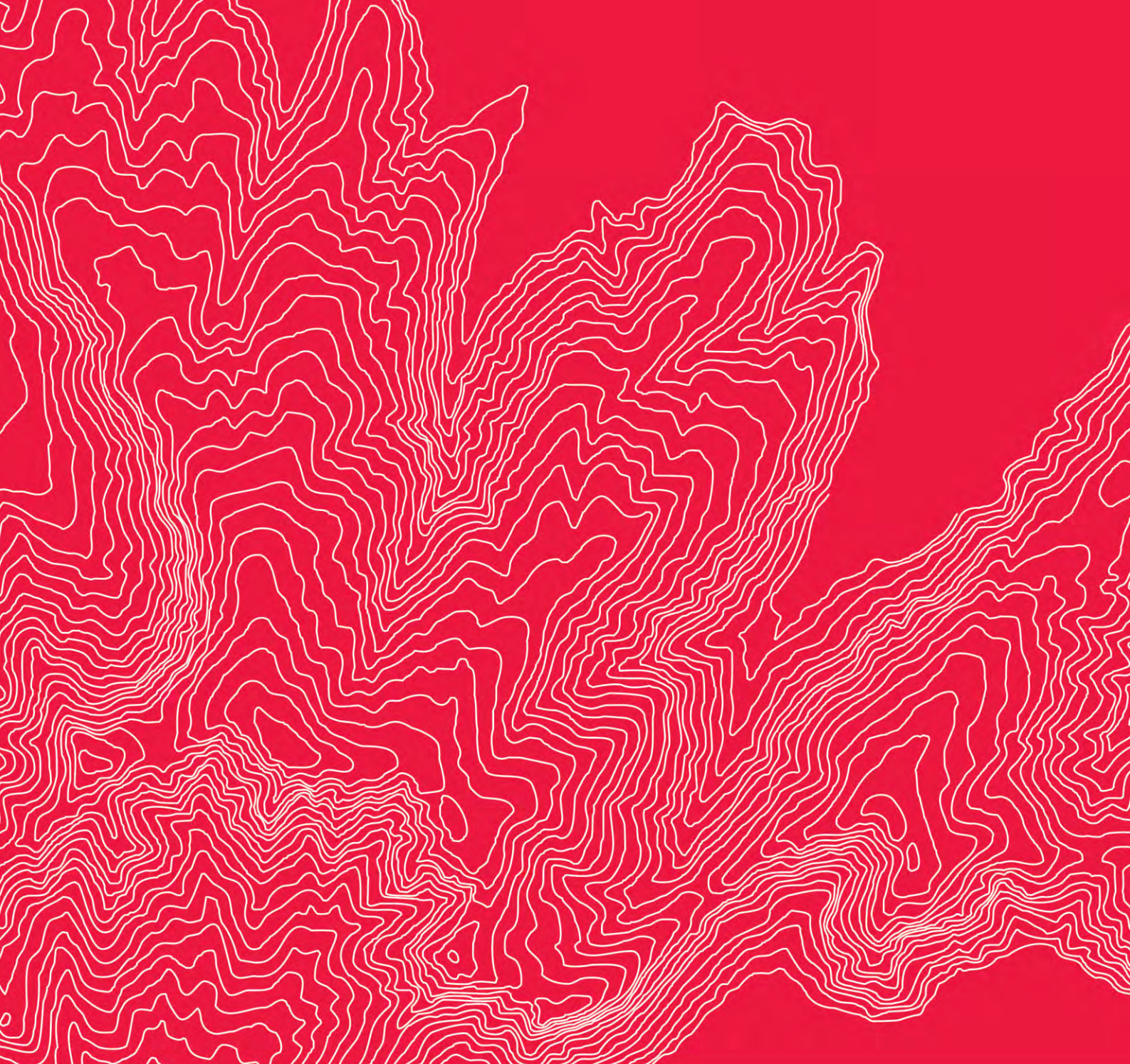




Infrastructure Design Report

**eliot
sinclair**

Memorial Ave, Christchurch

Prepared for Costco Wholesale New Zealand Ltd
610721

Infrastructure Design Report

Memorial Ave, Christchurch

Prepared for Costco Wholesale New Zealand Ltd

610721

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
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1. Purpose

This technical memorandum is in relation to infrastructure servicing for the proposed Costco development in Christchurch. The memo is a summary of existing infrastructure assessments completed to date.

The memo is intended to be used as technical supporting documentation for a referral application under the Fast-track Approvals Act 2024 (FTAA) for the Project.

For full details of the infrastructure servicing context refer to the 2022 Infrastructure Design Report completed by Eliot Sinclair & Partners Ltd (Project ref. 501827) in **Appendix C** of this report.

This 2022 report was for a previous development proposal though is directly relevant to the current 2026 Costco development. The existing infrastructure reporting applies to the entire FTAA referral area i.e. all the land at 475 Memorial Avenue, 400 Russley Road, and 500 and 520 Avonhead Road, Christchurch.

2. Executive Summary

The proposed development comprises an integrated Costco-led retail destination together with the infrastructure and civil works required to service the wider subdivision. The principal development components are a Costco Wholesale warehouse on Lot 4, a members' fuel facility on Lot 3, complementary retail activities on Lot 5, two further Industrial Park zoned allotments on Lots 1 and 2, and the supporting roading and infrastructure network.

The infrastructure strategy has been developed to service the Costco warehouse, fuel facility and complement any retail as part of a coordinated development rather than as isolated uses.

This enables efficient use of shared roading, water, wastewater, stormwater and utility infrastructure across the site. A revised internal road network and provision for future connections to the adjoining McVicar and Commodore sites are provided.

The principal infrastructure findings are summarised below:

- **Site contamination** investigations confirm that identified contamination can be managed through standard site and construction management practices. A large portion of the site has previously been consented for subdivision subject to standard consent conditions and good-practice site management provisions, with the same measures to apply across the entire Costco site.
- **Earthworks** will establish suitable development platforms, roads, utility corridors and stormwater facilities. Shallow ground improvements for roads may be utilised. Construction effects will be managed through an Erosion, Sediment and Dust Management Plan.
- **Roading** will connect to Memorial Avenue through a signalised intersection and a left-in/left-out intersection, and to Avonhead Road through the collector road. The network will include vested and private roads, roundabouts, shared paths, cycle facilities and provision for future connections to adjoining land. Detailed road and intersection designs will be prepared in accordance with Christchurch City Council requirements and the project traffic assessment as part of the substantive application stage.
- **Natural hazard** risks associated with flooding, liquefaction, seismic shaking, slope instability, tsunami and coastal inundation can be managed through standard engineering design and consenting processes, and the site is suitable for the proposed commercial and retail development from a natural-hazards perspective.

- **Utility servicing** is summarised in the following table.

Table 1 Summary of utility servicing

Service	Capacity / condition and anticipated authority requirements
Water supply	The Christchurch City Council water-supply network can provide the anticipated potable-water and FW4 firefighting demands. Hydrant testing undertaken in June 2026 achieved a flow of up to 133.33 L/s at a residual pressure of 320 kPa, confirming that the Council network has sufficient capacity to meet the anticipated demands. A DN300 internal main will connect the Memorial Avenue and Avonhead Road supplies, with two DN150 connections proposed for Costco Christchurch. Detailed water-supply modelling will be provided, and final hydrant arrangements will be confirmed, during detailed design and the engineering approval process.
Stormwater	Stormwater will be managed on-site using proprietary treatment devices and soakage facilities. Runoff from roads and hardstand areas will be treated before discharge to ground, while roof runoff will discharge directly to soakage. The soakage systems will accommodate runoff from rainfall events up to and including the 2% Annual Exceedance Probability storm. Facilities will be located outside the identified 100 m setback from the nearby potable-water well. The size and location of the soakage facilities will be confirmed during detailed design and the relevant engineering and building consent processes.
Wastewater	Wastewater will be serviced by a Local Pressure Sewer network and may include partial gravity servicing where suitable falls allow. The network will discharge to the existing DN375 gravity sewer in Avonhead Road. The number and location of pump units, the final connection point, the extent of any gravity servicing and the required odour-control measures will be confirmed during detailed design.
Power and Telecommunication Services	Orion has confirmed that electricity network capacity is currently available, although capacity is not reserved and remains subject to normal first-come, first-served allocation. Enable Networks has confirmed sufficient UFB fibre capacity, Chorus can extend its network to provide connection availability, and Rockgas has confirmed sufficient capacity to service the Costco development. Final connection arrangements, any upstream reinforcement and common-service designs will be confirmed with the relevant providers. Common-service designs will be provided for approval and comment.

Overall, no infrastructure servicing, geotechnical or natural-hazard constraint has been identified that would preclude the proposed Costco Christchurch project. The site can be appropriately serviced through extensions and upgrades to existing networks together with onsite stormwater and wastewater infrastructure. The remaining matters are conventional detailed-design, engineering-approval and utility-coordination matters rather than impediments to development

3. Introduction

This Infrastructure Design Report has been prepared for the Costco Christchurch project to support of a referral application under the FTAA. The application seeks consent for a range of activities including approval to modify the consented subdivision layout at 475 Memorial Avenue, 400 Russley Road, and 500 and 520 Avonhead Road, Christchurch.

