Proposed Amendment C193 Lilydale Quarry Development, Witness Statement of Roger Olds

SAC Hearing

Prepared by
Roger Olds

Date
May 2021

Job Number
1000511.v1

Table of contents

1 Introduction

1.1 The Witness

1 This witness statement is prepared by Mr Roger Olds for a hearing of the VPA Projects Standing Committee (SAC) called to address outstanding issues related to the proposed rezoning of the old Lilydale quarry (site) under the Yarra Ranges Planning Scheme.

2 I operate my own consulting practice and am a Consultant to Tonkin and Taylor (T+T) of Level 3, 99 Coventry Street Southbank Victoria 3006. I am a geotechnical consultant of over 40 years' experience with an honour's degree in civil engineering and a graduate diploma in geotechnical engineering from Monash University. I am a Fellow of Engineers Australia and a Fellow of the Academy of Technology Science and Engineering. My brief curriculum vitae is included in **Appendix A**.

3 I have extensive experience with earthworks for a variety of projects including roads, railways, dams and land development. I have previously acted as an expert witness in a number of matters including planning hearings related to filled sites. I have advised clients on how to develop or not develop such sites based on the circumstances. I have acted for Owners, Councils, Developers and Contractors.

4 The report has been prepared based on my involvement with the Lilydale quarry project, which is approaching 4 years. Since mid-2017 I have been the geotechnical lead on this project for T+T but other people have undertaken work which I have directed and/or reviewed. I have not been a signatory to all reports as I am not a T+T staff member.

5 The instructions for this statement were provided by Norton Rose Fulbright in their letter dated 22 April 2021, which is reproduced in **Appendix B**. The purpose of this statement is to provide the SAC with an overview of the Geotechnical Framework for the Lilydale quarry that will be relied upon in the proposed Section 173 Agreement between Yarra Ranges Shire Council (Council) and Hume Lilydale Pty Ltd and LBJ Developments Pty Ltd (the landowners).

6 I have read the Planning Panels Guide to expert evidence for such panel hearings and understand my duty to the SAC. I have prepared this statement to assist the SAC to understand the geotechnical issues related to the planned quarry rehabilitation.

1.2 Previous Work

7 I have directed and /or reviewed investigations undertaken by T+T at the site to assist in planning and undertaking development works. These include assessments of the geotechnical conditions and the potential contamination that may exist on site.

8 These investigations are summarized in a document known as the Geotechnical Framework for the Kinley Development which is a key component of the proposed Section 173 Agreement between Council and the landowners. The Geotechnical Framework was prepared to assist Council and other stakeholders to understand how the quarry would be rehabilitated to allow future development. The various investigation reports undertaken to date are appended to the Geotechnical Framework to assist stakeholders to understand the planning and design of the quarry rehabilitation process.

9 It is understood the key geotechnical element of the SAC hearing relates to the filling and future use of the old quarry site. This witness statement summarises the key elements and conclusions in the Geotechnical Framework and updates information in that report with the most recent information.

10 I rely upon the information in the Geotechnical Framework and additional information compiled since it was written. There is nothing I am aware of that changes any conclusions in the Geotechnical Framework.

2 History

11 The Lilydale quarry began quarrying limestone for the manufacture of cement and lime in about 1878. David Mitchell was the founder, and he then went on to assist having a railway line built, and to then be instrumental in the development of the Yarra Valley including its early development of vineyards. So, the site has an interesting history and was instrumental in early development of the area.

12 The site of the quarry was originally known as Cave Hill and the photo in **Figure 1** shows this topographic feature looking from the north west. As the quarry was developed the hill was progressively removed as the limestone being quarried lay below the overlying sedimentary and volcanic deposits (overburden). Once excavated, these overburden materials were stored on site to the east and south of the quarry pit and eventually created a new landform which ran from the quarry down to the adjacent land which has been developed for residential use.

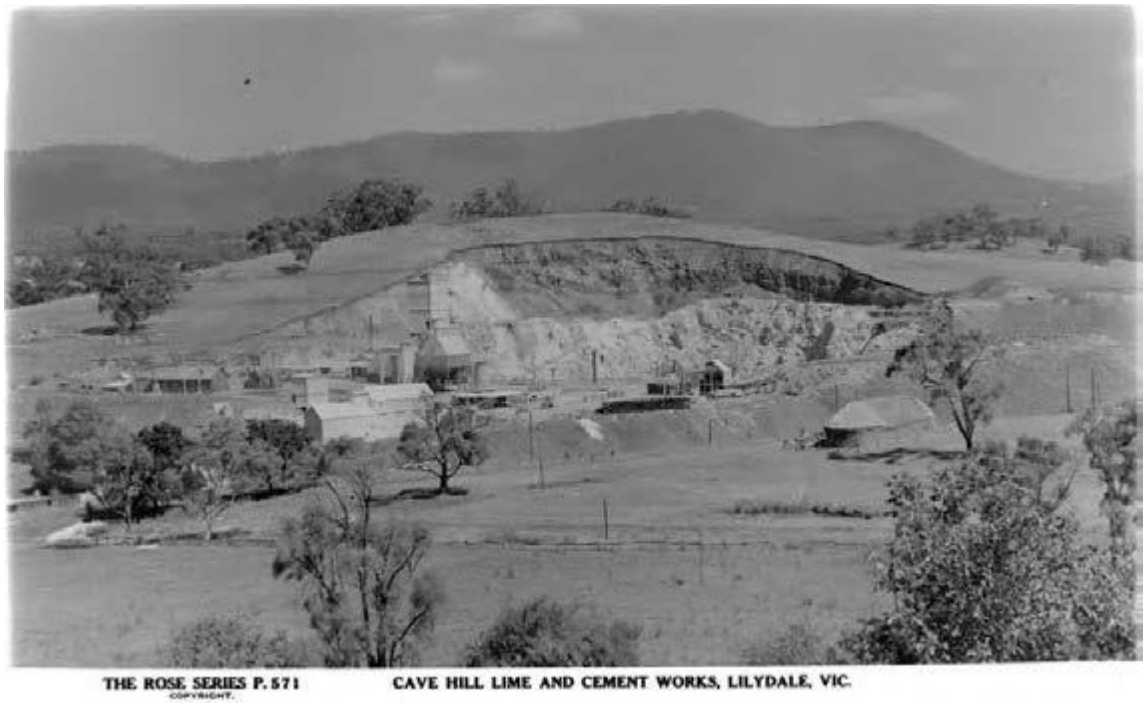


Figure 1. Lilydale quarry being cut into Cave Hill.

13 Quarrying ceased at the site in 2015 and the operator (Sibelco) sold the property in 2016 to Hume Lilydale and LBJ Developments. HBI Lilydale (HBI), a joint venture between Hume Lilydale and LBJ Developments, is proposing to develop the 143.8 Ha site as a residential development known as the Kinley Development. The former quarry pit occupies 25 Ha of the site and is intended to be developed under a Comprehensive Development Zone comprising commercial, residential and retail facilities, with open space proposed to be transferred to the Council for public use. There is also a planned heritage area of the site to be retained, which includes the old lime processing and associated facilities north of the quarry pit. An aerial photograph of the site showing the key features prior to development is shown in **Figure 2.**

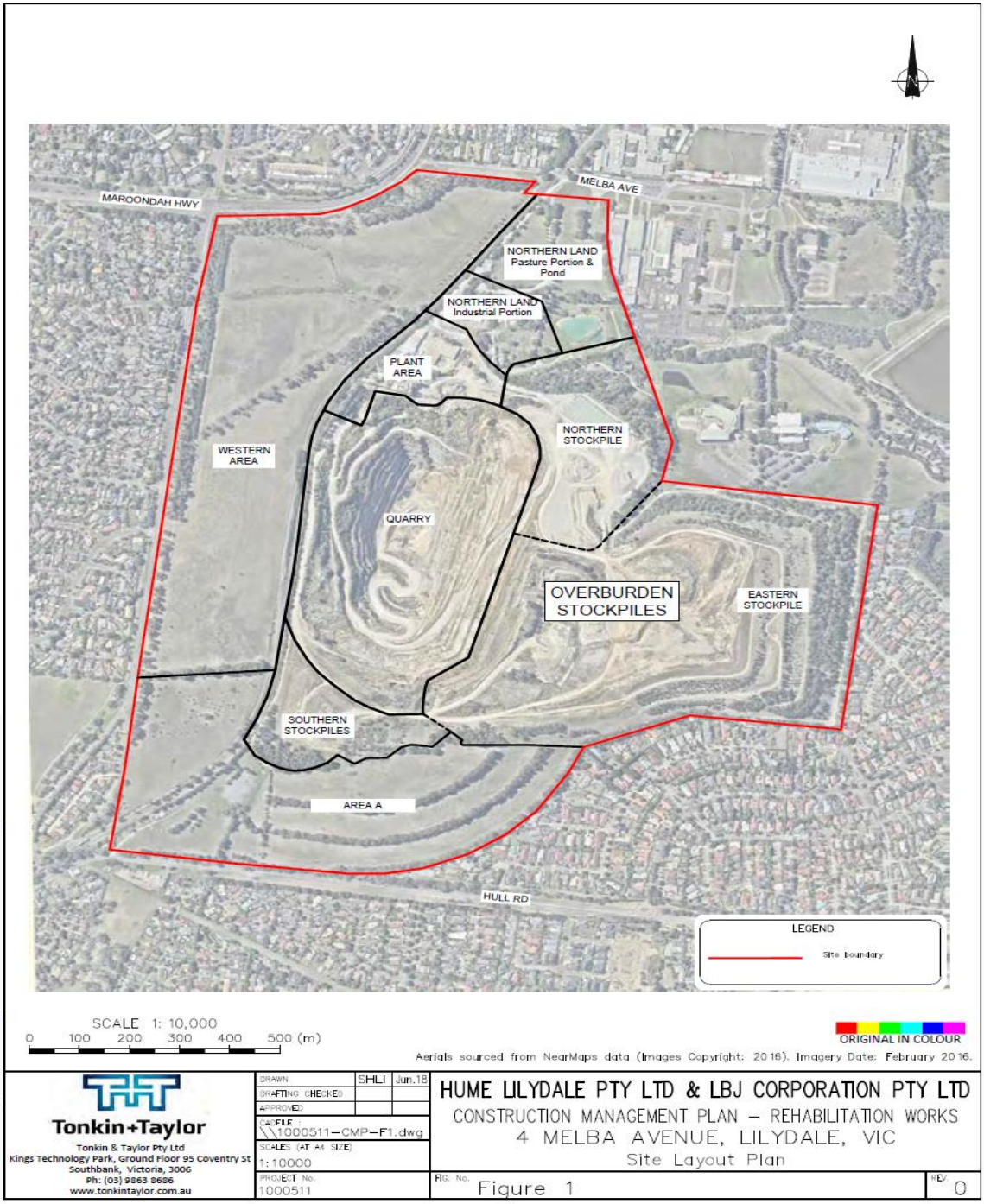


Figure 2. Aerial photo of site showing pertinent features of the site prior to development.

