the EPA is generally supportive of Amendment C129, however the EPA raises issues regarding the management of contamination on the land.

8.2 The EPA Submission states:

The site at 1221-1249 Centre Road, Oakleigh South was formerly used as a quarry and a landfill and therefore is considerably contaminated.

Council previously commissioned a Review of Environmental Matters at the site prepared by Senversa to provide an assessment of the environmental reports and arrangements to date. This report provides a useful overview to demonstrate the environmental risks of the development. The report highlights a number of environmental risks and longer term logistical risks at the site. These being and not limited to:

- In-ground infrastructure to manage landfill gas and leachate and the responsibility and payment for the ongoing management of these
- Restrictions suggested managing risks to residents vs Housing density plans (i.e. limiting digging past a defined depth).

EPA emphasises to Council that this land rezoning proposal presents the above risks. It is imperative that these risks associated with development of landfill sites are appropriately managed through the rezoning and development approvals to protect future land uses, human health and safety.

EPA understands that the proposed amendment will apply the existing Environmental Audit Overlay to incorporate the whole of the land within the Overlay and includes the land shown in the 'Former Talbot Quarry and Landfill Comprehensive Development Plan 2016' map as exhibited as an Incorporated Document within the Monash Planning Scheme.

The EPA advises Council that it is generally supportive of the proposed Planning Scheme Amendment and application of the Comprehensive Development Zone (CDZ) applied to 1221-1249 Centre Road, Oakleigh South.

EPA supports the staged approach to the environmental audit of the Development Site, allowing the site to be rezoned with the support of an Environmental Site Assessment (ESA) and Site Environmental Strategy Plan (SESP), and requiring a section 53X Audit as a condition of any future planning permit for a sensitive use.

However, EPA wishes to advise Council that this approach may send a false message to Developers/Land Owners that contaminated land sites can eventually be developed for a sensitive use, which may not be the case depending on the findings of the section 53X audit. EPA reinforces this message to Council to ensure that the CDZ does allow for consideration of a range of commercial and other non-sensitive uses, as Council proposes.

- 8.3 With respect to the application of *Ministerial Direction No. 1 – Potentially Contaminated Land*, the EPA states its position as follows:

Application of Ministerial Direction No.1:

It is EPA's view that addressing the requirements of Ministerial Direction No.1 through a staged approach of applying the CDZ through a land rezoning process is appropriate, on the basis that a section 53X audit will be required as part of any future planning permit condition allowing sensitive uses on the Development Site.

As this approach is not strictly in accordance with Ministerial Direction No.1, EPA wishes to emphasise to Council that the General Practice Note requires responsible authorities to be satisfied that the level of contamination will not prevent the use of the site, if they make the decision to not require an environmental audit as early as possible in the planning process.

EPA advises Council that EPA can provide support to Council to make this assessment, when/if reports are available for review. The critical item is that an audit is completed prior to construction that determines that the site is or can be made suitable for the appropriate level of proposed accommodation.

Please contact our Planning Assessment Officer, Andrew Scott on 1300 372 842 if you wish to discuss this matter further.

9 Council's Position

- 9.1 Two Council Officer's Reports were prepared in relation to Amendment C129 and put before the Council on 27 September 2016 and 30 May 2017.

- 9.2 The 27 September 2016 Officer's Report supported Amendment C129, including the proposed staged approach to remediation, and the Council resolved to request approval from the Minister to prepare and exhibit Amendment C129.
- 9.3 Subsequent to the receipt of submissions in response to the exhibition of Amendment C129, a revised Council Officer's Report was prepared and put before the Council at its meeting on 30 May 2017.
- 9.4 In the 30 May 2017 Council Officer's Report, the Council notes the concerns raised around the timing of the SESP and ESA, and the lack of information regarding the status of contamination on the Land. The 30 May 2017 Officer's Report proposes amendments to the exhibited version of Amendment C129, as summarised in the below table.
- 9.5 Key proposed changes are the insertion of a requirement to prepare an Overall Development Plan (ODP) prior to lodgement of a permit application, and the requirement for the SESP and ESA to be lodged with the ODP.

Stage	Exhibited process	Potential Alternative Process
Amendment C129 Rezoning land from SUZ to CDZ	Draft SRS/SESP	Draft SRS/SESP
Overall Development Plan – required in zone	Not included –Basic plan included in CDZ with rezoning	CDZ sets out detail for ODP No permit until ODP approved. Includes requirement for ESA/SESP to be signed off concurrently
SESP/ESA	Lodged with permit	Lodged with ODP prior to any permit application or permit issue
Permit	Requires audit as a permit condition	In accordance with ODP and SRS/SESP Requires audit as a condition
Permit Condition	Works/use not commenced until Audit complete	Works/use not commenced until Audit complete

- 9.6 The Panel has requested the submission of expert reports relating to environmental matters by 28 July 2017.

10 Brief of documents

- 10.1 Enclosed with this letter of instructions is a brief of documents relevant to the Amendment.
- 10.2 We confirm that you have copies of the relevant environmental assessments that have been undertaken for the Land.
- 10.3 Please contact us if you require further information.