In 2022, Christchurch City Council granted combined earthworks and subdivision consent RMA/2022/1411 for the site. The consented subdivision included a large balance allotment identified

as Lot 4, which was retained for future development pending confirmation of its intended use. The approved subdivision plan is included in **Appendix A** of this report. An associated Environment Canterbury consent (CRC224947) was also issued at that time. Eliot Sinclair prepared the Infrastructure Design Report (2022) in support of the subdivision consent (RMA/2022/1411) **Appendix C**.

This report updates the infrastructure assessment presented in the 2022 Infrastructure Design Report (**Appendix C**) and addresses the proposed subdivision plan. The proposed subdivision plan, included in (**Appendix B**), provides for the Costco warehouse, members' fuel facility, complementary retail activities and associated access, parking and infrastructure, together with the balance Industrial Park zoned allotments.

The full legal descriptions of the land area subject to subdivision are unchanged from those assessed under RMA/2022/1411.

4. Site Description

4.1. Location

The site is located in western Christchurch and is bounded by Memorial Ave to the northeast, established residential and commercial Lots to the southeast, Avonhead Road to the southwest and Russley Road to the Northwest.

4.2. Topography

The site is mostly flat to gently undulating grassed paddocks. There remains only one dwelling on the property at 520 Avonhead Rd with associated outbuildings.

4.3. Geology and Land Contamination

The site topsoil has been extensively investigated and generally comprises of 0.25 m to 1.0 m thickness of silty topsoil overlying interbedded layers of river silts, sands, and sandy gravels to around 15 m below ground level (bgl). The average depth of topsoil was calculated to be 0.41 m.

The Eliot Sinclair Geotechnical Investigation Report (2022) has been previously submitted as part of the subdivision consent application and is not appended to this Infrastructure Servicing Report. However, an overall technical memo confirming the site is suitable for development is included in **Attachment 9** of the Referral Memo.

Eliot Sinclair has undertaken site contamination investigations across the site, including a Preliminary and Detailed Site Investigation in April 2022. Buildings at 400 Russley Road were demolished following these investigations in 2022. Following the later demolition of buildings at 500 Avonhead Road, a complementary soil investigation was undertaken in May 2025 to assess soil conditions in that area. A memo summarising the findings of those earlier investigations and their relevance to the proposed subdivision plan is provided in **Attachment 7** of the Referral Memo. The memo concludes that the site has been assessed under best-practice industry guidance and that identified contamination can be managed through standard site and construction management practices. A large portion of the site has previously been consented for subdivision, subject to standard consent conditions and good-practice site management provisions, with the same measures to apply across the entire Costco site.

4.4. Hydrogeology

Eliot Sinclair has carried out a hydrological investigation which determined the following:

- Groundwater monitoring (onsite and nearby wells) indicates a seasonal groundwater fluctuation range between 7-10 m bgl.

- Infiltration testing was carried out at 8 locations across the site, at a 3 m depth, and recorded rates ranging from 4 m/hour to 35 m/hour which is considered suitable to cater for the stormwater discharges from the site.
- There is a potable water supply well located within Sec 1 SO 506443, located within the southwest corner of their site, adjacent to Russley Road and Avonhead Road. This is the only well identified that could be subject to adverse effects. The hydrological investigation identified a 100 m radius around the well in which no soakage pit could be installed to ensure any adverse effects due to the stormwater discharges are less than minor.

5. Proposed Development

The proposed development comprises the infrastructure and civil works required to service all allotments, together with a Costco Wholesale warehouse retail store, a fuel facility, complementary retail activities, and two further Industrial Park zoned allotments on Lot 4, Lot 3, Lot 5, and Lots 1 and 2, respectively, as well as the roading network on Lots 100 to 106 and Lot 108.

The proposed Costco development will be located on Lot 4. Note that the Costco development area is indicative only at this stage and is subject to change as the design is refined. The proposed subdivision plan is provided in **Appendix B** of this report and this may be further refined as part of the substantive application.

It should be noted that the development is anticipated to be staged, with Lots 1 and 102 comprising the second stage. This stage may or may not be undertaken concurrently with the first stage, as shown on the application plan in **Appendix B** of this report.

6. Earthworks

6.1. Overview

Generally, site earthworks will be restricted to the formation of carriageways, utility services and three waters installation, cut and fill earthworks for site contouring and to provide an even development platform, and the installation of stormwater treatment and soakage pit facilities. Earthworks construction will be in accordance with CCC's design standards and NZS4431 earthfill requirements. Earthworks volume calculations and design have not yet been completed for the whole site.

This does not affect the conclusion that the site can be appropriately formed for the proposed development, with final cut-and-fill volumes and ground-improvement requirements to be confirmed through detailed design. It is proposed that earthworks staged to limit the amount of land disturbed at any one time.

6.2. Erosion, Sediment and Dust Management

A resource consent application for the discharge of construction phase stormwater into land has previously been applied for and secured from Environment Canterbury for a reduced area of earthworks associated with Stage 1 of the earlier subdivision consent. A resource consent application for the discharge of construction phase stormwater into the land for the whole site will be needed. The ESDMP and approved discharge consent will be provided as part of the engineering approval process.

A new or amended construction-phase stormwater discharge consent will be required for earthworks across the wider site, supported by appropriate erosion and sediment controls.

An existing bore on the site will need to be located and recommissioned, or alternatively a new bore established, to enable groundwater to be used for dust suppression during earthworks.

The proposal may also involve the temporary stockpiling of topsoil to facilitate staged earthworks, with surplus material removed from the site as required.

The proposed ESDM measures will be developed with reference to the ECan Erosion and Sediment Control Toolbox for Canterbury (2022) and the Ministry for the Environment Dust Guidelines (2001).

7. Roding

The proposed road network comprises collector roads, other vested roads and a private road, as shown in **Appendix B** of this report. The collector and private road designs will be carried out in accordance with the CCC Infrastructure Design Standard (IDS) Part 8: *Roding*. The traffic design layout within the site including the signalised intersection will be governed by the traffic engineering design during the detailed engineering design stage.

The proposed road network provides a coherent access framework for the Costco warehouse, fuel facility and complementary retail, while also retaining future connectivity to adjoining land. The combination of Memorial Avenue and Avonhead Road connections, together with the internal collector and private road network, provides a robust framework capable of supporting the staged development of the site. Refer to Attachment 5 of the overall Referral Memo for the transport assessment.

8. Water Supply

There is presently no suitably sized water main immediately adjoining the site; however, sufficient capacity exists in the wider Council network at the identified connection points to service the development through the proposed DN300 extensions. The closest points of supply are the existing DN300 uPVC water supply main located 50 m west of the Memorial Avenue and Roydvale Avenue intersection, and the DN300 uPVC water supply main located at the Avonhead Road and Hawthornden Road intersection, as shown in Figure 3.



Figure 1. Closest Water Supply Connection Points (CCC Services Maps, 2022)

It is proposed that a new DN300 water supply main be laid within Memorial Avenue between the Roydvale Avenue intersection and the development entrance (approximate pipe run of 600 m). A new DN300 water supply main will be laid within Avonhead Road between the Hawthornden intersection and the future development entrance (approximate pipe run of 380 m) along the northern side of Avonhead Road.

The proposed development flows and available water-supply pressures are as follows:

- An available network pressure of 300 kPa at the proposed connection points, in accordance with the Christchurch City Council (CCC) pressure zone map.
- An FW4 firefighting supply, as confirmed by CCC subject to site-specific hydrant flow testing.
- A peak potable water demand of 1.2 L/s per connection for commercial zones, in accordance with the CCC Infrastructure Design Standard (IDS), based on 29 assumed water-supply connections.
- A commercial demand set at 60% of the peak demand, resulting in a combined potable water and firefighting demand of approximately 124.8 L/s.

These available flows and pressures were confirmed through site-specific fire hydrant testing undertaken by Sprinkler & Alarm Inspections Ltd on 2 June 2026. Testing was carried out at three

hydrants adjacent to 363 Memorial Avenue to verify the capacity of the CCC network to accommodate the proposed FW4 firefighting and development flows while maintaining the required supply pressure.

A flow of up to 133.33 L/s was achieved during testing, with a corresponding residual pressure of 320 kPa. These results confirm that the CCC network can provide the proposed FW4 firefighting and development flows while maintaining a pressure exceeding 300 kPa.

Accordingly, the water-supply assessment is supported by site-specific testing rather than desktop assumptions alone. The testing demonstrates that the existing Council network, with the proposed extensions and internal reticulation, is capable of servicing the anticipated development demand.

A DN300 potable water-supply main is proposed along the collector road, linking the points of supply in Memorial Avenue and Avonhead Road. The remaining internal water-supply mains will also be DN300 to provide sufficient capacity for the proposed commercial and firefighting demands. A detailed water-supply modelling report will be provided to CCC as part of the engineering approval process.