3 Development Planning

14 T+T became involved with the site assisting HBI during the due diligence phase and has continued to advise HBI thereafter. T+T is a firm of consulting engineers specializing in geotechnical and environmental engineering with extensive experience in land development.

15 T+T has undertaken several investigations at the site to assist in planning and undertaking development. These include assessments of the geotechnical conditions and the potential contamination that may exist on site.

16 These investigations are summarized in a document known as the Geotechnical Framework for the Kinley Development. The various investigations to date are appended to this document.

17 The site is most unusual in that there is a very large volume of overburden material stored in stockpiles on site which was removed to allow the limestone to be quarried. The volume of material has been estimated to be approximately 8.6 million cubic metres by Reeds (the civil engineering designers and surveyors for the project). It will be necessary to remove this overburden material from the current locations in the eastern and southern stockpiles, so that these areas can be returned to their natural levels to allow development to take place on natural ground.

18 The volume of the quarry pit void has been estimated by Reeds to be 10 million cubic metres. With the planned final landform, Reeds estimate a volume of 9 million cubic metres will be required to achieve the final site levels currently planned. With an estimated 8.6 million cubic metres in the stockpiles and about 1 million cubic metres from other earthworks planned in the different stages of the Kinley development, it is proposed to fill the quarry using only material from the Kinley project. There is no plan to import or remove material during filling of the quarry, as some densification is expected when the material is compacted, reducing the 9.6 million to 9 million compacted cubic metres.

19 It is planned that the natural ground levels adjacent to the eastern and southern boundaries of the quarry pit will be excavated to match the finished fill levels in the pit, to obscure the old walls of the quarry within the developed area.

20 Most other quarry sites that have previously been developed rely on importing material from a variety of sources with associated risks around the quality of the material and contamination. This site is unique in having ready access to the old overburden material which needs to be removed to allow those areas to be developed.

21 The overburden material is natural material and has no evidence of contamination. As such it is considered a significant resource which allows the quarry to be backfilled. Whilst the previously approved remediation plan for the quarry had been to allow it to fill with groundwater and fenced, the current plan creates a valuable and safe asset for the community.

22 The rehabilitation plan of the approved Work Plan for Work Authority 199 requires filling the quarry pit to RL 100m under the statutory control of the Department of Jobs Precincts and Regions (DJPR). In order to facilitate future development, the quarry will need to be filled to between RL 120m and 140m and requires Council to take over statutory control of the work.

4 Engineering of the works

4.1 Planning

23 Once it was decided to place the overburden material in the old quarry it remained a question as to how to do this and what investment to make into the engineering of this fill material. The quarry had been excavated to about RL 10m and dewatered for many years. The expected natural groundwater level is RL 88m, approximately 12m below the currently approved rehabilitation level and 32m to 52m below the proposed final level.

24 The options for backfilling were to loosely dump the overburden into the quarry and spread it with minimal compaction, or to invest in engineering this material by compaction so that the land could have a future beneficial use.

25 Transporting the material from the stockpiles to the quarry floor incurs a significant cost and the incremental additional cost to spread the material in layers and compact it was considered by HBI to be justified.

26 T+T undertook a literature search to find other projects where engineered filling up to 120m depth may have been undertaken previously to allow development. No such projects could be located in the literature. So, a process of engineering investigation and design was undertaken to establish a methodology to engineer the filling work in a manner that could lead to its eventual suitability for development.

27 Filling of land for development typically involves a thickness of one or two meters of fill. There are other quarries around Melbourne that have been filled by approximately 30m thickness of fill. Australian Standard AS 3798 “Guidelines for Earthworks for Commercial and Residential Developments” was first written in the 1990s to provide a common standard for filling of land. However, it never contemplated filling to 120m depth. Hence this project required a first principles engineering approach.

4.2 Laboratory Testing

28 A program of laboratory soil testing was undertaken to provide data to allow settlement estimates for the filling to be made. These tests were done on samples taken from the stockpiles and simulating the loading of the fill up to 1600kPa before then being saturated to see how much collapse might occur when groundwater recovers. These tests were done at different densities as the soil compressibility is very dependent on the soil density.

29 From these tests a report was prepared to estimate the settlement of the fill. However, it has always been known that these are simply estimates and that due to the number of variables involved, the only eventual certainty about the final fill performance will come from monitoring of settlement both during the filling works and after completion.

4.3 Specification for Compaction

30 The laboratory information was used to develop a target density requirement well in excess of what is required by AS 3798. This target has been implemented for the entire filling process and is included in the Specification for the earthworks included in the Geotechnical Framework. It is required that the fill be placed to a minimum average density ratio of 101% Standard each day, compared to 95% Standard required by AS3798 for residential development and 98% Standard for commercial development. All filling is being conducted under Level 1 supervision as defined in AS 3798, by Chadwick Geotechnics, a T+T subsidiary.

31 The other specified requirement was to not add water to the fill but to place it at the moisture content in the stockpile. The reason for this is that higher density can be obtained if the right compaction plant is used, and the soil is dry. The water between the soil particles can restrict densification of the soil, but it can also cause delayed settlement as the water needs to be expelled from the soil as it is compressed (a process known as primary consolidation described below).

32 The specification for the works is also unusual in that it specifies a method of compacting the soil with a minimum number of passes of particular compaction plant. The purpose of this is to exceed the specified minimum density requirements as much as possible.

4.4 Settlement Estimates

33 Based on the laboratory consolidation tests that were conducted, published literature and the planned compaction specification, estimates of settlement were made for the filling material in the quarry. These were based on many assumptions. Because the fill material is unsaturated (which means there is a mix of air and water in the voids between the soil

particles) it does not follow conventional consolidation theory of soil mechanics, which is the approach used for fully saturated soils.

34 Normally with saturated soils the application of load to soil leads to an increase in water pressure instantaneously, and as the water is squeezed out of the soil the pressure drops. The time it takes to squeeze the water out depends on the resistance to water being squeezed out (called soil permeability) and the distance the water has to travel. As the water pressure drops the stress is transferred to the soil particles and they move closer together. This process is called primary consolidation.

35 Once the soil water pressure is in equilibrium with the groundwater then primary consolidation is complete. But further settlement can continue to occur due to the high stresses involved from the depth of fill, and the potential for additional settlement as the soil saturates with a rising groundwater level. These processes are also very hard to predict as they depend on the initial density of the soil. Typically, the higher the initial density the less settlement from all of the above processes.

36 Once the groundwater fully saturates the soil then the stress in the soil reduces due to buoyancy effects. This essentially means the soil is 'unloaded' and at that stage the rate of settlement should reduce significantly.

37 So, whilst this would be difficult to estimate for a saturated soil, it becomes more complex when there is a mix of air and water in the soil as the air and water behave in different ways. The only way to reliably predict future settlement in such material is to measure settlement over time as detailed in the Geotechnical Framework, and update the original model used for the settlement estimation.

38 The initial settlement estimates for the filling are summarised in **Appendix C.**

4.5 Groundwater Modelling

39 From previous hydrogeological studies of the quarry commissioned by Sibelco it was estimated that the natural groundwater level would be approximately RL 88m compared to the dewatered level of about RL 0m. Given the discussion above regarding settlement and the beneficial effect of a fully recovered groundwater condition on settlement, it was important to try to understand how long groundwater recovery could take.

40 There had been previous estimates of this made as part of the Sibelco quarry rehabilitation plan prior to the landowners purchasing the site, but these essentially involved an assessment of the natural rock aquifer surrounding the quarry, as there was no fill to be placed in the quarry.

41 Placing fill inside the quarry pit slows the groundwater ingress into the pit. If the fill was to be placed in a loose state, then water would be able to infiltrate more readily, but settlement would be much greater due to the large voids between the soil particles. If the fill was to be placed in a dense state, then the rate of groundwater inflow is slowed but settlement is less. It was decided to place the soil as dense as reasonably practicable to limit settlement, despite the knowledge it would result in slowing the rate of groundwater infiltration.

42 To obtain some indication of the time it might take for groundwater to infiltrate the fill, some simple groundwater modelling was undertaken with a range of permeability and other modelling assumptions. This modelling estimated it could take 20 years for groundwater to recover to RL 88m and reach equilibrium in the fill.

4.6 Landslips

43 The site had some existing landslips at the time it was purchased by the landowners. These have been assessed and monitored since that time. Remedial actions were taken to reduce the risk of landslips as part of the rehabilitation works. Since this work was undertaken there have be no issues with landslip.