11 Client details, further information and site inspection

- 11.1 Please arrange for your fee estimate and accounts to be provided directly to our mutual client at the following address:

Brandon Yeoh
Development Director
Sterling Global
Level 50 Rialto South Tower, 525 Collins St
Melbourne VIC 3000

E-mail: brandon.yeoh@sterlingglobal.com.au

12 Confidentiality

- 12.1 This letter and enclosed documents and all future communications between us and between you are confidential (**Confidential Information**), and are subject to a claim for privilege and must not be disclosed without our consent or the consent of our client.
- 12.2 The duty of confidentiality will continue beyond the conclusion of your instructions.
- 12.3 If you are obliged by law to disclose Confidential Information, it is not a breach of this engagement if you first give written notice to us of that obligation, if you can do so without breach of any law.
- 12.4 You must return all documents and other media, including copies, which contain Confidential Information to us. You must delete all electronically stored material immediately when requested to do so by us.
- 12.5 You must take all steps necessary to maintain Confidential Information and notes in strictest confidence.

13 Change of opinion

- 13.1 If for some reason, you change your opinion after delivering your report, please advise us as soon as possible. If that change is material, a supplementary report will need to be prepared, which explains the reasons for the change in your opinion.

Should you require any further information, please call Tom Ellicott on (03) 8686 6142 or contact Rory O'Connor on (03) 8686 6068.

Yours faithfully



Rory O'Connor
Special Counsel
Norton Rose Fulbright Australia
Partner: Sally Macindoe

Appendix C Curriculum Vitae of Ian Pedler

Our People

Ian V Pedler

Senior Principal Geotechnical Engineer



Professional Profile

Ian Pedler graduated from Melbourne University in 1975 with first class honours in Civil Engineering and subsequently with a Master of Engineering Science degree in 1977. Mr Pedler commenced employment with the State Electricity Commission of Victoria in 1976 as a geotechnical engineer and worked on the geotechnical investigation of the 2000 MW Loy Yang Power Station Project, located in the Latrobe Valley, Victoria. Mr Pedler joined the Coffey Group in 1991 and was project manager for a geotechnical investigation for a \$500m vehicle manufacturing project at Altona. Other major projects include the investigation and rehabilitation of Melbourne Water sewers that collapsed in 1992 and 1993, Section 3 of North Western Sewer Project, tender design for tunnels for the Deep Tunnelled Sewerage System in Singapore, and geotechnical investigation, design and construction advice for a \$400m pulp and paper mill at Tumut, NSW. During 2002 and 2003, Mr Pedler was Coffey's project manager for the Port Phillip Bay Channel Deepening geophysical and geotechnical investigations. Mr Pedler has provided geotechnical design advice and services for the Edgewater on the Maribyrnong development since 1994. His recent time was spent as the geotechnical lead for the design joint venture for the East West Link project and as part of the independent review team of the Recovery Design of the Morwell River Diversion at Yallourn following a breach failure in 2012.

Mr Pedler has broad experience in a wide range of geotechnical projects including roads, dams, buildings, excavations, tunnels, earthworks, landslides and reclamation projects.

Mr Pedler has authored and co-authored 14 technical papers.

Areas of Expertise

Geotechnical studies for tunnels and excavation; Computer Analysis

Dam design, construction, safety and remedial works

Landfills

Landslides

Sewer conditions, investigation and rehabilitation

Foundation design, footings, piles and rafts

Qualifications

Bachelor of Engineering (Civil), 1st Class Honours, University of Melbourne, 1975

Master of Engineering Science, University of Melbourne, 1977

Fellow, Institution of Engineers, Australia, CPENG NPER3

Member, College of Civil Engineers

Committee Member, Victoria Group (1988 to 2003)

Member, Australian Geomechanics Society

Registered Building Practitioner, Victoria

Career Summary

2008-Present Coffey Geotechnics Pty Ltd,

Senior Principal Engineer

2001-2008 Coffey Geosciences Pty Ltd,
Principal Engineer

1998-2001 Coffey Geosciences Pty Ltd,
Technical Manager, Victoria & Tasmania

1995-1997 Coffey Partners International Pty
Ltd, Manager, Victoria & Tasmania

1991-1995 Coffey Partners International Pty
Ltd, Senior Geotechnical Engineer

1987-1991 State Electricity Commission of
Victoria (SECV), Geotechnical Design Division,
Senior Geotechnical Engineer: Class 5

1986 Coffey and Partners Pty Ltd, Senior
Geotechnical Engineer

1976-1985 SECV, Hydro and Investigations
Division, Geotechnical Engineer

Relevant Project Experience

Dams and Levees

SECV, Loy Yang Power Station, Settling Pond,
Traralgon, Victoria

Investigation, preliminary design and contract
documentation for turkey nest shaped earth
embankment 15m high and 1700m long.
Assessment of underseepage from dam and
design and implementation of relief well
remedial works.

SECV, Yallourn North Twin Ash Pond,
Yallourn, Victoria

Site investigation and geotechnical advice for
design of twin ash pond system constructed on
20m of ash and lined with a HDPE liner.

Renison Ltd, HMS Stockpile, Zeehan,
Tasmania

Evaluation of stability of 40m high HMS waste
stockpile over old tailings dam.