Water supply mains within the collector road will be vested with CCC, all other water supply mains will remain in private ownership.

Consultation with Fire and Emergency New Zealand (FENZ) has been undertaken. FENZ provided their approval (as of 2 May 2022) for the proposed water layout plan and fire hydrant locations in relation to the anticipated land use requirements at the time, supporting the existing consent.

The Costco site will be provided with two DN150 connections to service its potable water and fire-protection requirements.

All other sites will be serviced by OD20 PE pipes and connected to standard DN15 water meters at the street boundaries in accordance with the CCC IDS and Construction Standard Specifications (CSS).

All infrastructure within the privately owned roads will remain in private ownership.

9. Stormwater

The site's measured infiltration rates and relatively deep groundwater provide favourable conditions for onsite stormwater disposal by soakage, subject to the identified treatment requirements and separation from the potable-water well.

The Site is located within the Christchurch International Airport Bird Strike Management Area (Christchurch District Plan, Appendix 6.11.7). All proposed activities, including stormwater management infrastructure, will comply with the permitted activity rules and standards for this area (Rule 6.7.4.3).

9.1. Collector Road (Vest with CCC)

9.1.1. Primary Conveyance Network

Stormwater runoff generated by the collector road will be captured by kerb and channel, sumps, and pipe reticulation prior to discharging to a Stormwater360 Filterra Bioretention treatment unit or similar which will discharge treated stormwater to soakage pits.

The stormwater network, soakage pits and layouts will be designed in accordance with CCC's standards.

The Filterra treatment unit will be sized to capture and treat all runoff generated by rainfall intensities up to 5 mm/hour. Stormwater runoff beyond the treatment capacity will bypass the treatment unit and discharge directly to the soakage pit.

The stormwater treatment and disposal methodology has been discussed with Mr. Brian Norton (CCC Senior Stormwater Planning Engineer), who provided confirmation of his acceptance of the proposal. CCC has indicated that it is likely the operational phase discharge could fall under their global consent for the roads and allotments.

9.1.2. Secondary Conveyance Network

Stormwater runoff generated from rainfall events up to and including the 2% AEP must be captured and discharged via the soakage pit. There are two methods to allow for this.

- i) Stormwater runoff flow rates beyond the sump and pipe capacities will discharge to the internal road network and will be conveyed as overland flow to an inlet chamber which will allow a direct entry for runoff to enter the soakage pit.
- ii) All sump and pipes will have capacity to convey all stormwater runoff generated from rainfall events up to and including the 2% AEP.

The preferred design option will be confirmed during the detailed design phase.

Stormwater runoff generated beyond the 2% AEP will discharge to Memorial Avenue or Avonhead Road.

9.2. Private Roads

9.2.1. Primary Conveyance Network

The private roading stormwater infrastructure will be designed with the same methodology as stated for the collector road and in accordance CCC IDS Part 5: *Stormwater Land Drainage*. However, it must be noted that as the roads will be privately owned, the stormwater network will have a minimum capacity to convey the 10% (10 year) AEP critical duration rainfall event, in accordance with Clause E1 of the Building Code.

9.2.2. Secondary Conveyance Network

Stormwater runoff generated from rainfall events up to and including the 2% AEP must be captured and discharged via the soakage pit (or pits). Therefore, the same methodology will be used as stated for the collector road. Stormwater runoff generated beyond the 2% AEP will discharge to Memorial Avenue.

9.3. Internal Allotments

9.3.1. Roof Stormwater Discharges

Roof stormwater is considered generally clean not requiring treatment; therefore, all roof stormwater discharges will be directly to onsite soakage pits which will be designed with sufficient capacity to detain and discharge runoff generated from all rainfall events up to and including the 2% AEP critical duration storm. The design of the stormwater infrastructure will be completed during the building consent process. It is assumed that Council's global consent would be utilised for the discharges.

9.3.2. Hardstand Stormwater Discharges

All stormwater runoff generated from internal Lot hardstand (car parking, vehicle movement areas, miscellaneous areas etc.) will be captured via sumps and pipe reticulation prior to discharging to proprietary treatment units, which in turn will discharge to an adjacent soakage pit.

The soakage pits will be sized with sufficient capacity to detain and discharge all stormwater runoff generated from rainfall events up to and including the 2% AEP critical duration storm.

The location and type of soakage pit construction will be the same as that stated for the roof soakage pits. The stormwater infrastructure will require approval during the building consent process. It is assumed that Council's global consent would be utilised for the discharges.

9.3.3. Secondary Flow

Internal sump and pipe infrastructure is generally sized with capacity to convey runoff generated during the 10% AEP storm event, in accordance with Clause E1 of the Building Code. To ensure that stormwater runoff is not discharged beyond the site boundary during rainfall events that exceed the 10% AEP, either the site hardstand will need to be graded such that stormwater can pond on the ground surface or be graded such that overland flows are directed to an inlet chamber for direct entry into the soakage pits, or the reticulation network will need to be designed with sufficient capacity to convey the 2% AEP runoff. This design item will be confirmed during the detailed design process.

Stormwater runoff generated during rainfall events beyond the 2% AEP will discharge to the adjacent privately owned roads from where it will discharge as overland flow to Memorial Avenue or Avonhead Road.

10. Wastewater

10.1. Existing Network

There is no sewer infrastructure within Memorial Avenue, however, there is an existing DN300 and DN375 uPVC gravity sewer main located within Avonhead Road which the development can discharge wastewater into.

10.2. Proposed Network

The proposed development is currently consented to be serviced by a Local Pressure Sewer (LPS) network discharging to the existing DN375 gravity sewer reticulation within Avonhead Road. The manhole connection for the LPS sewer outfall is to be confirmed by the CCC during the detailed design phase.

While LPS forms the consented servicing solution, there is potential for portions of the development to be serviced by gravity reticulation where suitable grades and connection levels can be achieved. The feasibility and extent of any gravity servicing will be assessed and confirmed during detailed design.

All wastewater infrastructure within the private roads will remain in private ownership.

The LPS system will be designed in accordance with the CCC IDS and CSS.

11. Utility Services

11.1. Power & Telecommunications

Orion has confirmed that network capacity is currently available to service the proposed development. While that capacity is not reserved and remains subject to normal first-come, first-served allocation, no present electricity-network constraint has been identified that would prevent the development being serviced. The final connection arrangement, including any requirement for upstream reinforcement, will be confirmed with Orion during detailed design. Enable Networks has confirmed sufficient UFB fibre capacity for the development. Chorus has also confirmed that it can extend its network to provide connection availability.

Rockgas has confirmed that sufficient capacity is available within its network to meet the requirements of the Costco site.

Power and telecommunications services will be provided to service the site in accordance with utility company and industry standards at the time of development. All cables and ducts will be placed below ground, and kiosks will be placed within individual allotments (subject to confirmation from Orion).

Common service designs will be provided to CCC for their approval and comment as part of the engineering approval process for the subdivision.

11.2. Street Lighting

All street lighting within the collector road to be vested and the private road and will comply with the CCC Infrastructure Design Standard Part 11: *Lighting* and AS/NZS 1158 and the specified category unless alternative street lighting options are discussed with and approved by Council.

The signalised tee intersection with Memorial will be designed to match with the existing road lighting category.

There is a requirement in the consent notice (11898381.3) on the Lot 2 DP 553686 title to upgrade the Memorial Avenue frontage with a shared path. *"No urban activity shall operate on Lot 2 until such time as Memorial Avenue is upgraded with a shared path (at 2.5m wide) with street lights"*.

This assessment for the Memorial Ave frontage street lighting will be incorporated during the detailed design phase.

12. Natural Hazard

A Natural Hazards Risk Assessment was prepared by Eliot Sinclair in April 2022 in support of the subdivision consent (RMA/2022/1411). A memo summarising the findings of that assessment and the relevance to the proposed subdivision plan is provided in **Attachment 11** of the Referral Memo.

The assessment concludes that the site is suitable for the proposed commercial and retail development from a natural-hazards perspective. Risks associated with flooding, liquefaction, seismic shaking, slope instability, tsunami and coastal inundation are either low or can be appropriately addressed through normal engineering design and consenting measures. No natural hazard has been identified that would preclude development of the site.

13. Conclusion

This Infrastructure Design Report confirms that the proposed subdivision can be appropriately serviced and developed as an integrated Costco-led destination comprising the Costco warehouse, members' fuel facility, complementary retail activities, associated access and parking, and the wider supporting subdivision and infrastructure network.

The site is suitable for the Costco Christchurch project from an earthworks, geotechnical and natural-hazards perspective. Shallow ground improvements will be undertaken to improve subgrade performance, with pavement depths and foundation requirements confirmed through construction-phase testing and detailed geotechnical design. Any uncontrolled fill encountered will be remediated, and construction effects will be managed through an Erosion, Sediment and Dust Management Plan.

The proposed transport network will provide access from Memorial Avenue and Avonhead Road, together with connections to adjoining land to support the wider area's future development. The vested and private roads, intersections, pedestrian and cycle facilities, pavement construction and street lighting will be developed through detailed design in accordance with applicable Christchurch City Council standards and the project traffic assessment.