44 As the fill levels rise to the level of each landslip further remedial actions will be taken to remove any unsuitable materials and replace them with compacted fill.

45 Some parts of the northern face of the quarry will be above the final level of filling. These faces will be retained as part of the heritage works planned to the north of the quarry. These areas will be assessed in more detail as permanent batter slopes as the fill levels approach final level. Any remedial work required to maintain long term stability will be conducted.

4.7 Contamination

46 The site of the quarry pit and backfilling operations has shown no signs of contamination. The site of the old processing plant will remain as heritage assets and be developed as commercial and retail areas. These parts of the site will be subject to more detailed environmental assessment and any necessary clean up undertaken.

47 The heritage area, quarry pit and old stockpile sites, together with groundwater are subject to environmental audit prior to development.

4.8 Implementation

48 Prior to constructing the engineered fill, the existing uncompacted material in the base of the quarry needed to be removed to expose the bedrock. This resulted in considerable excavation of up to 10m below the old floor. It also involved removing the old haul road into the pit which

included about 300,000 cubic metres of material that although well compacted, could not be tested to certify it met the specification.

49 Once the quarry was cleaned of uncompacted material, a drainage blanket was placed over the entire floor of the quarry. This is shown in **Figure 3.**

Figure 3 showing the gravel drainage blanket in the base of the quarry.

50 The purpose of the drainage blanket was to create connection of the quarry floor to the groundwater table outside the quarry. A new dewatering sump was constructed to control groundwater. This was directly connected to the drainage blanket by holes formed in the concrete sump so that the entire quarry would remain dewatered when pumping from the sump took place. The sump has a concrete riser constructed progressively as the filling is raised. The outside of the sump riser is coated with bitumen to reduce the frictional load applied from the settling fill material. It is also surrounded by gravel and a geotextile filter to allow surface runoff to drain vertically to the sump.

51 The quarry pit walls were also assessed for the potential for rockfalls. Loose rocks were removed by hand using specialist contractors operating from ropes. Some sections were protected by steel mesh bolted to the quarry walls. These works were undertaken to protect

the workers in the base of the quarry and were successful in preventing any unforeseen rockfalls.

52 During the work on the rock faces a series of caves were observed in the quarry walls. The extent of the caves was unknown. Being aware that when groundwater rises to its natural level the caves will fill with water, it was recognized that this could lead to erosion of the fill material from the quarry pit into the caves. So, all caves that have been encountered to date have been sealed with concrete as they have been exposed. All caves exposed as the fill level rises will also be sealed as they are encountered. An example of one such cave opening in the base of the quarry is shown in **Figure 4.**

Figure 4 showing the opening of a cave in the base of the quarry.

53 The placing of fill material has progressed successfully as planned under Level 1 geotechnical supervision by Chadwick Geotechnics, with regular engineering inspections by T+T engineers. Compaction testing is undertaken daily and reported weekly. Quarterly reports are provided to all stakeholders in accordance with the reporting program detailed in the Geotechnical Framework.

54 The filling is now at approximately RL 80m and has reached the stage where the fill has a planar surface over the entire pit floor and a single haul road running down onto the fill. This follows removal of the many hairpin bends in the haul road and variable fill levels that were initially required to access the base of the original quarry floor. As such the filling process is now much simpler and is achieving increased production rates. Approximately 2.75 million cubic meters of fill has been placed to date.

55 A recent photo of the filling works is shown in **Figure 5.**

Figure 5 showing filling works in April 2021.

56 The fill material from the stockpiles has been of consistent quality with only small sections of lime product noted as unusual. Large oversize boulders have been collected, stockpiled and crushed from the start of the project. These materials were initially used to construct the drainage and filter layers in the base of the quarry.

57 A summary of the compaction results to date is presented in **Table 1.**

Table 1 Summary of compaction testing results at April 2021

No of Compaction Tests	Average Density Ratio (% Standard)	Average Moisture relative to Optimum (%)	Range in Moisture relative to Optimum (%)	Average Air Voids (%)
4346	102.6	-0.2	-5.7 to +4.0	1.8

5 Monitoring

5.1 Settlement

58 Three settlement arrays have now been installed across the width of the quarry in accordance with the planned instrumentation in the Geotechnical Framework. The summary details of these are shown in **Table 2.**

Table 2 Summary of settlement monitoring installations

Settlement Array	Location (Chainage)	RL (m AHD)	Number of monitoring points along array	Date of installation
North	8*	-	4	07/01/2019
	20	25.57		
	40	25.59		
	60	25.57		
	80	25.58		
	94.694*	-		
South	30	34.35	4	18/03/2019
	50	34.35		
	70	34.38		
	90	34.35		
Central	25	66.14	7	15/02/2021
	45	66.10		
	67	66.10		
	89	66.10		

	105	66.13		
	125	66.11		
	145	66.12		

*** Discontinued as of 21/02/2021.**

59 The results of the settlement monitoring to date are shown in **Appendix D**. The results are within the original predicted range of settlement estimates and show there is variability between sites. There could be many reasons for these variations and speculation on the cause is not considered beneficial.

60 The key purpose of the monitoring is to continue to observe the fill behavior as the stresses on the ground continue to increase as filling continues. At present with the dewatering pump switched off, the settlement rate is being carefully observed to see if any increase in settlement rate can be observed as groundwater enters the filling. No noticeable change in settlement rate has been observed to date other than when new filling is placed.

61 Ultimately it will be through the analysis of all settlement monitoring data that future predicted settlement can be made, and particularly the finished surface monitoring where extensive data will be collected over the filled quarry surface and adjacent land.

5.2 Groundwater monitoring

62 The groundwater has been kept in a dewatered state since the start of the project until September 2020. Since then, the dewatering pump has been mostly switched off to allow the groundwater to recover and an assessment of the fill permeability to be made based on actual site conditions rather than assumed models.

63 In each trench where the settlement arrays are installed, vibrating wire piezometers have also been installed. Eight (8) piezometers were installed in in the Northern Trench, eight (8) piezometers were installed in the Southern Trench and thirteen (13) piezometers were installed in the Central Trench.

64 A photograph of the northern array installation is included as **Figure 6.**

Figure 6 showing typical installation of settlement and piezometer array.

65 To the end of February 2021 two of the vibrating wire piezometers in the northern installation have recorded minor evidence of groundwater pressure of up to 10 kPa. This correlates to groundwater at RL26m which is similar to the sump groundwater level. The data from the vibrating wire piezometers and the monitoring bores are included in **Appendix E.**

66 In addition to these instruments there are three groundwater monitoring bores outside the quarry and the sump inside the quarry that have data loggers installed to allow continuous monitoring of groundwater levels. The locations of the monitoring bores and sump are shown in Figure 7.

67 The data in Appendix E shows a good correlation between the rise in the groundwater level outside the quarry and the rise in the sump. The water level in the sump does not necessarily reflect the water level in the fill but has a direct hydraulic connection to the external monitoring bores via the drainage blanket which connects to the groundwater outside the quarry through the floor and walls of the quarry.

Figure 7 showing the locations of groundwater monitoring bores and sump.

6 Post Filling Behaviour

68 Once the quarry backfilling is completed in 2 to 3 years a lot more information will have been collected on settlement and groundwater behaviour. However, it is still expected that the ongoing settlement of the fill will vary across the area of the filled surface. The main causes for this variable settlement are considered likely to include:

- Variable depths of filling;
- Variable densities of placed fill; and
- Variable degrees of groundwater infiltration.

69 The depths of filling will be readily determined from survey before and after filling, so this variable is reasonably predictable. The degree of compaction will vary but statistically can be assessed and over the significant depth of fill, reasonable assumptions can be made of what density is likely to occur over any particular depth of fill. However correlating density to the compressibility of the fill will require further analysis.

70 The variable that will remain most uncertain at the completion of filling is expected to be the degree of saturation throughout the fill, and the impact of saturation on settlement. It is expected that more data collected over the next two years will assist in this assessment, but it is still likely to remain as the most uncertain variable on predicting future settlement.

71 Given the current uncertainty around the rate of groundwater infiltration into the fill and its impact on settlement, the possibility of keeping the dewatering system operational to remove this uncertainty has been raised as a possibility to remove this risk.

72 Therefore, once the filling is completed to finished design level a system of surface monitoring points will be established on the fill surface and on the surrounding natural ground outside the quarry pit so that settlement and differential settlement can be monitored.

73 The method to undertake this monitoring is not finalized as yet because technology is changing rapidly, and it may be possible to accurately record movements using satellites or other techniques. This would impact on the cost and hence the number of points that could be economically surveyed. However, in principle there will be adequate survey to satisfy all stakeholders as to the behaviour of the fill material. Once the trend of the settlement can be established then extrapolation of that data to predict future settlement can be undertaken.

7 Future Development

74 The planned development of the site will ultimately be controlled by the predicted settlement. The land to be transferred to Council for open space and roads is subject to meeting agreed settlement criteria before the transfer takes place so the risk sits with HBI prior to transfer.

75 There are criteria proposed to be included in the 173 agreement with Council so that the conditions of transfer can be known to both parties. This allows Council to assess the type of development they can undertake on the transferred land that will cope with the predicted settlement.

76 With respect to the development on private land HBI is aware that this will depend on the settlement monitoring results, the timing of development, any additional work to be done on the fill and the type of foundation design. It is expected that footing systems will be non-standard and require dual certification. Dual certification means that an independent engineer will design the footing system and a second independent engineer will certify its suitability. At this stage it is considered premature to discuss footing types in any detail, but broad concepts would include;

- Basements to remove fill and hence have a foundation that has essentially been surcharged;
- Piled footings around the perimeter of the quarry where piles could be founded on the first bench inside the quarry perimeter and on natural ground outside the quarry perimeter;
- Rigid slab footings or piled raft footings where settlement of the fill is shown to be quite uniform and moderate loading is applied to the footing; or
- A combination of the above.