Renison Ltd, Dunkley Dam, Zeehan, Tasmania

Feasibility study for 25m high tailings dam to
store 30 years of mine production.

Area A, B, C Dams

Slope stability assessment and design for
proposed 4m raising of three dams to total
height of 30m.

SECV, Loy Yang Power Station, Settling Pond,
Traralgon, Victoria

Investigation of ground heave of 220mm
around operating dam, including installation of
multi-level piezometer and data loggers,
collaborative research program with CSIRO
using COMPAC one-dimensional settlement
program, finite element groundwater seepage
studies and FLAC and BITEMJ displacement
analyses.

Investigation of seepage and ground
movement at 6800 ML Ash Pond and 7200 ML
High Level Storage both 45m high earth
embankments. Design and installation advice
on remedial relief well systems. Preparation of
dam safety report for peer group review.

MMWH Australia, Kogan Creek Coal
Mine, Chincilla, QLD

Review of earthworks specification for
construction of a flood control levee around the
coal mine.

SECV, Yallourn, Open Cut, Yallourn, Victoria,
Proposed Yallourn Ash Pond

Feasibility study for proposed 35m high ash
storage dam constructed on overburden
material placed in the base of existing open
cut.

Heathcote Gold Mine, Heathcote, Victoria

Geotechnical investigation and design for
300,00 m³ staged tailings dam for a gold mine
at Heathcote. Provision of documentation and
construction quality control services for stage 1
raising.

Barwon Water, No 5 Water Storage, Colac,
Victoria

Project director and technical review for 450ML
water storage for the city of Colac.

Embankments up to 10m high and storage
lined with GCL, compacted clay line, HDPE
liner and an underdrain system to control
groundwater levels for low storage levels

Barwon Water, Apollo Bay Water Storage,
Victoria

Site investigation and geotechnical design of a
number of sites to locate a 250ML water
storage in landslip prone areas.

Melbourne Water, Greenvale Reservoir,
Greenvale, Victoria

Embankment stability review for the existing
27,000 ML storage serving the northern
suburbs of Melbourne. The reservoir

comprises a 2500m long earth and rockfill embankment up to 52m maximum height. The review involved assessment of the subsurface conditions, groundwater levels, stability conditions for steady state, rapid drawdown and seismic conditions

Melbourne Water, Various, Melbourne, Victoria

Stability review of existing water storages including Surrey Hills, Mornington, Dromana and Devil Bend.

Melbourne Water Corporation, Eastern Treatment Plant, Sludge Drying Pan, Bangholme, Victoria

Technical review of geotechnical design and construction advice for the rehabilitation and construction of new sludge pans with shallow water groundwater. Advice provided for Stages 6, 7, 8, 9 and 10.

Melbourne Water Corporation, Eastern Treatment Plant

Technical review of geotechnical investigation for Western Effluent Holding Basin to temporarily store storm water flows.

Melbourne Water Corporation, Western Treatment Plant, Werribee, Victoria

Review of risk assessment conducted for earthen embankments at the treatment plant. The study comprised measurement of the condition of each embankment and development of a risk rating which was used to make recommendations on appropriate remedial works

Stawell Water Board, No 4 Reservoir, Stawell, Victoria

Investigation of cause of seepage and embankment movements. Design of remedial works involving downstream weighted berm.

Stawell Water Board, Wet Weather Storage, Victoria

Investigation, design and earthworks quality control testing for 360ML wet weather storage dam.

CMPS & F, Cobram, Vic

Technical review of condition assessment of 70km of levees along the Murray River based on field assessment, drilling and laboratory testing.

Visy Pulp and Paper Mill, Tumut, NSW

Project director for investigations, design and documentation of a 10 ML Waste Water

holding dam and two buffer/cooling ponds. The dam is approximately 80m long by 25m wide and lined with a HDPE liner.

Project director for feasibility studies, detailed site investigations, design and documentation of 480 ML Winter Storage Dam holding treated water from the pulp and paper mill for disposal by spray irrigation. The dam comprises a zoned earthfill embankment with a central chimney drain approximately 300m long and maximum height of 9m. The sides of the storage and upstream face of the embankment are lined with a Geosynthetic Clay Liner with a 600mm thick compacted clay liner across the base of the storage.

Project director for feasibility studies, detailed site investigations, design and documentation of 190 ML Fresh Water Dam to supply fresh water to the pulp and paper mill. The dam comprises a zoned earthfill embankment with a central chimney drain, 160m long with the crest about 15m above the natural ground level which increases to about 25m above the natural ground level at the downstream toe. The storage of the dam and upstream face of the embankment is lined with a Geosynthetic Clay Liner.

CMPS & F, Central Highlands Water, Daylesford, Victoria

Review of investigation, design and preparation of technical specification for 140ML effluent storage dam.

Parks Victoria, Kelynack Dam, Mill Park, Victoria

Technical review of investigation and recommended remedial works and surveillance monitoring program for 27m high embankment

Robert Luxmore, Torquay, Victoria

Review of investigation and design of 6 hectare ornamental lake system lined with GCL for a residential golf course development.