Potable water and firefighting demands can be met by the existing Council network. Site-specific hydrant testing has confirmed adequate flow and residual pressure, and the proposed internal water network will provide the required servicing capacity. Wastewater can be conveyed by a local pressure sewer system or gravity to the existing gravity sewer in Avonhead Road, subject to detailed modelling and confirmation of the final connection and odour-control arrangements with Council.

Stormwater can be managed onsite using treatment devices and soakage facilities. The proposed systems will treat runoff from roads and hardstand areas and accommodate runoff from events up to and including the 2% AEP design storm. The location of soakage facilities will maintain the required separation from the nearby potable-water well, and detailed designs will be submitted through the relevant engineering and building consent processes.

Electricity, fibre telecommunications and gas services are available to service the development, subject to confirmation of final connection requirements and network capacity at the time of detailed design.

Overall, no infrastructure servicing, geotechnical or natural-hazard constraint has been identified that would preclude the Costco Christchurch project. The investigations undertaken to date, including site-specific hydrant testing, hydrogeological investigations and previous geotechnical and natural-hazard assessments, demonstrate that the site can be safely and appropriately serviced. The outstanding matters relate to normal detailed engineering design, network-provider coordination and approval processes rather than any fundamental constraint on development.

Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited for the purposes of supporting the proposed Costco Christchurch project, including the referral application under FTAA and associated subdivision and infrastructure approvals.

The report is based on:

- Desktop, geotechnical and hydrological investigations.
- Correspondence with Christchurch City Council.
- Correspondence with service providers.

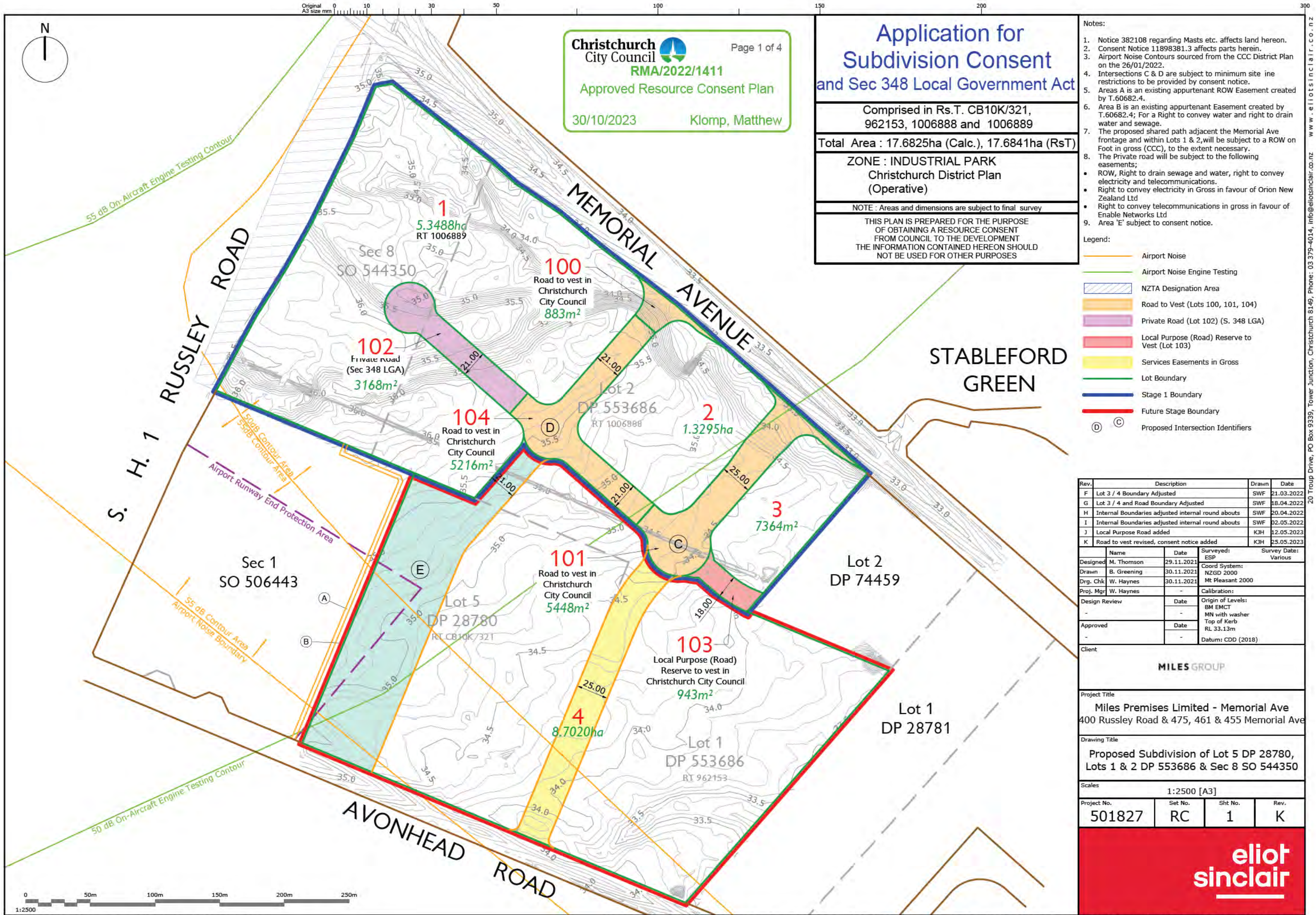
Where data supplied by Costco Wholesale New Zealand Ltd or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of the site conditions and existing services to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Variations in conditions may occur between investigatory locations and there may be conditions such as subsoil features that were not detected by the scope of the investigation that was carried out or have been covered over or obscured over time. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of Costco Wholesale New Zealand Ltd, the Christchurch City Council, Environment Canterbury, Environmental Protection Authority and Minister of Infrastructure for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. Approved Subdivision Plan



Christchurch
City Council
RMA/2022/1411
Approved Resource Consent Plan
30/10/2023 Klomp, Matthew

Application for Subdivision Consent and Sec 348 Local Government Act

Comprised in Rs.T. CB10K/321,
962153, 1006888 and 1006889

Total Area : 17.6825ha (Calc.), 17.6841ha (RsT)

ZONE : INDUSTRIAL PARK
Christchurch District Plan
(Operative)

NOTE : Areas and dimensions are subject to final survey

THIS PLAN IS PREPARED FOR THE PURPOSE
OF OBTAINING A RESOURCE CONSENT
FROM COUNCIL TO THE DEVELOPMENT
THE INFORMATION CONTAINED HEREON SHOULD
NOT BE USED FOR OTHER PURPOSES

Notes:

1. Notice 382108 regarding Masts etc. affects land hereon.
2. Consent Notice 11898381.3 affects parts herein.
3. Airport Noise Contours sourced from the CCC District Plan on the 26/01/2022.
4. Intersections C & D are subject to minimum site in restrictions to be provided by consent notice.
5. Areas A is an existing appurtenant ROW Easement created by T.60682.4.
6. Area B is an existing appurtenant Easement created by T.60682.4; For a Right to convey water and right to drain water and sewage.
7. The proposed shared path adjacent the Memorial Ave frontage and within Lots 1 & 2, will be subject to a ROW on Foot in gross (CCC), to the extent necessary.
8. The Private road will be subject to the following easements;
 - ROW, Right to drain sewage and water, right to convey electricity and telecommunications.
 - Right to convey electricity in Gross in favour of Orion New Zealand Ltd
 - Right to convey telecommunications in gross in favour of Enable Networks Ltd
9. Area 'E' subject to consent notice.

Legend:

- Airport Noise
- Airport Noise Engine Testing
- NZTA Designation Area
- Road to Vest (Lots 100, 101, 104)
- Private Road (Lot 102) (S. 348 LGA)
- Local Purpose (Road) Reserve to Vest (Lot 103)
- Services Easements in Gross
- Lot Boundary
- Stage 1 Boundary
- Future Stage Boundary
- Proposed Intersection Identifiers

Rev.	Description	Drawn	Date
F	Lot 3 / 4 Boundary Adjusted	SWF	21.03.2022
G	Lot 3 / 4 and Road Boundary Adjusted	SWF	18.04.2022
H	Internal Boundaries adjusted internal roundabouts	SWF	20.04.2022
I	Internal Boundaries adjusted internal roundabouts	SWF	02.05.2022
J	Local Purpose Road added	KJH	12.05.2023
K	Road to vest revised, consent notice added	KJH	25.05.2023

	Name	Date	Surveyed: ESP	Survey Date: Various
Designed	M. Thomson	29.11.2021	Coord System: NZGD 2000 Mt Pleasant 2000	
Drawn	B. Greening	30.11.2021		
Drg. Chk	W. Haynes	30.11.2021		
Proj. Mgr	W. Haynes	-	Calibration:	
Design Review		Date	Origin of Levels: BM EMCT	
-		-	MN with washer	
Approved		Date	Top of Kerb RL 33.13m	
-		-	Datum: CDD (2018)	