8 Conclusions

77 The filling of the Lilydale quarry creates engineering challenges for future development of the land due to the depth of the filling. Due to the lack of proven laboratory and analytical methods to predict settlement with certainty, an observational approach is being taken to compare actual settlement to analytical predictions of the fill behaviour.

78 Significant effort is being put in to compacting the fill to a standard well above the normal requirements of AS 3798 which is considered likely to allow development at some time in the future.

79 Ongoing monitoring of settlement and groundwater is being conducted and an increased confidence in the behaviour of the fill and groundwater will be gained over that time to inform decisions on how best to develop the land once filling is completed.

80 The work has been and will continue to be conducted in accordance with the Geotechnical Framework for the project which is the document being relied upon in the Section 173 Agreement between the Council and the landowners.

81 It is considered the procedures outlined in the Geotechnical Framework will deliver outcomes that will allow stakeholders to be confident in the final development of the site.

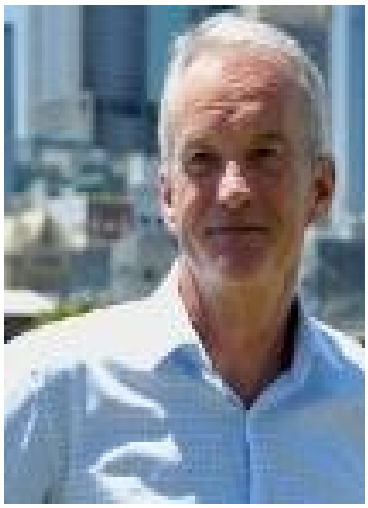
82 I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

Signed

Roger Olds

Appendix A: Curriculum Vitae – Roger Olds

Roger Olds Consulting Pty Ltd



Education:
- Bachelor of Engineering, 1st Class Honours (Monash) 1978
- Diploma of Geotechnical Engineering (Monash) 1992
- JMW Leader of the Future 2003
- Leading Change &Organisational Renewal (Stanford) 2010
- Practitioner's Certificate in Mediation (IAMA) 2011

Professional Affiliations:
- FIEAust, CPEng
- Fellow ATSE
- Member, College of Civil Engineers
- Member, Australian Geomechanics Society
- Nationally accredited mediator Institute of Arbitrators and Mediators Australia (IAMA)

Specialisation:
- Geotechnical & Pavement Engineering
- Mediation and Conciliation
- Mergers and Acquisitions
- Alliancing
- Leadership
- Innovation
- Risk Management

Awards
- Monash University Civil Engineering Alumnus of the Year 2006
- Engineers Australia 100 most influential engineers 2005-10

Roger Olds established his own consulting practice to undertake work with clients based on his experience and knowledge gained over more than 40 years in the corporate and construction world.

Working as a consultant, Roger has advised most of the major Australian construction and consulting engineering firms on the issues of geotechnical risk and innovation for a wide variety of projects. Generally known as one to challenge conventional thinking, Roger has delivered on many innovative ideas to save time and money on projects. He has been involved in numerous design and construct contracts and alliance contracts throughout Australia.

He was the Managing Director of Coffey International Ltd, an ASX 300 public listed company, from 1996 to 2011. He oversaw the growth of Coffey from a specialist geotechnical engineering consulting company with a turnover of $30m to a global multi-specialist business with turnover exceeding $800m.

Roger has advised a variety of clients in regard to earthworks for construction of roads, railways, dams and land development. He has a strong knowledge of compaction and testing of earthfill to achieve the desired engineering performance. He has acted as an expert on a number of geotechnical matters including proposed and failed developments on filled land.

In a corporate role Roger led over 30 acquisitions, which involved major negotiations with a variety of people. Between that, and resolving many commercial disputes without litigation, Roger has developed strong communication and inter-personal skills which will assist parties to resolve disputes or complete merger negotiations.

Roger was educated at Monash University and obtained first class honours in civil engineering, graduating in 1978. Roger also undertook post-graduate coursework studies in geotechnical engineering and management in the early 1980s, after working in Canada in 1981. His blend of strong technical and corporate/commercial knowledge is combined with an ability to communicate and gain the trust of people. These attributes and Roger's ability to quickly get to the heart of an issue are of great value in providing advice to his clients.

Appendix B: Brief to Expert

22 April 2021

Privileged and confidential

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Your reference:

Our reference:
4036949

Dear Roger

Amendment C193 to the Yarra Ranges Planning Scheme
Land: 4 Melba Avenue, Lilydale (Lilydale Quarry)

We act for HBI Lilydale Pty Ltd (**HBI Lilydale**) in relation to proposed planning scheme amendment C193 to the Yarra Ranges Planning Scheme (**Proposed Amendment**). HBI Lilydale is a joint venture between Hume Lilydale Pty Ltd (**Hume Lilydale**) and LBJ Developments Pty Ltd (**LBJ Developments**). Hume Lilydale is itself a joint venture between Intrapac Property, Brencorp Properties, and Bayport Group.

1 Background

1.1 On 12 August 2020, the Minister for Planning directed the Victorian Planning Authority (**VPA**), to lead the preparation of the Proposed Amendment to facilitate the redevelopment of a 143.8 ha site in the south of Lilydale (being, 4 Melba Avenue, Lilydale, the **Site**). The Minister's direction came after HBI Lilydale had been working with the Yarra Ranges Council for a number of years in relation to the Preparation of the Proposed Amendment.

1.2 Part of the Site (around 25 hectares) was formerly used for the extraction and production of natural limestone and was known as the Lilydale Quarry. The Proposed Amendment, seeks to insert the Lilydale Quarry Comprehensive Development Plan (**CDP**) into the Yarra Ranges Planning Scheme and rezone the Site to facilitate the rehabilitation and future redevelopment of the Site for predominantly residential use supported by commercial, retail and other uses.

1.3 The redevelopment of the Site has been identified as a project on the VPA's Fast Track Program. Public consultation on the Proposed Amendment ran from 13 November 2020 to 18 December 2020 and 57 submissions were made. The VPA is in the process of considering the submissions.

1.4 The unresolved matters have been referred to the VPA's Projects Standing Advisory Committee (**SAC**) for consideration. It is anticipated that the SAC will conduct a public hearing or a roundtable between 31 May and 11 June 2021.

1.5 As you would be aware, in 2020 Tonkin + Taylor prepared a Geotechnical Framework for the Site which informed preparation of the Proposed Amendment and was released for public consultation.

2 Your engagement

2.1 Our client wishes to engage you to:

(1) review the background materials in your brief including the Geotechnical Framework (**the Framework**);

(2) confer with instructing solicitors where necessary;

(3) prepare an expert witness statement which:

(a) explains the geotechnical issues associated with filling the quarry in the context of the proposed Amendment and;

(b) the manner in which the Proposed Amendment proposes to approach the geotechnical considerations associated with filling the quarry. ; and

(4) if necessary, appear before the SAC to present your evidence.

3 The Site

3.1 Whilst HBI Lilydale is the proponent of the Proposed Amendment, the registered proprietors of the Site are Hume Lilydale and LBJ Developments. The Site is comprised of four titles:

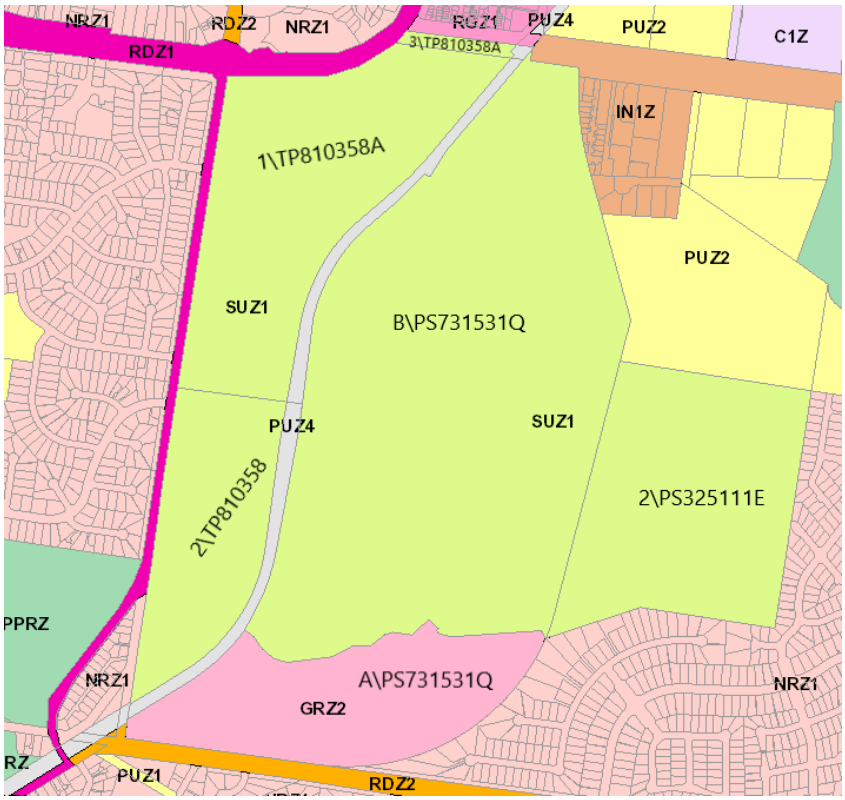
(1) Certificate of Title Volume 11584 Folio 193, more particularly known as Lot B on PS 731531Q;

(2) Certificate of Title Volume 11584 Folio 192, more particularly known as Lot A on PS 731531Q;

(3) Certificate of Title Volume 08756 Folio 801, more particularly known as Lot 2 on PS 325111E; and

(4) Certificate of Title Volume 08245 Folio 536, more particularly known as Lots 1, 2 and 3 on TP 810358A.