Coliban Water, Main Channel, Victoria

Project manager for investigation, hazard zoning and operation advice on slope instability of 40 km of water supply channel.

Tunnels and Shafts

Department of Planning, Transport and Infrastructure, Obahn City Access Project, Adelaide

Geotechnical lead for geotechnical investigation and design services for the tender for grade separation of the Obahn bus corridor through the Hackney Road/Botanic Road and Rundle/Dequetteville Terrace intersections and Botanic parklands to East Terrace. This involved assessment of geotechnical information, groundwater control and impacts and design advice for the proposed tunnel and road alignments.

East West Connect Consortium, East West Link Project, Melbourne

Geotechnical lead for the geotechnical investigation and design services for the design joint venture for the \$6.8 billion East West Link project. Work involved geotechnical design advice for twin 15m diameter tunnels, cut and cover portals and elevated structures linking to City Link at the Tullamarine freeway and Hoddle Street, Abbotsford. Planned additional geotechnical and investigations to assess groundwater and environmental aspects for the project.

Melbourne Water, Essendon, Melbourne

Section 3 of the North Western Sewer Project comprising 4km of 4m diameter tunnel constructed with a Lovat earth pressure balance tunnelling machine. Ground conditions varied from high strength basalt to saturated silty sands. Work included supplementary investigations, construction advice, monitoring of ground movements and groundwater changes during construction, and review and assessment of contractual claims on behalf of the principal. Provision of construction advice and services to respond to unexpected ground movement and groundwater behaviour. Project received an Institute of Engineers Australia, Victoria Division, Excellence Award.

Melbourne Water, North Melbourne, Kensington, Clifton Hill

Project Director for investigation and repair of collapsed sewers in north western suburbs of Melbourne. Work included investigation of collapsed area and remedial works including new diversion tunnels using a combination of pipe jacking, open excavation and micro tunnelling techniques. Investigations were conducted to assess new tunnel routes,

groundwater conditions and dewatering programs.

Yarra Valley Water, Epping Craigieburn Sewer, Campbellfield, Victoria

Geotechnical and hydrogeological investigation for 1.3m diameter sewer extending the existing sewer over a length of 4km from Epping to Craigieburn. Gravity geophysical study also carried out to assess the potential presence of paleochannels.

Yarra Valley Water, Epping Branch Sewer Sections 2 and 3, Campbellfield, Victoria

Geotechnical review of available information for detailed design of Epping Branch Sewer, Sections 2 and 3 which extends from Hume Freeway to Cooper Street pump station. Reviewed geotechnical investigation for functional design. Also conducted assessment of sewer construction on major assets including freeway.

Coliban Water, Bendigo, Victoria

Project manager for condition assessment of 5 existing tunnels through siltstone and basalt rock for water supply to city of Bendigo. Assessment involved mapping and geophysical studies of lined sections and documentation of remedial works.

Enetech Streamline, Moonee Ponds, Melbourne

Geotechnical investigation of 2.5m diameter tunnel for new sewer project. Ground conditions varied from highly to moderately weathered siltstone to saturated sands and clays. Provision of advice on potential ground movements and assessed ground movement and groundwater changes during construction. Provision of as constructed records and geotechnical advice on construction issues involved with access shafts along the alignment.

MWH Australia, Ringwood South Branch Sewer, Victoria

Technical review of geotechnical and hydrogeological investigation for the duplication of a 3.7km long sewer.

MWH Australia, Hobsons Bay Main Sewer, Newport, Victoria

Peer review of Geotechnical Interpretative Report for proposed sewer tunnel to be constructed under Yarra River as part of ancillary works associated with Channel Deepening Project.

State Electricity Commission of Victoria,
Latrobe Valley

Assessment of latent soils condition claim arising from construction of a 3m diameter tunnel for the Loy Yang Fire Service Pipeline. Involved supplementary investigation, analysis, briefing counsel and attending arbitration proceedings.

Deep Tunnelled Sewerage System, Contract T-02, Singapore

Prepared Geotechnical Interpretative Report for 7.7km long section of the deep sewer system for The Bedok Tunnel, Contract T-02 for tender submitted by Shimizu in conjunction with Montgomery Watson and Jacob Associates. The 6m diameter tunnel was located at depths of 25 to 30m in alluvial soils of the Kallang Formation which comprise very soft to stiff soils. The soft marine soils exhibit similar characteristics to Coode Island Silt.

Deep Tunnelled Sewerage System, Contract T-05, Singapore

Technical reviewer of Geotechnical Interpretative Report for 12.6km section of deep sewer system for the Kranji Tunnel, Contract T-05 located in strong granite and soft to stiff alluvial soils.

Public Transport Authority, South West Metropolitan Railway, Perth

Technical review of geotechnical and hydrogeological desk study of Perth CBD options.

Sewers, Treatment Plants and Geophysical Studies

Melbourne Water, Various Brick Sewers, Melbourne

Project manager for innovative seismic testing using Seismic Resonance testing to assess over 26km of major brick sewers serving the Melbourne area. Involved assessing subsurface conditions to assist in developing condition risk rating.