Client	MILES GROUP
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Project Title	Miles Premises Limited - Memorial Ave 400 Russley Road & 475, 461 & 455 Memorial Ave
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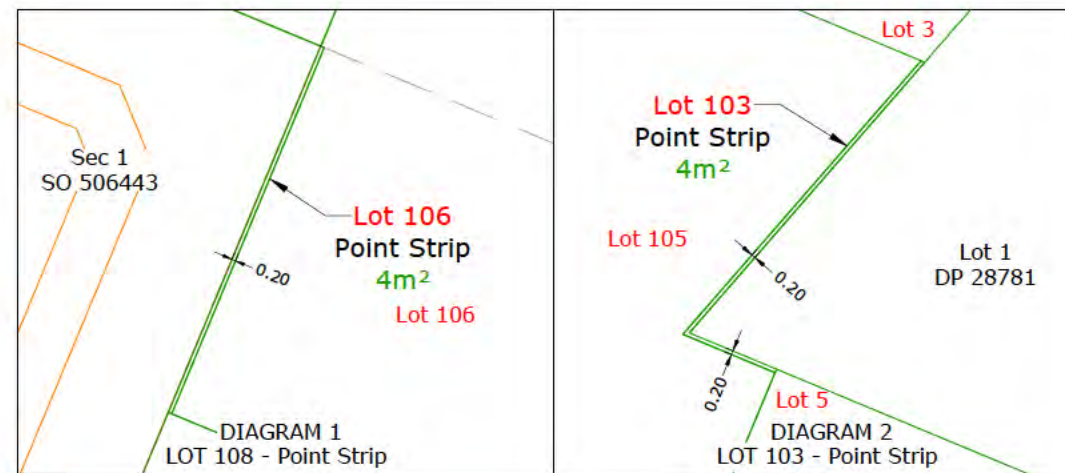
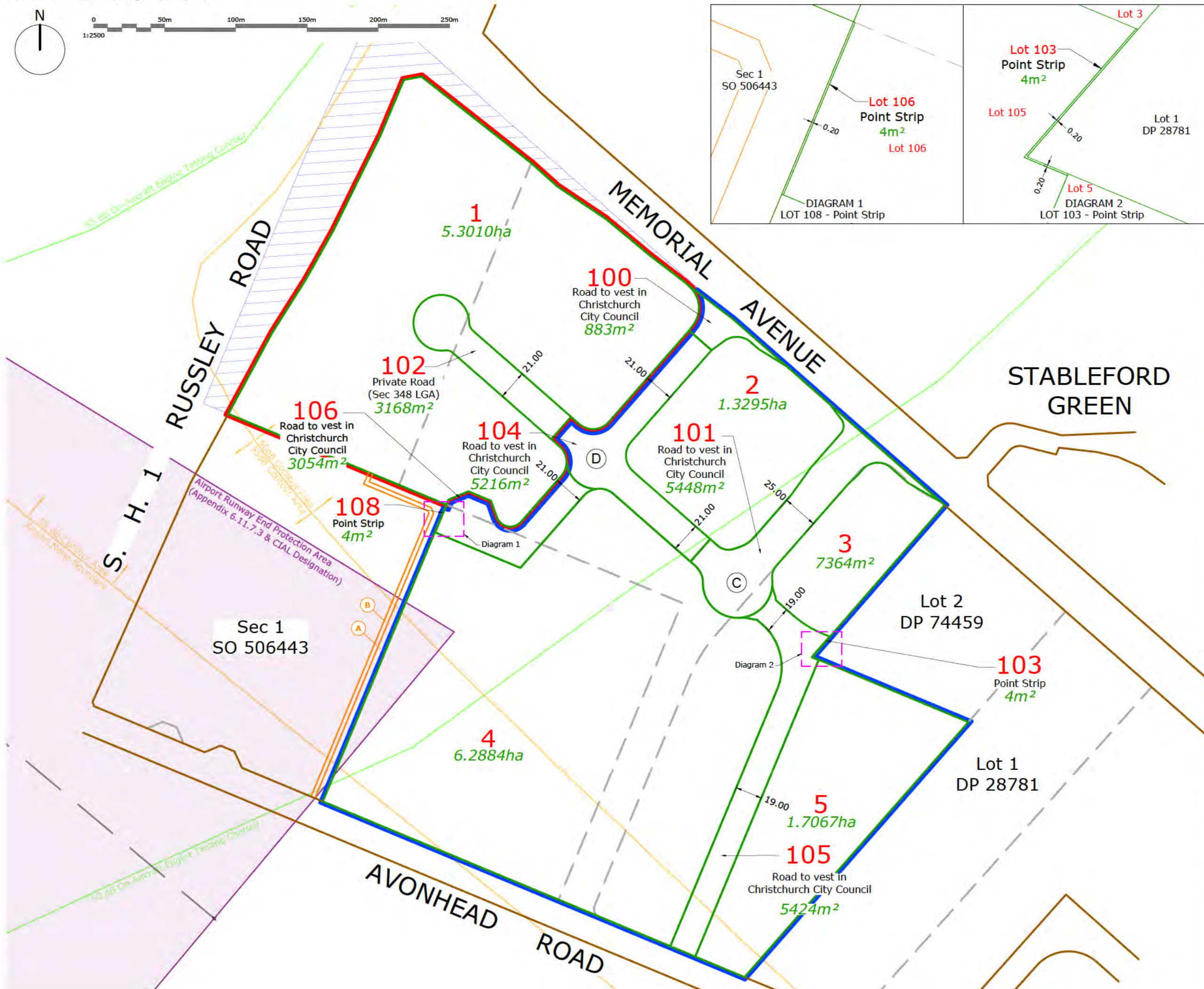
Drawing Title	Proposed Subdivision of Lot 5 DP 28780, Lots 1 & 2 DP 553686 & Sec 8 SO 544350
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Scales	1:2500 [A3]
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Project No.	Set No.	Sht No.	Rev.
501827	RC	1	K

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Appendix B. Proposed Subdivision Plan



DISCLAIMER
© Eliot Sinclair and Partners Ltd. This drawing and all its information is only to be used for its intended purpose. All rights reserved.

- Notes:
1. Notice 382108 regarding Masts etc. affects land hereon.
 2. Consent Notice 11898381.3 affects parts herein.
 3. Airport Noise Contours sourced from the CCC District Plan on the 26/01/2022.
 4. Intersections C & D are subject to minimum site line restrictions to be provided by consent notice.
 5. Areas A is an existing appurtenant ROW Easement created by T.60682.4.
 6. Area B is an existing appurtenant Easement created by T.60682.4; For a Right to convey water and right to drain water and sewage.
 7. The proposed shared path adjacent the Memorial Ave frontage and within Lots 1 & 2, will be subject to a ROW on Foot in gross (CCC), to the extent necessary.
 8. The Private road will be subject to the following easements;
 - ROW, Right to drain sewage and water, right to convey electricity and telecommunications.
 - Right to convey electricity in Gross in favour of Orion New Zealand Ltd
 - Right to convey telecommunications in gross in favour of Enable Networks Ltd
 9. Areas and dimensions subject to final survey.

- LEGEND:
- Airport Noise
 - Airport Noise Engine Testing
 - REPA Boundary
 - ▨ NZTA Designation Area
 - Lot Boundaries
 - Underlying Lot Boundary
 - Stage 1 Boundary
 - Future Stage Boundary
 - Easement
 - (D) (C) Proposed Intersection Identifiers

F	SAS	19.08.26	Status Update
E	SAS	13.08.26	Lot 5, 105 and 103
D	SAS	11.08.26	For Consent
C	SAS	10.08.26	Lot 103 and 105
B	SAS	06.08.26	Fast Track Referral Application
REV.	DRAWN	DATE	NOTE

CLIENT			
MILES GROUP			
DESIGNED			
DRAWN			
REVIEWED			
APPROVED			
			06.07.26 LJ
STATUS			
INDICATIVE - FOR FTAA REFERRAL			
SCALE			
1:2500 [A3]			