3.2 Directly to the south of the Site is a 20 ha parcel (Lot A on PS 731531Q) which is also owned by Hume Lilydale and LBJ Developments and is “Stage 1” of the “Kinley” housing development. Stage 1 is not subject to the Proposed Amendment. Stage 1, was rezoned General Residential Zone - Schedule 1 (**GRZ1**) in November 2014 and is currently being developed for residential purposes under planning permit YR-2014/932/B.



3.3 The Site is currently:

(1) zoned, Special Use Zone Schedule 1 – Earth and Energy Resources Industry (**SUZ1**);

(1) in part, subject to the following overlays:

(a) Bushfire Management Overlay;

(b) Erosion Management Overlay, Schedule;

(c) Heritage Overlay, Schedule 201 – Cave Hill Limestone Works (**HO201**);

(d) Specific Controls Overlay, Schedule 13; and

(e) Public Acquisition Overlay, Schedule 9;

(2) wholly within a bushfire prone area;

(3) affected by an entry on the Victorian Heritage Register (VHR Number H2366 – Cave Hill Limestone Quarry);

(4) affected by one or more areas of cultural heritage sensitivity; and

(5) bounded by Mooroolbark Road to the west, Maroondah Highway and Melba Avenue to the north, Hull Road to the south and residential neighbourhoods to the east and south east.

3.4 The Site is bisected north-south by the Lilydale Railway Line, separating the Site into the 'Eastern Land' and 'Western Land'.

1.2 The Site was used for the extraction and production of natural limestone products for over 137 years. Extraction operations ceased in October 2015. Hume Lilydale and LBJ Developments purchased the Site from Sibelco Lime (Victoria) Pty Ltd in 2016.

1.3 In the centre of the Site is an open quarry pit. The pit has a surface area of 25 ha and was extracted to a depth of approximately RL 15m AHD. Rehabilitation works are being carried out on the Site under Work Authority WA199 (**WA199**). WA199 includes an approved Work Plan and incorporates a rehabilitation plan.

1.4 The Work Plan for WA199 was approved on 28 May 2004, and varied on 31 December 2009 and 11 June 2020. It allows for the backfilling of the pit with materials from the existing overburden stockpiles to a level of approximately RL 100m AHD. A copy of the approved Work Plan is provided at **Tab 5** of your brief. Additional filing will be required above that approved under the Work Plan to achieve the planned finished surface levels.

1.5 To date, the pit has been filled to approximately RL 80. A time lapse video of the filling of the quarry pit can be accessed here. The password to access the video is "reliveit".

1.6 Once the Site is rehabilitated to a safe and stable condition WA199 is intended to be relinquished. Stage 1 was excised from the WA199 on 13 November 2019. The current boundary of WA199 is shown below in red.

4 Proposed Amendment

4.1 The VPA released the Proposed Amendment for public consultation on 13 November 2020.

4.2 The Proposed Amendment seeks to:

(1) insert the CDP as an incorporated document;

(2) rezone the Site from SUZ1 to Comprehensive Development Zone, Schedule 1 (**CDZ1**) and insert a new CDZ1 into Clause 37.02;

(3) reduce the extent of HO21 so it does not apply to the pit area;[1]

(4) apply PAO, Schedule 12 to part of the Site to support the widening of Mooroolbark Road and replace the schedule to the PAO with a new Schedule that includes reference to the widening of Mooroolbark Road;

(5) apply the Environmental Audit Overlay (**EAO**) to part of the Site to the east of the railway line; and

(6) amend the Schedule to Clause 51.03 to include land zoned CDZ in certain exemptions relating to buildings and works and vegetation removal.

4.3 It is proposed that the Site will be redeveloped for the following uses:

(1) residential dwellings (32% being low density, 49% being medium density and 20% being high density): approximately 3,200 dwellings;

(2) affordable housing: 5% of dwellings delivered;

(3) retail and commercial/office: 6,000sqm;

(4) public open space: 15.67 ha; and

(5) Government Specialist School: 1.9 ha.

The Lilydale Quarry Comprehensive Development Plan

4.4 To support the CDZ, the CDP will be incorporated into the Planning Scheme. The CDP itself is supported by the following six reference documents:

(1) Conservation Management Plan prepared by Lovell Chen, which informs decision-making around heritage matters and provides guidance on how the Site's past should be appropriately managed in the context of new development;

(2) Heritage Interpretation Strategy prepared by Lovell Chen, which establishes a recommended approach to the interpretation of cultural heritage values associated with the former Lilydale Quarry;

(3) Integrated Water Management Strategy prepared by Incitus, which determines the required water management assets for an integrated approach to the supply of water, the removal of wastewater and the management of stormwater runoff;

(4) Stormwater Strategy prepared by Incitus, which outlines a management plan for stormwater that will be generated from the urbanisation of the land, including a Drainage Strategy Plan;

(5) Integrated Transport Plan prepared by Cardno, which contains high-level transport principles and priorities, providing an over-arching concept for the transport system and mix; and

[1] The reduced extent of HO21 is shown on Heritage Overlay Map 40 (Tab 10 of your Brief).

(6) Sustainability Framework prepared by WSP, which provides the high-level sustainability principles and an outcome-based framework against which development options are to be evaluated.

4.5 The CDP divides the Site into four precincts which will be designed and delivered progressively due to the 15 plus year development timeframe. The four precincts are:

(1) **Precinct 1, Western Neighbourhood –** This precinct will accommodate a mix of traditional and medium density housing. The northern edge of the precinct will allow for a commercial mixed use or restricted retail development that responds to the Maroondah Highway frontage.

(2) **Precinct 2, Heritage Village –** This precinct will accommodate mixed use activity, which will integrate the Site's heritage assets with residential uses including townhouses and small to medium-scale apartment buildings, and open spaces. Sport and recreation facilities will be provided in the precinct's north.

(3) **Precinct 3, Eastern Neighbourhood –** The precinct will also accommodate a mix of traditional and medium density housing focused around a central park. Medium density housing will be concentrated at the Western end of the precinct in proximity to the potential future train station. The precinct will directly connect to Lilydale Lake.

(4) **Precinct 4, Urban Core -** This precinct will also accommodate mixed use activity. Medium to high density housing and transit-oriented development will be focused around the potential future train station and urban plaza. Retail, commercial and community uses will be supported in the Urban Core.

4.6 The CDZ requires the detailed development outcome of each precinct to be agreed with the Responsible Authority through further detailed planning (requirements to be satisfied before planning permits can be issued within the area controlled by the CDZ and CDP). For example, the CDZ requires a geotechnical statement to be prepared before a subdivision permit or building and works permit can be issued for land within Precinct 4.

5 Section 173 Agreements

5.1 The CDZ references three agreements under Section 173 of the *Planning and Environment Act 1987* that are required to be entered into by Hume Lilydale Pty Ltd and LBJ Developments Pty Ltd including (**Geotechnical Section 173 Agreement**)filling of the quarry pit.

Geotechnical Framework

5.2 As you would be aware, the Geotechnical s173 Agreement is in the process of being negotiated between Hume Lilydale Pty Ltd, LBJ Developments Pty Ltd and Yarra Ranges Council (**Council**) and is close to finalisation. The proposed Geotechnical Section 173 Agreement is anticipated to provide a mechanism for regulation of the filling of the quarry including a reference to a geotechnical framework to guide the filling of the quarry pit and defines the ultimate performance criteria for the filling of the quarry and is intended to allow Council a degree of oversight over the filling activities. Hume Lilydale Pty Ltd, LBJ Developments Pty Ltd and Council have been negotiating the terms of the agreement for in excess of 12 months and it is now close to finalisation.

5.3 The Geotechnical Framework referenced in the Section 173 Agreement has been prepared by Tonkin & Taylor and details the approach, filling specifications, fill process, monitoring, reporting, and survey assessment and investigation works to be undertaken. A copy of the Geotechnical Framework is provided at **Tab 23** of your brief.

Exhibition and submissions

5.4 The Proposed Amendment was released for public consultation between 13 November 2020 and 18 December 2020 and was supported by a number of background studies.

5.5 The documents released for public consultation are currently available on VPA's website at the following link:

https://vpa.vic.gov.au/project/lilydale-quarry-strategic-site/

5.6 The Proposed Amendment documentation is also included at **Tabs 6 to 44** of your brief.

5.7 A total of 57 submissions were received during the public consultation period. Forty three of these submissions were from nearby residents. Council (submitter 36), was the primary submitter to raise geotechnical issues. Council's submission expressed the view that the CDZ should include a requirement for geotechnical assessment of land within 30 metres of the quarry pits edge.

6 HBI Lilydale has worked closely with the VPA in the preparation of the Proposed Amendment and is fully supportive of the Proposed Amendment as drafted.

6.1 HBI Lilydale also provided the VPA with a response to the submissions made, which is located at **Tab 46** of your brief.

7 **Standing advisory committee hearing and evidence**

7.1 The Minister has now referred all unresolved submissions in relation to the Proposed Amendment to the VPA Projects Standing Advisory Committee (**SAC**).

7.2 The "consultation process", be it a roundtable or hearing, is expected to be between **31 May 2021 and 11 June 2021.**

7.3 The draft directions which have been circulated by the SAC have witness reports due for circulation by noon on Friday, **14 May 2021**.

7.4 Please provide us with a **draft** report addressing the matters in paragraph 2.1(3) as soon as possible.

8 **Enclosed documents**

8.1 We have uploaded a brief of documents to Dropbox. Please let us know if you have any queries or require any additional material to be provided to you.

8.2 Please ensure that you have regard to Planning Panels Victoria's Guide to Expert Evidence (April 2019) when preparing your evidence.