Melbourne Water, Various sewers and drains, Melbourne

Project manager for innovative seismic SEWREEL testing of drains and sewers involving the towing of seismic geophones along the base of operational sewers and measuring the seismic response of surface impact sources. Identification of disturbed or loose ground for external grouting.

Mainsail, Corio Shipping Channels, Geelong, Victoria

Geotechnical assessment of founding conditions for replacement channel beacons using seismic reflection and refraction information and available geotechnical data.

Melbourne Water, Williamstown Main Sewer, Victoria

External grouting to fill voids around sewer to reduce seawater infiltration.

Tenix Pty Ltd, Aeration Tanks, eastern Treatment Plant, Bangholme, Victoria

Geotechnical investigation and provision of construction advice for construction of large aeration tanks located 5m below ground level and close to the groundwater table.

Melbourne Water Corporation, Eastern Treatment Plant, Sludge Drying Pan, Bangholme, Victoria

Technical review of geotechnical design and construction advice for the rehabilitation and construction of new sludge pans with shallow water groundwater. Advice provided for Stages 6, 7, 8, 9 and 10.

Melbourne Water Corporation, Eastern Treatment Plant

Technical review of geotechnical investigation for Western Effluent Holding Basin to temporarily store storm water flows.

Melbourne Water, Buckley Street Road Collapse, Essendon, Victoria

Geotechnical and geophysical investigation for road collapse resulting from funnel developing from North Western Sewer being constructed at a depth of 20m below ground surface. Road surface measuring 6m by 3m settled up to 400mm over a period of a few days as 100m³ grout was injected from tunnel level. Downhole seismic testing indicated that loose zones were still present at depth after grouting from tunnel and filling of the depression was completed. A further 20m³ of grout was introduced from the surface before the road was reopened. Seismic re-testing verified that the loose zones had been filled and consolidated.

City West Water, Dudley Street Sewer, Docklands, Victoria

Review of geotechnical investigation for new sewer in Melbourne Docklands area which is

located in and close to soft, highly compressible Coode Island Silt.

MWH Australia, Pakenham Treatment Plant, Victoria

Geotechnical investigation of new treatment tanks.

MWH Australia/City West Water Brimbank Detention Tanks, Keilor, Victoria

Geotechnical investigation for 20m by 30m by 5m deep detention tanks located below ground level.

Port of Melbourne Corporation, Port Phillip Bay Channel Deepening Project, Victoria

Project manager for geotechnical and geophysical investigation for maintenance and channel deepening project to allow the passage of deeper draught vessels. The investigation involved over 1000km of underwater seismic reflection and 600km of underwater seismic refraction survey at the northern and southern ends of Port Phillip Bay, drilling from a jack up barge, vibrocoring using divers and associated laboratory classification and strength testing.

Department of Education, Kangan Tafe, Docklands, Victoria

Assessment of potential impact of remediation of low level contaminated soil located over existing Dudley Street sewer constructed of vitrified pipe.

Tenix Pty Ltd, Aeration Tanks, eastern Treatment Plant, Bangholme, Victoria

Geotechnical investigation and provision of construction advice for construction of large aeration tanks located 5m below ground level and close to the groundwater table.

Major Projects

Wyndham Harbour Pty Ltd, Wyndham Harbour Marina, Werribee South, Victoria

Geotechnical and hydrogeological investigation for 1000 berth marina and residential development involving dredging to a depth of RL-3.5m in Port Phillip Bay. Established subsurface and groundwater conditions and conducted detailed groundwater modelling and design to monitor underlying aquifer of regional importance to local irrigation farmers. Geotechnical design advice on breakwater foundations, harbour works, engineered fill platform for the

residential development and wetlands. Presentation to EES panel hearings.

Delfin Lend Lease, Edgewater on the Maribyrnong, Footscray, Victoria

Project manager for a 95 hectare residential development at Maribyrnong since 1995 providing geotechnical and investigation design advice. Together with civil consultant identified risk and suitable treatment of excavating and lime treating potentially acid sulphate producing soft Coode Island Silt by including it in the building platform. Project won a 2004 ACEA Silver Award of Highly Recommended which recognised the first time that lime stabilisation has been used on a large scale in Melbourne and the close monitoring of the fill platform to allow progressive release of areas of the site for infrastructure and residential construction.

Bonacci Group, Fyansford Quarry, Geelong, Victoria

Review of geotechnical investigation for the rehabilitation of former basalt quarry for residential and public open space including design advice for treatment of existing and permanent batters in rock and overburden and construction adjacent to river frontage.

Port of Melbourne Corporation, Port Phillip Bay Channel Deepening Project, Victoria

Project manager for geotechnical and geophysical investigation for maintenance and channel deepening project to allow the passage of deeper draught vessels. The investigation involved over 1000km of underwater seismic reflection and 600km of underwater seismic refraction survey at the northern and southern ends of Port Phillip Bay, drilling from a jack up barge, vibrocoring using divers and associated laboratory classification and strength testing.

John Holland, Toyota Manufacturing Plant, Altona, Victoria

Project manager for a geotechnical investigation for a \$500 million vehicle manufacturing project at Altona. Investigation included over 6km of seismic refraction testing to assess rock levels across the site and geotechnical design for pavements, large buildings and office structures on reactive clay soils.