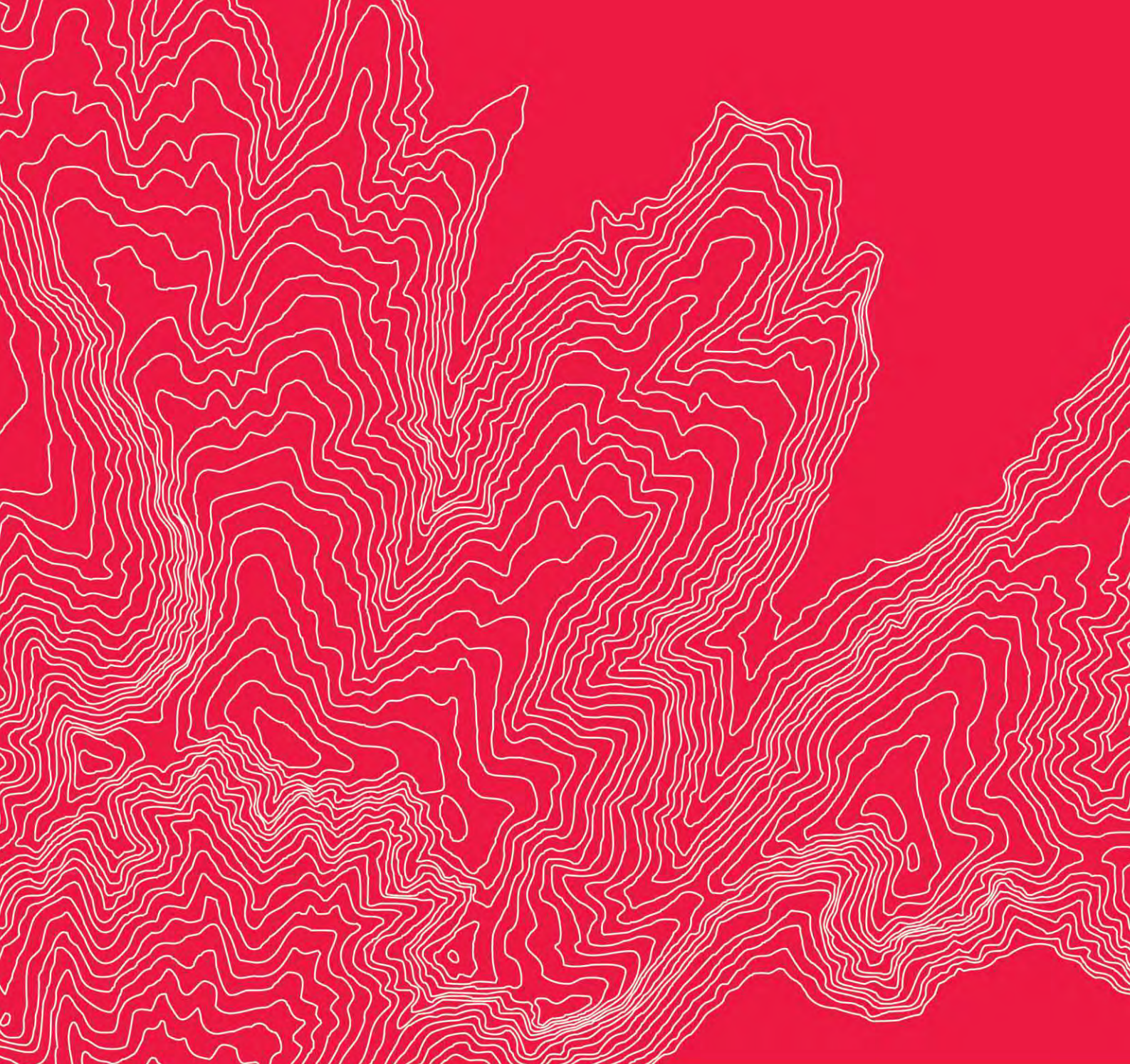
Miles Premises Limited - Memorial Ave
500 & 520 Avonhead Road
475 Memorial Ave & 400 Russley Road

Indicative amended subdivision plan for FTAA referral purposes

PROJECT	SET	SHEET	REV.
501827	RC	810	F



Appendix C. 2022 Infrastructure Design Report



Infrastructure Design Report

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Memorial Ave, Christchurch
Prepared for Miles Premises Limited
501827

Infrastructure Design Report

Memorial Ave, Christchurch
Prepared for Miles Premises Limited
501827

Quality Control Certificate
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Action	Name	Signature	Date
	s 9(2)(a)		
	s 9(2)(a)		
	s 9(2)(a)		
	s 9(2)(a)		

2. Site Description

2.1.



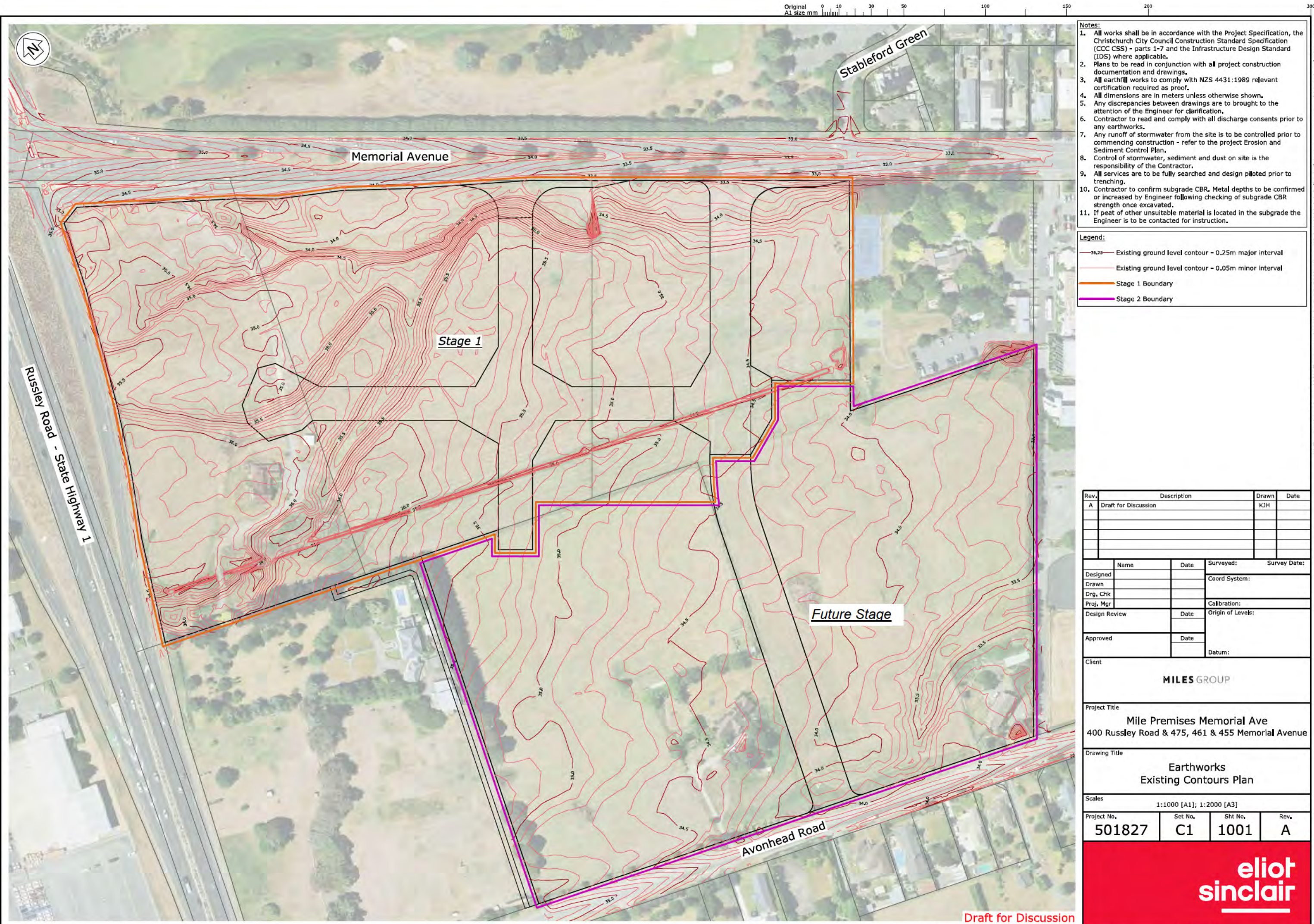
Figure 1. Site Location Plan

2.2.

2.3.



Figure 2. Closest Water Supply Connection Points (CCC Services Maps, 2022)



- Notes:
1. All works shall be in accordance with the Project Specification, the Christchurch City Council Construction Standard Specification (CCC CSS) - parts 1-7 and the Infrastructure Design Standard (IDS) where applicable.
 2. Plans to be read in conjunction with all project construction documentation and drawings.
 3. All earthfill works to comply with NZS 4431:1989 relevant certification required as proof.
 4. All dimensions are in meters unless otherwise shown.
 5. Any discrepancies between drawings are to be brought to the attention of the Engineer for clarification.
 6. Contractor to read and comply with all discharge consents prior to any earthworks.
 7. Any runoff of stormwater from the site is to be controlled prior to commencing construction - refer to the project Erosion and Sediment Control Plan.
 8. Control of stormwater, sediment and dust on site is the responsibility of the Contractor.
 9. All services are to be fully searched and design piloted prior to trenching.
 10. Contractor to confirm subgrade CBR. Metal depths to be confirmed or increased by Engineer following checking of subgrade CBR strength once excavated.
 11. If peat or other unsuitable material is located in the subgrade the Engineer is to be contacted for instruction.