8.3 If you are required to give evidence at any hearing conducted remotely, please ensure that you have read and understood Planning Panel Victoria's Direction for witnesses providing expert evidence through remote conferencing.

9 **Client details**

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

Intrapac Property Pty Ltd
Attention: Anthony Jansen
E: ajansen@intrapac.com.au

10 Confidentiality

10.1 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.

10.2 The duty of confidentiality will continue beyond the conclusion of your instructions.

10.3 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.

10.4 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.

10.5 You must take all steps necessary to maintain Confidential Information and notes in strictest confidence.

11 Change of opinion

11.1 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 Jacqueline Plant on 8686 6437.

Yours faithfully

Jacqueline Plant
Special Counsel
Partner: Tamara Brezzi
Norton Rose Fulbright Australia

BEFORE THE VPA PROJECTS STANDING ADVISORY COMMITTEE
PLANNING SCHEME AMENDMENT C193 TO THE YARRA RANGES PLANNING SCHEME

BETWEEN

HBI LILYDALE PTY LTD

Proponent

and

YARRA RANGES COUNCIL

Responsible Authority

LAND: 4 Melba Avenue, Lilydale (Lilydale Quarry)

Brief to expert

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www.nortonrosefulbright.com
Our ref: 4036949

Index to brief

BACKGROUND

No	Document	Date
1.	Planning Property Reports and planning scheme extracts for: A. Lot 2 on TP810358; B. Lot 2 on PS325111; C. Lot 1 on TP810358; D. Lot B on PS731531; and E. Lot 3 on TP810358.	February 2021
2.	Certificate of title: A. Volume 11584 Folio 193; B. Volume 08756 Folio 801; and C. Volume 08245 Folio 536.	July 2019
3.	Planning Permit YR-2014/932/B and endorsed plans	7 September 2018
4.	Work Authority WA199: A. Original, dated February 2001; and B. Variation dated January 2010.	
5.	Approved Work Plan 001498 for WA 199	11 June 2020

PROPOSED AMENDMENT

No	Document	Date
Public Consultation Documents		
6.	Explanatory report	November 2020
7.	Instruction sheet	November 2020
8.	Lilydale Quarry Comprehensive Development Plan	November 2020
9.	Zoning Map 40	November 2020
10.	Heritage Overlay, Schedule 201 Map 40	November 2020
11.	Public Acquisition Overlay, Schedule 12 Map 40	November 2020
12.	Environmental Audit Overlay Map 40	November 2020
13.	Clause 22.13 – Former Lilydale Quarry	November 2020

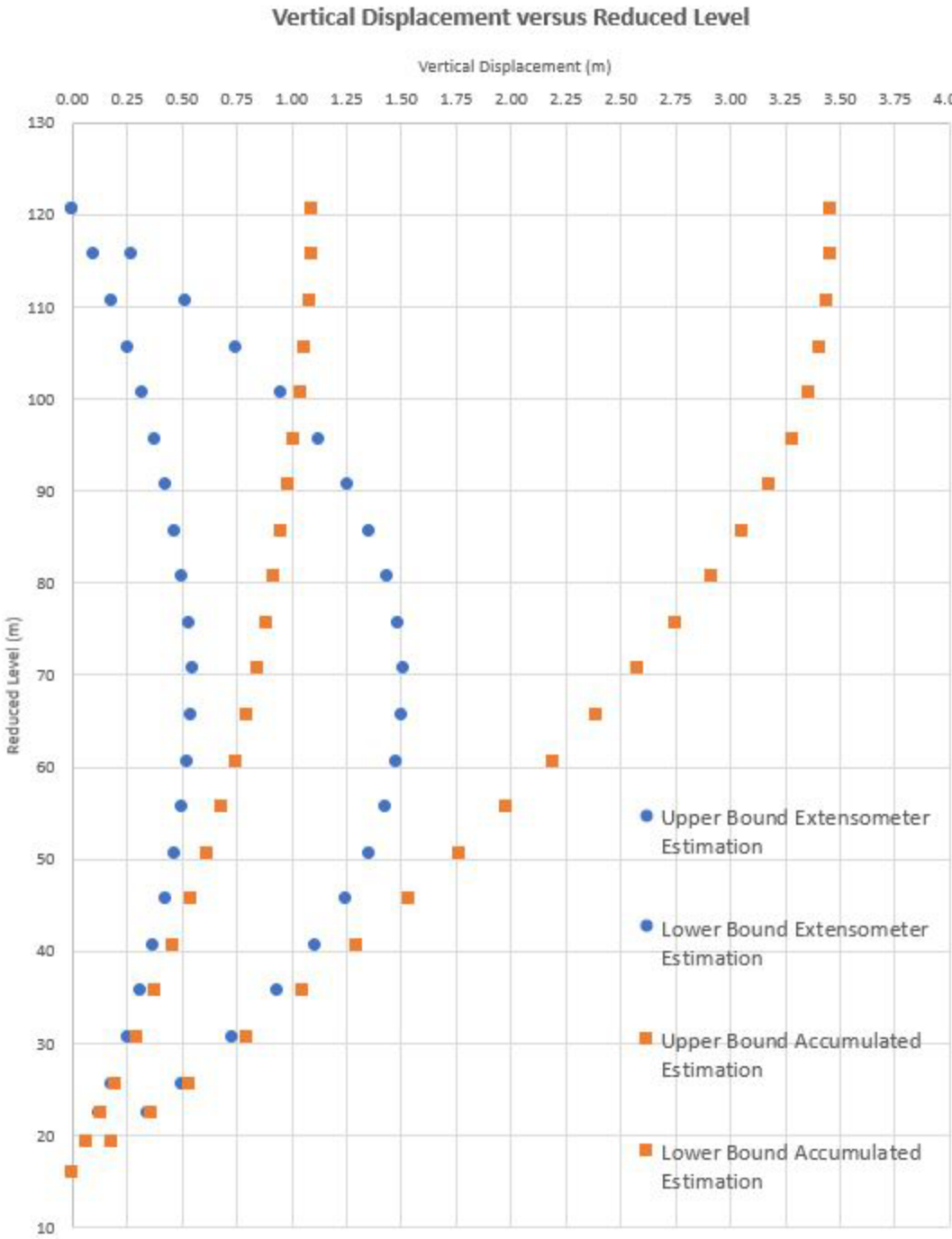
No	Document	Date
14.	Schedule 1 to Clause 37.02 – Comprehensive Development Zone	November 2020
15.	Schedule to Clause 45.01 Public Acquisition Overlay	November 2020
16.	Schedule to Clause 51.03 Upper Yarra Valley And Dandenong Ranges Regional Strategy Plan	November 2020
17.	Schedule to Clause 72.03 What Does This Planning Scheme Consist Of?	November 2020
18.	Schedule to Clause 72.04 Documents Incorporated In This Planning Scheme	November 2020
Background studies		
19.	Planning Report, prepared by Urbis	October 2020
20.	Development Contributions, prepared by Urban Enterprise	October 2020
21.	Community Needs Assessment, prepared by Ethos Urban	October 2020
22.	Open Space Strategy, prepared by TCL	April 2020
23.	Retail & Commercial Analysis, prepared by Urbis	October 2020
24.	Economic Benefit Snapshot, prepared by Urbis	June 2020
25.	Stormwater Strategy, prepared by Incitus	October 2020
26.	Engineering Servicing Report, prepared by Reeds Consulting	October 2020
27.	Geotechnical Overview, prepared by Urbis	October 2020
28.	Integrated Water Management, prepared by Incitus	October 2020
29.	Geotechnical Framework, prepared by Tonkin & Taylor	April 2020
30.	Sustainability Framework, prepared by WSP	October 2020
31.	Bushfire Assessment, prepared by Biosis	April 2020
32.	Conservation Management, prepared by Lovell Chen	September 2015
33.	Flora and Fauna Assessment, prepared by Nature Advisory	April 2020
34.	Heritage Interpretation, prepared by Lovell Chen	April 2020
35.	Environmental Site Assessment, prepared by Taylor & Tonkin	April 2020
36.	Housing Supply and Demand Analysis, prepared by SGS	December 2016
37.	Affordable Housing Needs Assessment, prepared by Urbis	April 2020
38.	Kinley Affordable Housing, prepared by Urbis	April 2020

No	Document	Date
39.	Train Station Cost Benefit Analysis, prepared by SGS	September 2017
40.	Cave Hill Station Concept Report, prepared by Raylink	September 2017
41.	Kinley Station Value Analysis, prepared by Intrapac	February 2020
42.	Integrated Transport Plan, prepared by Cardno	October 2020
43.	Supporting Traffic Impact Assessment, prepared by Cardno	October 2020
44.	Urban Design Report, prepared by Roberts Day	April 2020

Other

No	Document	Date
45.	Submissions	Various
46.	HBI Lilydale's comments on submissions	
47.	Not used	
48.	Not used	
49.	Not used	
50.	Geotechnical peer review prepared by Senversa on behalf of Yarra Ranges Council	16 December 2020