External Reviews and Expert Witness

Diamond Press, Laverton, Victoria

Assessment of cracked concrete floor of large printing and paper storage building constructed on reactive clay soils.

Wyndham Harbour Pty Ltd, Wyndham Harbour Marina, Werribee South, Victoria

Geotechnical and hydrogeological investigation for 1000 berth marina and residential development involving dredging to a depth of RL-3.5m in Port Phillip Bay. Established subsurface and groundwater conditions and conducted detailed groundwater modelling and design to monitor underlying aquifer of regional importance to local irrigation farmers. Geotechnical design advice on breakwater foundations, harbour works, engineered fill platform for the residential development and wetlands. Presentation to EES panel hearings.

Gadens Lawyers, Somerset Development, Sunbury, Victoria

Geotechnical investigation and design for residential development on steep site subject to tunnel erosion. Preparation of report and appearance at planning appeal.

State Electricity Commission of Victoria, Latrobe Valley

Assessment of latent soils condition claim arising from construction of a 3m diameter tunnel for the Loy Yang Fire Service Pipeline. Involved supplementary investigation, analysis, briefing counsel and attending arbitration proceedings.

Confidential, Victoria

Investigation and preparation of a claim related to movement of office floor slab and pavements at a large freight distribution centre.

Department of Infrastructure, Morwell River Diversion, Victoria

Assessment of proposal to relocate the Morwell River on overburden placed in the Yallourn Open Coal Mine.

Confidential, Victoria

Peer review of geotechnical investigation of failed reinforced earth concrete block wall located in partially filled former brick clay quarry.

Parks Victoria and DNRE, Victoria

Technical review of slope hazard and slope mitigation advice for historic mine site in eastern Victoria.

Mt Hotham Alpine Resort management Board, Victoria

Technical review of risk assessment and design advice for various structures subject to slope instability.

Bonacci Group, Great Alpine Road, Victoria

Review of detailed site investigation and global stability for proposed elevated road at Mt Hotham.

National Grid Australia, Basslink Project

Geotechnical investigation for the foundation design of transmission line on the Victorian side of the electricity connection with Tasmania as part of the Integrated Impact Assessment Study. Provision of construction advice including downhole seismic testing to assess cavities formed during directional drilling beneath the shore crossing and associated remedial grouting.

Moonee Valley City Council, Valley Lake, Niddrie, Victoria

Assessment of development plans and provision of geotechnical design advice to Council for the filling of a former large quarry for residential purposes. Involved engineered fill up to 30m thick comprising boulders and overburden clay soils.

Hume City Council, Former Quarry, Tullamarine, Victoria

Provision of expert report for Council submission to VCAT regarding the filling of a former quarry for proposed light industrial use.

Moonee Valley City Council, Ascot Chase, Ascot Vale, Victoria

Geotechnical assessment of proposed 17.7 hectare residential and public open space development for Council. The development involves filling the site to above the 100 year flood level which will cause large settlement of the underlying soft and highly compressible Coode Island Silt. Provision of advice on filling activities and construction techniques to reduce potential differential settlement affecting Council's infrastructure.

Hume City Council, Former Sand Pit, Keilor, Victoria

Provision of expert report on proponents proposed filling and rehabilitation of a former sand pit.

VicUrban, Boardwalk Development, Point Cook, Victoria

Investigation and reporting on the placement of potentially unsuitable engineered fill as part Stage 59 of the residential development.

Moonee Valley City Council, Pin Oak Street, Ascot Vale, Victoria

Investigation and assessment of cracking of houses and alleged potential link to a collapsed brick drain located about 50m away from the distressed properties.

Slater and Gordon, Orrong Road, Elsternwick, Victoria

Assessment of cracks in house resulting in localised settlement under exterior walls as a result of leaking water from a damaged hot water system.

Hume City Council Mickleham

Expert opinion on remediation slope stability work to address tunnel erosion issues.

Yallourn, Victoria

Member of review team for the independent peer review of the Recovery Design of the Morwell River Diversion remedial works following the breach in 2012.

Landfills

Melbourne Grammar, Port Melbourne, Victoria

Technical review of geotechnical investigation for the construction of a settlement sensitive synthetic hockey field on an old landfill overlying soft Coode Island Silt. Design solution included a geogrid reinforced crushed rock platform placed on the preloaded and dynamically compacted fill.

City of Onkaparinga, Frank Hilton Reserve, Adelaide

Review of investigation and design for landfill closure for landfill currently used as a recreational park. Includes the design of a sea retaining wall located at beach level.

Leighton Contractors, Princess Freeway Interchange, Laverton, Victoria

Investigation and design of road embankment to encapsulate low level waste as a means to reduce filling costs and treat the fill in an environmentally friendly manner.

GB Landfill Bundoora, Victoria

Geotechnical advice regarding proposed filling and development of former quarry site.

Benella Landfill Benella, Victoria

Geotechnical design of additional cell development for environment approval.

Delfin Lend Lease Footscray, Victoria

Investigation of former landfill site for construction of access road to Edgewater residential development.