Legend:

— 36.25 —	Existing ground level contour - 0.25m major interval
— —	Existing ground level contour - 0.05m minor interval
—	Stage 1 Boundary
—	Stage 2 Boundary

Rev.	Description	Drawn	Date
A	Draft for Discussion	KJH	

Designed	Name	Date	Surveyed:	Survey Date:
Drawn			Coord System:	
Drg, Chk			Calibration:	
Proj, Mgr			Origin of Levels:	
Design Review		Date		
Approved		Date	Datum:	

Client

MILES GROUP

Project Title

Mile Premises Memorial Ave
400 Rusley Road & 475, 461 & 455 Memorial Avenue

Drawing Title

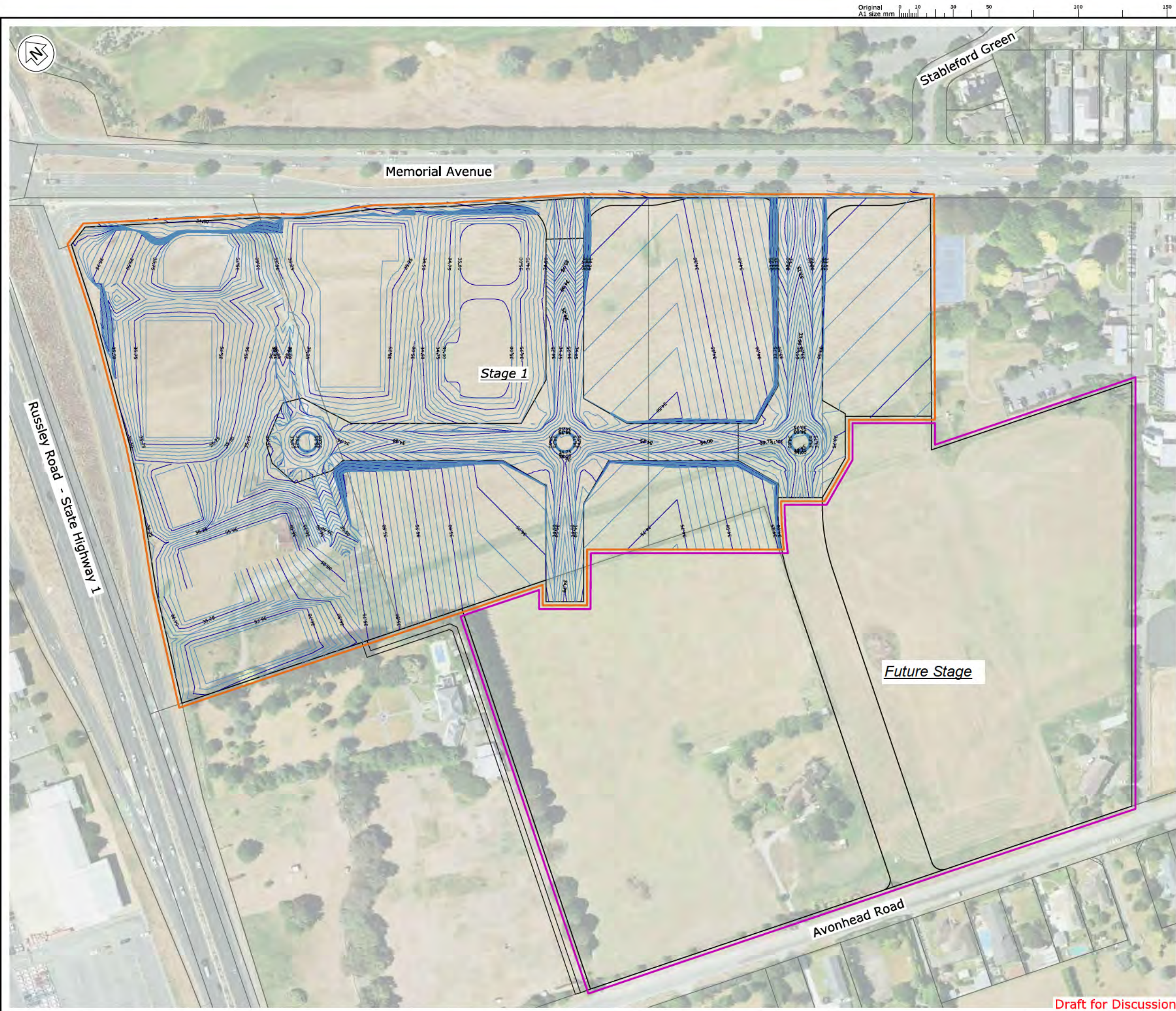
Earthworks
Existing Contours Plan

Scales

1:1000 [A1]; 1:2000 [A3]

Project No.	Set No.	Sht No.	Rev.
501827	C1	1001	A





- Notes:
1. All works shall be in accordance with the Project Specification, the Christchurch City Council Construction Standard Specification (CCC CSS) - parts 1-7 and the Infrastructure Design Standard (IDS) where applicable.
 2. Plans to be read in conjunction with all project construction documentation and drawings.
 3. All earthfill works to comply with NZS 4431:1989 relevant certification required as proof.
 4. All dimensions are in meters unless otherwise shown.
 5. Any discrepancies between drawings are to be brought to the attention of the Engineer for clarification.
 6. Contractor to read and comply with all discharge consents prior to any earthworks.
 7. Any runoff of stormwater from the site is to be controlled prior to commencing construction - refer to the project Erosion and Sediment Control Plan.
 8. Control of stormwater, sediment and dust on site is the responsibility of the Contractor.
 9. All services are to be fully searched and design piloted prior to trenching.
 10. Contractor to confirm subgrade CBR. Metal depths to be confirmed or increased by Engineer following checking of subgrade CBR strength once excavated.
 11. If peat or other unsuitable material is located in the subgrade the Engineer is to be contacted for instruction.

- Legend:
- Design finish level contour - 0.25m major interval
 - Design finish level contour - 0.05m minor interval
 - Stage 1 Boundary
 - Stage 2 Boundary

Rev.	Description	Drawn	Date
A	Draft for Discussion	KJH	

Designed	Name	Date	Surveyed:	Survey Date:
Drawn			Coord System:	
Drg, Chk			Calibration:	
Proj, Mgr			Origin of Levels:	
Design Review		Date		
Approved		Date	Datum:	

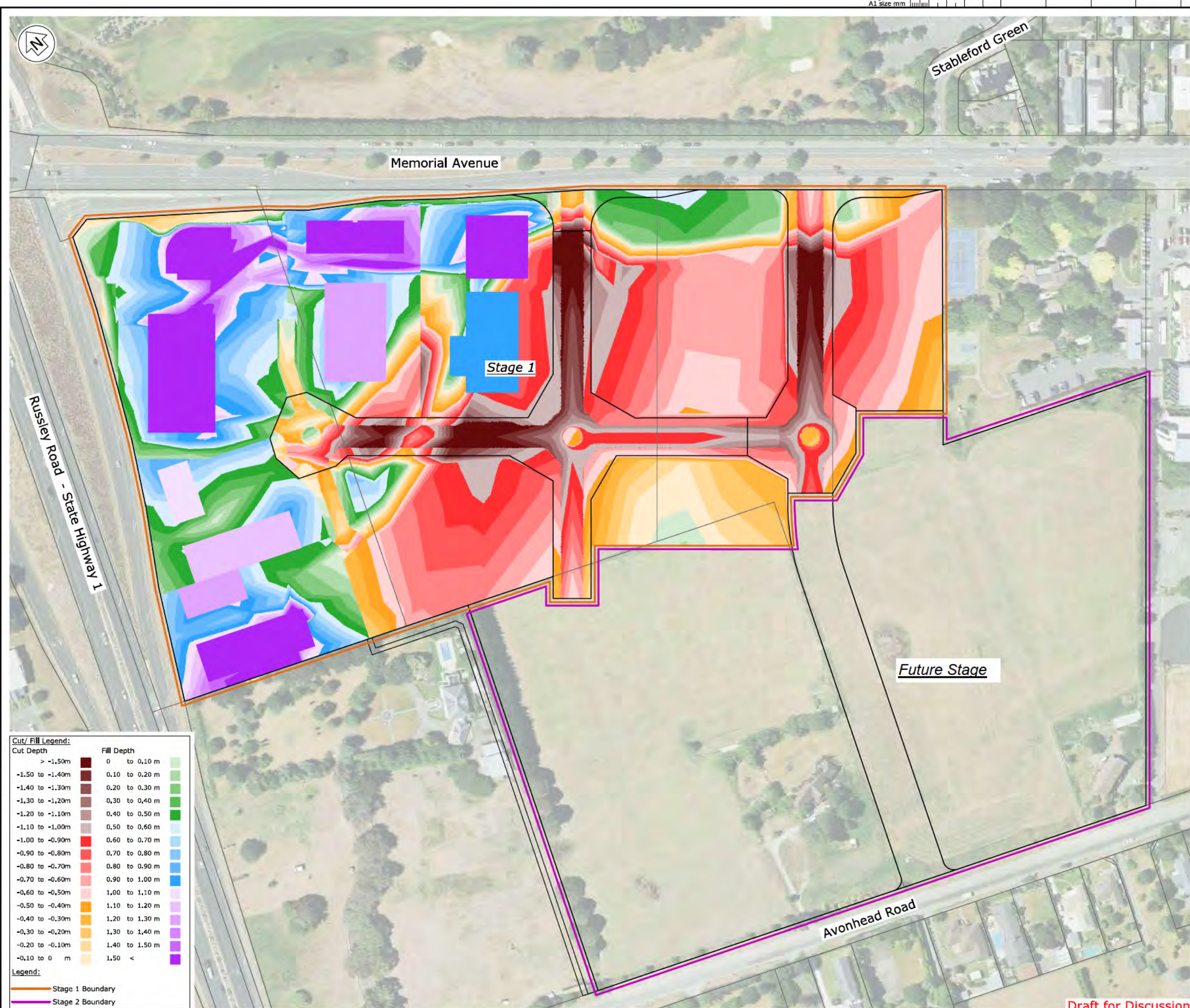
Client
MILES GROUP

Project Title
Mile Premises Memorial Ave
400 Russley Road & 475, 461 & 455 Memorial Avenue