Appendix C: Settlement Estimates


Vertical Displacement versus Reduced Level
Vertical Displacement (m)
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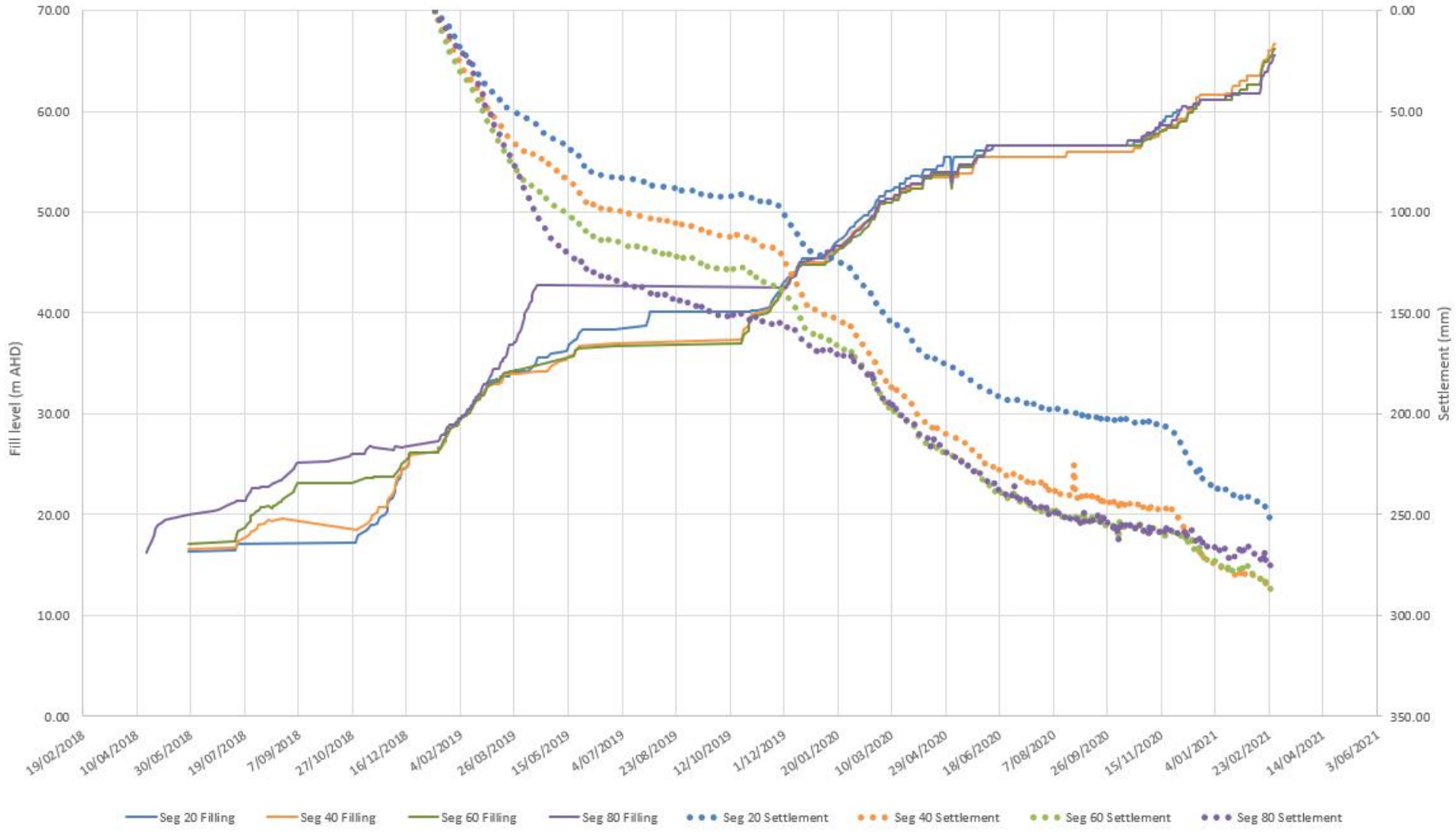
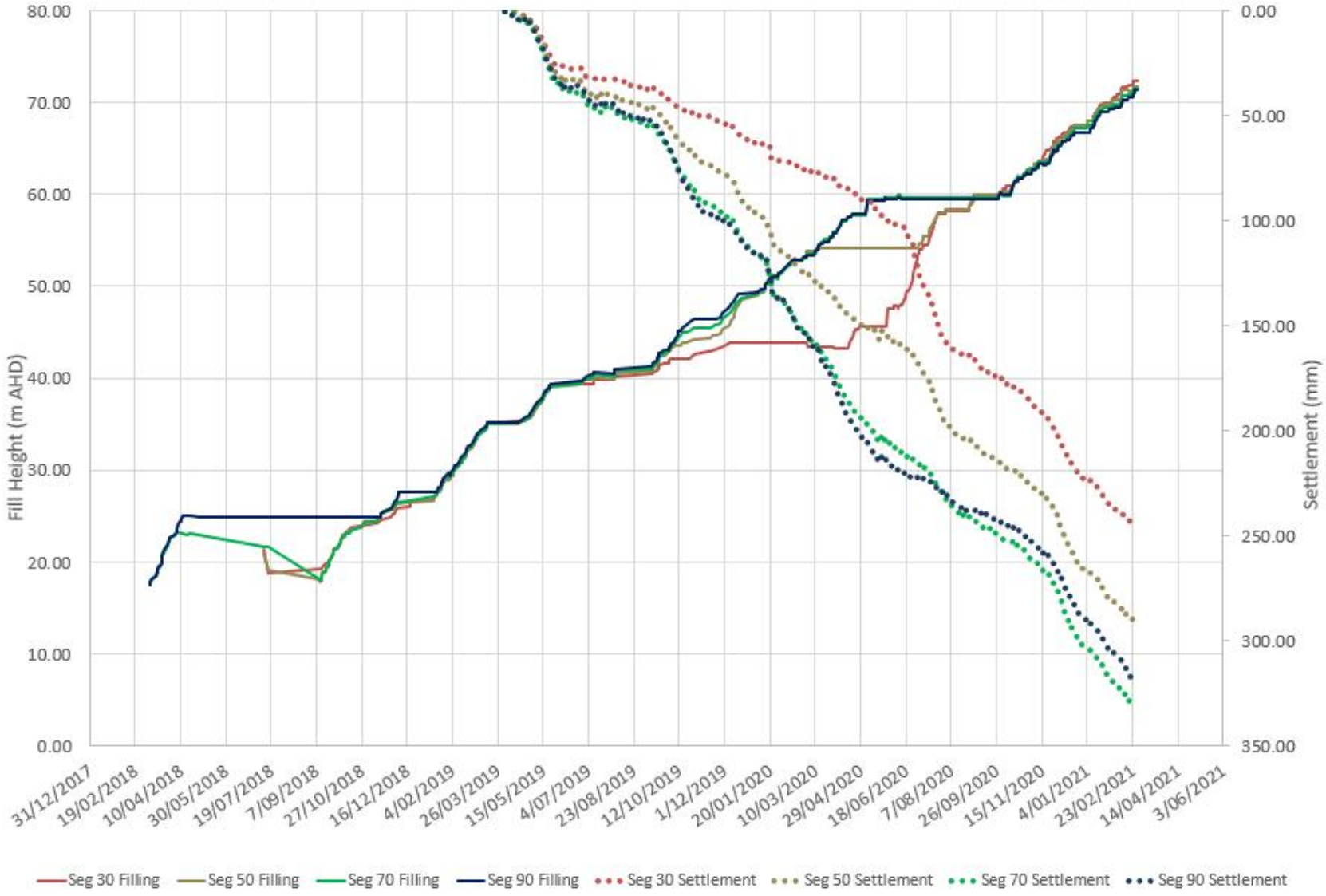
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
Reduced Level (m)
130
120
110
100
90
80
70
60
50
40
30
20
10
Upper Bound Extensometer Estimation
Lower Bound Extensometer Estimation
Upper Bound Accumulated Estimation
Lower Bound Accumulated Estimation