ADI Limited, Footscray, Victoria

Geotechnical advice and review of construction of low level soil repository at former ammunition production site.

Narre Warren North, Victoria

Review of investigation of landslide that occurred in a clay fill slope at former quarry site in Narre Warren North.

Eaglehawk Landfill Cell 3 Stage 2, Bendigo, Victoria, in 2008

Geotechnical advice for an environmental audit of the construction of an extension of landfill cell that comprises geomembrane and geosynthetic clay liner as the composite lining system.

Angelsea Landfill, Angelsea, Victoria

Technical review of Design of Stage 3 rehabilitation works.

Hallam Road Landfill Cell 8, Hampton Park, Victoria, in 2008

Geotechnical advice for an environmental audit of the construction of a new landfill cell that comprises geomembrance liner and compacted clay liner as the composite lining system.

Carroll Road landfill, Clayton, Victoria

Technical review of design of rehabilitation of landfill.

Carroll Road landfill, Clayton, Victoria

Technical review of design of leachate pond system.

Publications

Moore, P J and Pedler, I V (1977). "Some Measurements of Compressibility of Sanitary Landfill Material" Proc 9th International Conference on Soil and Rock Mechanics, Tokyo, May, 1977 pp.

Fletcher, S J and Pedler, I V (1984). "Underseepage at the Loy Yang Settling Pond Dam" Proc 4th Australian - New Zealand Conference on Geomechanics, Perth, May, 256 pp.

Pedler, I V and Schneider, P (1984). "Prediction and Observation of Settlements of Loy Yang A Power Station" Proc 4th Australian - New Zealand Conference on Geomechanics, Perth, May, 316 pp.

Raisbeck, D and Pedler, I V (1985). "Settlement Prediction and Monitoring in an Area of Regional Subsidence" Proc 11th International Conference on Soil and Rock Mechanics, San Francisco, August, 2231 pp.

Pedler, I V (1985). "Settlement of the Loy Yang Raw Coal Bunker" Proc Australian Geomechanics Society, Victoria Group and ACADS, Seminar on Performance versus Prediction in Geomechanics at Melbourne University, 20 November 1985.

Pedler, I V and Skotnicki, A L (1988). "Boundary Element Analyses of Surface Movement Associated with Faulted Structures" Proc 5th Australian-New Zealand Conference on Geomechanics, Sydney, August.

Pedler, I V and Magennis, R (1989). "Some examples of spreadsheet Applications in Geomechanics". ACADS seminar on Spreadsheet Applications for Engineers presented at Footscray Institute of Technology, 12 April 1989.

Pedler, I V and Raisbeck, D (1990). "Enhanced Surveillance of Dams at Loy Yang". Proc. ANCOLD Dam Safety Seminar, Ballarat, Victoria. October 1989. In ANCOLD Bulletin No. 85, April, pp 29-46.

McKinley, T J and Pedler, I V (1990). "Beyond the Theory of Landslides - Examples of the Treatment of Local Landslides". Presented to Australian Geomechanics Society Student/Graduate meeting, Monash University, 18 July 1990.

Pedler, I V and Mulder, J W, (1991). "Contamination Modelling of an Ash Disposal Dam". ACADS seminar on Contamination Modelling, at Clunies Ross House, 30th April, 1991.

Pedler, I V and Whiteley, R J, (1994). "Geophysical Assessment of Epsom Road Sewer". 2nd National Trenchless Technology Conference, Sydney, June.

Pedler, I V, Powell, G E, Marshall, TW and James, T, (1997). "Encapsulation of Low Level Contaminated Soil in Freeway Embankments". Proc of 1st Australia – New Zealand Conference on Environmental Geotechnics - Geoenvironment 97, Melbourne, November.

Pedler, I V and Whiteley, R J, (2000). "Applying Innovative Geophysical Methods to Assist Identification and Repair of Road Collapses". International Conference on Geotechnical and Geological Engineering, GeoEng2000, Melbourne, November.

Pedler, I V and Whiteley, R J, (2012). "Verification of ground improvement with specialised surface and underground seismic geophysical testing: Case Studies". Proceedings of the International Conference on Ground Improvement and Ground Control. Edited by Buddhima Indraratna, Cholachat Rujikiatkamjorn and Jayan S. Vinod. University of Wollongong, 30 October 2012, pp 1449-1455.

Appendix D – Edgewater Development



View of lake entrance and harbour area from eastern side of the Maribyrnong River

URBAN RENEWAL

Transforming the banks of the Maribyrnong

Coffey is providing geotechnical and engineering services to the Edgewater on the Maribyrnong project, which will create a new residential and recreational precinct in Melbourne.

Edgewater on the Maribyrnong is a major project being undertaken by the Maribyrnong Development Company in a joint venture between Delfin Lend Lease and ComLand.

The development is a 95 hectare residential and mixed-use site, with 1.5 kilometres of river frontage, a 7 hectare lake and a harbour precinct capitalising on the significant heritage elements of the site.

Coffey was commissioned to provide engineering advice for the construction of the lake system and the engineered fill platform on the flood plain adjacent to the Maribyrnong River.