Appendix D: Settlement Monitoring

Plot of northern shape array settlement versus fill

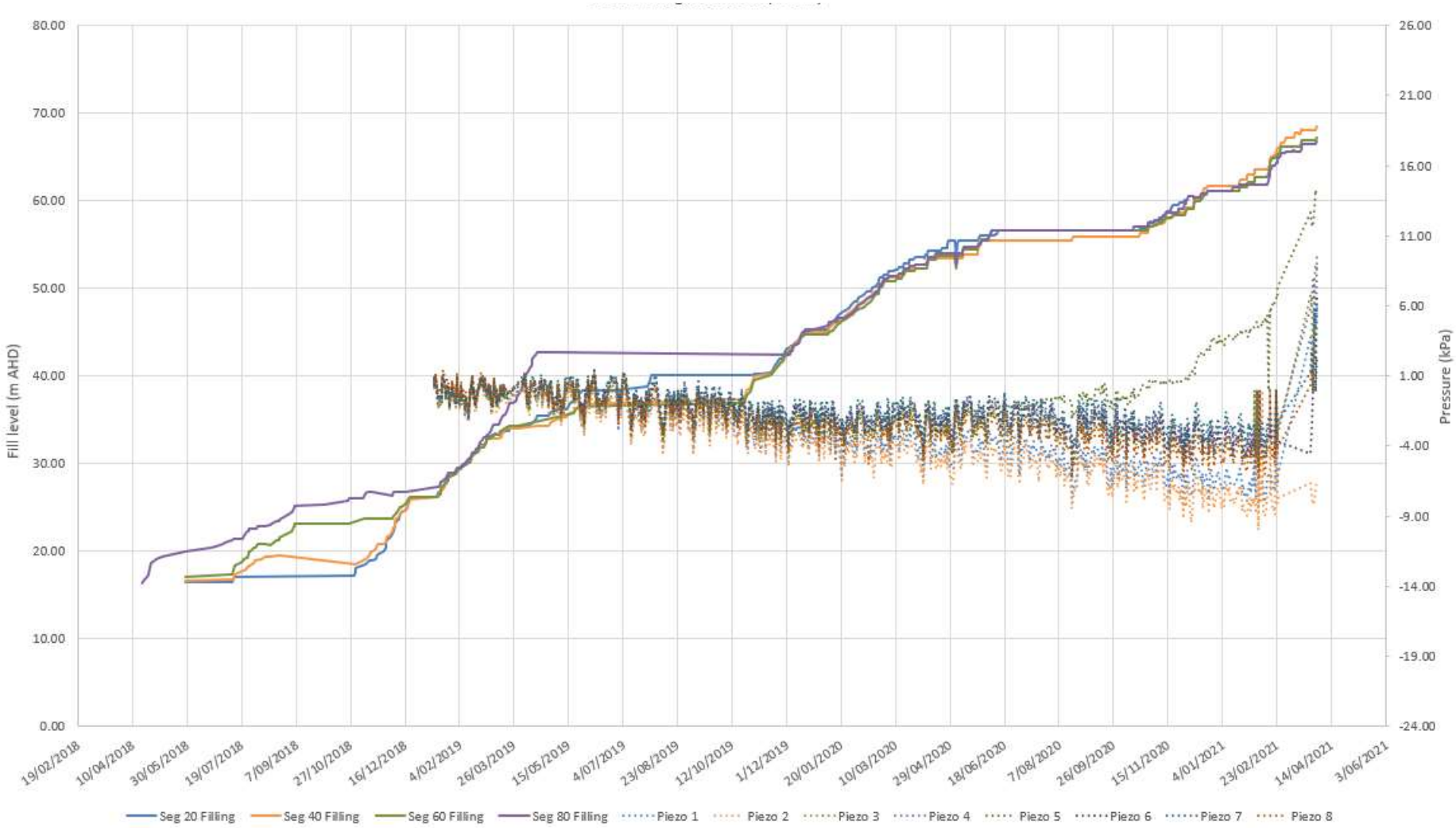


Plot of southern shape array settlement versus fill height above shape array

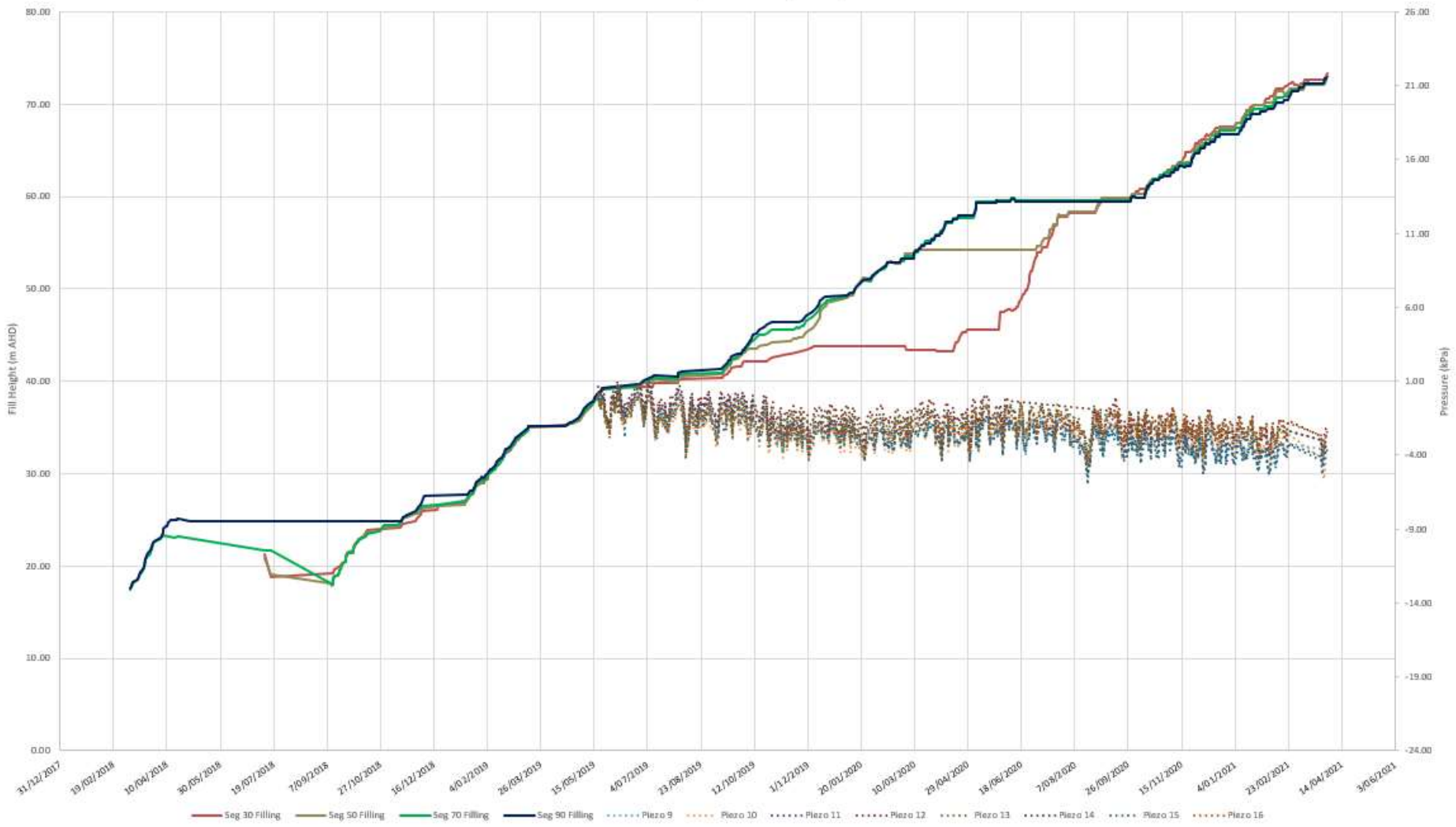


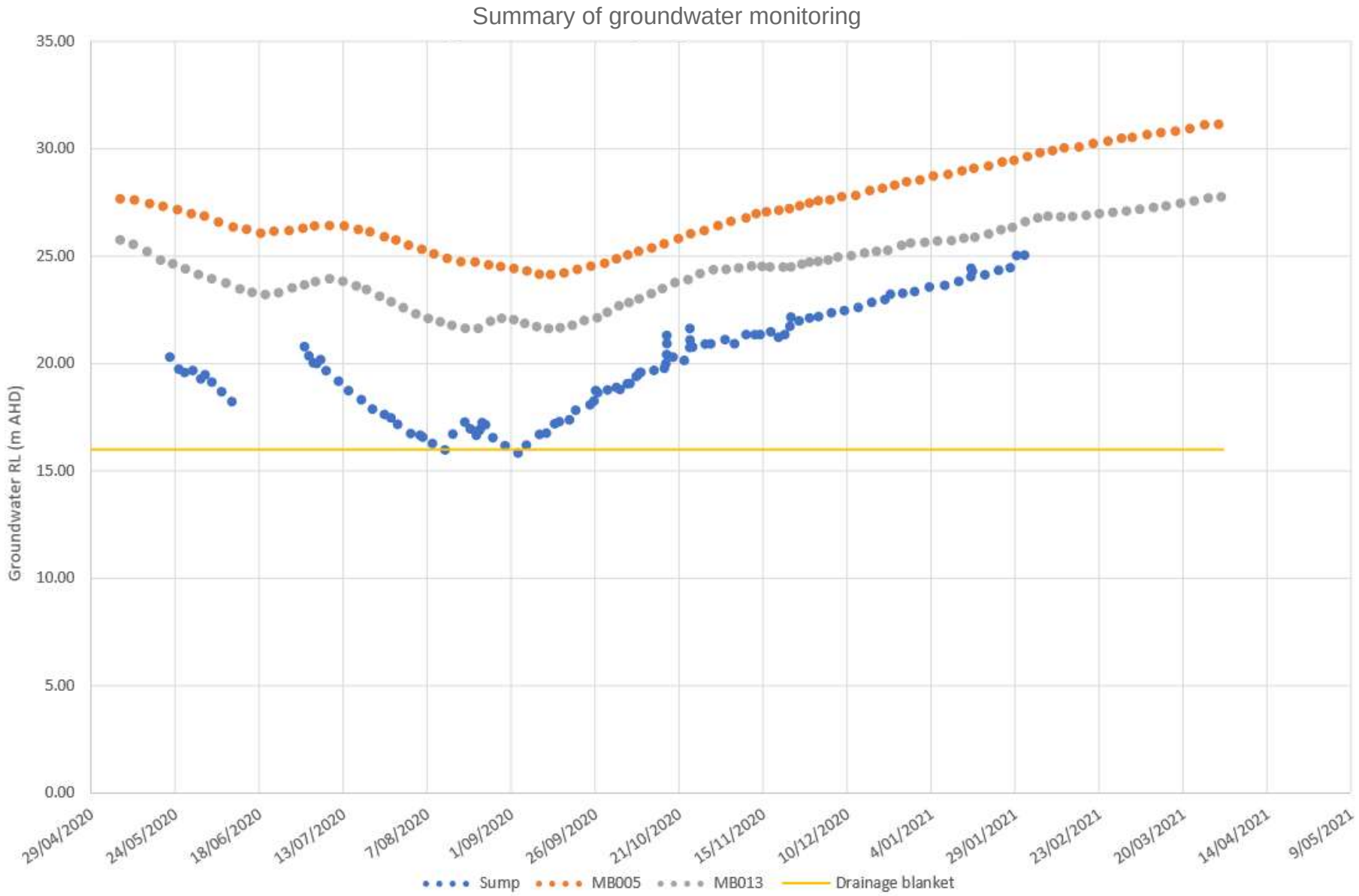
Appendix E: Groundwater Monitoring

Plot of northern vibrating wire piezometers versus fill height above shape array



Plot of southern vibrating wire piezometers versus fill height above shape array




Summary of groundwater monitoring
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25.00
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15.00
10.00
5.00
0.00
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13/07/2020
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1/09/2020
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15/11/2020
10/12/2020
4/01/2021
29/01/2021
23/02/2021
20/03/2021
14/04/2021
9/05/2021
Sump
MB005
MB013
Drainage blanket