During construction, Coffey completed field trials and provided advice on the use of lime-treated Coode Island silt within the engineered fill platform. This was the first time this process has been used on a large scale in Melbourne.

Coffey provided advice during initial works on the lime treatment process, subgrade preparation, field compaction trials and fill placement procedures. We are currently in the process of monitoring ongoing settlement to assess when the balance of infrastructure works can be completed.

Coffey was also contracted to conduct geotechnical investigation for medium density buildings to be located on the slopes of the escarpment and to assist in the development of building guidelines for purchasers and builders.

Project Director Alex Pyrlis said the engineered fill platform and lake system represents a significant investment by the joint venturers. The lake and wetlands area would become a social hub as well as provide a habitat for native flora and fauna.

"Edgewater Lake will soon be accessible by river taxis, ferries, and small to medium sized boats. This level of access will enable people to cruise to Edgewater Lake from places such as the Docklands, Southgate and Williamstown," Mr Pyrlis said.

"The new parklands will become the community heart of Edgewater, a place where residents and locals from surrounding suburbs can enjoy the best of the river lifestyle Melbourne has to offer," he said.

**For more information, contact
Ian Pedler on (03) 9853 3396.**

SILVER AWARD OF HIGHLY COMMENDED

ENVIRONMENTAL PROJECTS

Edgewater

AWARDED TO

GHD and Coffey Geosciences Pty Ltd

CLIENT

Delfin LendLease

PROUDLY SPONSORED BY

Willis



Edgewater on the Maribyrnong is a 95 hectare residential and mixed use urban development project with 1.5km of river frontage, a lake, wetlands and harbour precinct located 7km west of Melbourne.

GHD and Coffey Geosciences provided services for the development, design and construction of the urban renewal project. They identified particular risks, provided comprehensive geotechnical testing and developed engineering solutions to address problems associated with the excavation for a lake and construction of an engineered fill platform from notoriously soft and compressible Coode Island Silt which characterises some of the site. This work led to major cost savings and the successful development of a high quality major residential project.

Significant Aspects

- GHD and Coffey Geosciences developed a sustainable lime neutralising treatment process which allowed the use of 200,000 cubic metres of potentially acid sulphate producing Coode Island Silt within the engineered fill platform. This is the first time that lime stabilisation has been used on a large scale in Melbourne.

- Close monitoring of settlement of the fill platform allowed progressive release of areas of the site for infrastructure and residential construction to assist in cash flow for the development.



JUDGES' COMMENTS

- This projects demonstrates the use of advanced and innovative engineering to address major environmental and unstable site problems.

SILVER AWARD OF HIGHLY COMMENDED

SPECIALIST SERVICES

Asian Gallery Air Conditioning

AWARDED TO

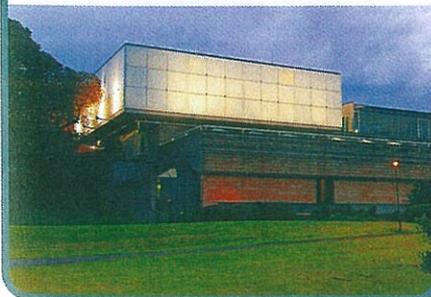
Steensen Varming (Australia) Pty Limited

CLIENT

Art Gallery of New South Wales

PROUDLY SPONSORED BY

Standards Australia

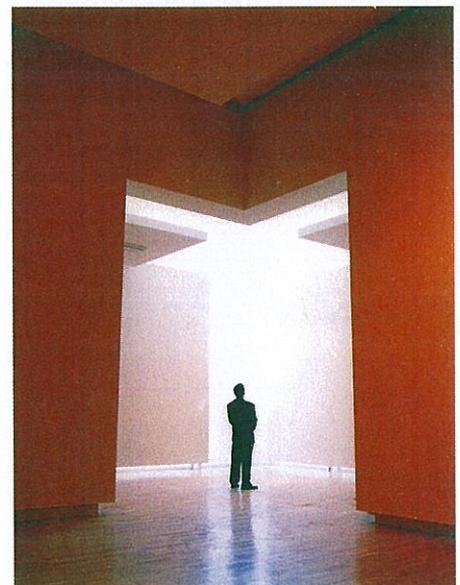


The Asian Gallery is a new, glass cube wall and metal roof structure constructed on top of the existing Asian Gallery at the Art Gallery of New South Wales.

Steensen Varming Australia developed innovative solutions to achieving stable and accurate temperature and humidity conditions against difficult conditions including a solar heat absorbing reactive glass façade. This involved the delivery of cooling air supply from above the gallery and its use to transfer most of the heat on the outer glass to the rising return air stream between the walls. Accurate humidity control was also achieved through the use of ultrasonic humidification technology.

Significant Aspects

- Specific humidity and temperature control throughout the new gallery has met all of the client's strict requirements and has enabled the Gallery to secure international Asian artwork loans for display.
- By developing the innovative return air scheme and the hidden supply outlets and equipment, the consultant has contributed to the development of an improved facility for community enjoyment.



JUDGES' COMMENTS

- The project demonstrates to ability of engineering innovation to overcome demanding conditions and to contribute to a world-class Gallery facility.

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