Drawing Title
Earthworks
Design Contours Plan

Scales			
1:1000 [A1]; 1:2000 [A3]			
Project No.	Set No.	Sht No.	Rev.
501827	C1	1002	A





Notes:

- Depths shown are from existing top of silt level to design subgrade level including level building platform subgrade.
- Existing top of silt interpolated from topographical survey of test pits by Eliot Sinclair dated September 2021 & March 2022. Top of silt to be confirmed once excavated during construction.
- Building platforms levelled to the lowest point of existing top of silt below the platform.
- The following allowances have been made:
 - Pavement thickness
 - Collector Road 520mm
 - Private Road 450mm
 - Building foundations 250mm
 - Road frontage 150mm
 - Topsoil fill depth to finished level (excluding Toyota)
 - 300mm (finished with rye grass)
 - Topsoil fill depth to finished level within Toyota
 - 0mm (finished with long term stabilisation polymer)
- Finish levels are preliminary only and subject to final design.
- Pavement thickness are preliminary only and subject to geotechnical analysis of the site and detailed design.
- Volumes are solid volume. No allowance for reject material, consolidation, compaction or bulking.
- No allowance for excavation and remediation of historic watercourses within the site.
- No allowance for earthworks relating to road widening within Memorial Ave.

Volumes:

Topsoil Strip	38,300m ³
Topsoil Fill	16,400m ³ (excl. berms & landscaping areas)
Level Building Pads	9,000m ³
Subsoil Cut	39,600m ³
Subsoil Fill	37,900m ³
Total earthworks vol.	141,000m ³

Cut/ Fill Legend:

Cut Depth	Fill Depth
> -1.50m	0 to 0.10 m
-1.50 to -1.40m	0.10 to 0.20 m
-1.40 to -1.30m	0.20 to 0.30 m
-1.30 to -1.20m	0.30 to 0.40 m
-1.20 to -1.10m	0.40 to 0.50 m
-1.10 to -1.00m	0.50 to 0.60 m
-1.00 to -0.90m	0.60 to 0.70 m
-0.90 to -0.80m	0.70 to 0.80 m
-0.80 to -0.70m	0.80 to 0.90 m
-0.70 to -0.60m	0.90 to 1.00 m
-0.60 to -0.50m	1.00 to 1.10 m
-0.50 to -0.40m	1.10 to 1.20 m
-0.40 to -0.30m	1.20 to 1.30 m
-0.30 to -0.20m	1.30 to 1.40 m
-0.20 to -0.10m	1.40 to 1.50 m
-0.10 to 0 m	1.50 <

Legend:

- Stage 1 Boundary
- Stage 2 Boundary

Rev.	Description	Drawn	Date
A	Draft for Discussion	KJH	

Designed	Name	Date	Surveyed:	Survey Date:
Drawn			Coord System:	
Drg, Chk			Calibration:	
Proj, Mgr			Origin of Levels:	
Design Review		Date	Datum:	
Approved		Date		

Client

MILES GROUP

Project Title

Mile Premises Memorial Ave
400 Rusley Road & 475, 461 & 455 Memorial Avenue

Drawing Title

Earthworks
Cut/Fill Plan

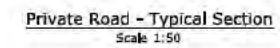
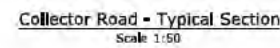
Scales

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Project No.	Set No.	Sht No.	Rev.
501827	C1	1003	A



- 120 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149, Phone: 03 379-4014, info@eliotsonclair.co.nz



	Name	Date	Surveyed:	Survey Date:
Designed	L. Jagvik	16.02.2022	Coord System:	
Drawn	K. Hewson	16.02.2022		
Drg, Chk	M. Thomson	16.02.2022		
Proj, Mgr	W. Haynes	16.02.2022	Calibration:	
Design Review		Date	Origin of Levels:	
Approved		Date		
			Datum:	

MILES GROUP

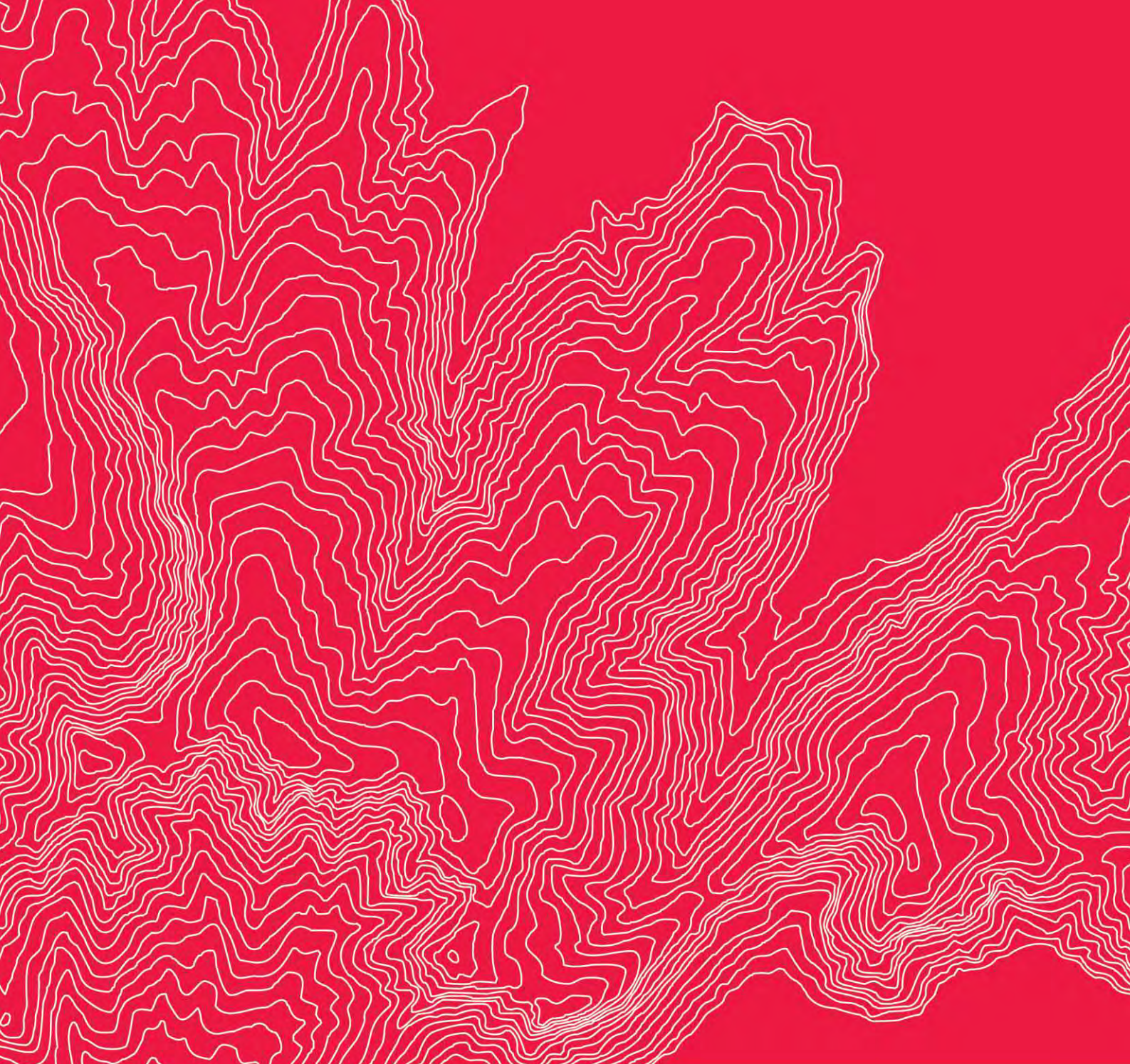
Drawing Title

Roading
Typical Sections and Details - Sheet 1

1:50 [A1]; 1:100 [A3]

C

Draft for Discussion



Miles Premises Ltd – Memorial Ave

**eliot
sinclair**

Hydrogeological Investigation and
Infiltration Testing

Prepared for Miles Premises Ltd
501827

Miles Premises Ltd – Memorial Ave

Hydrogeological Investigation and Infiltration Testing

Prepared for Miles Premises Ltd

501827

Quality Control Certificate

Eliot Sinclair & Partners Limited

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Action	Name	Signature	Date
Prepared by:	Simon Pollock Environmental Scientist MSc BSc		2 November 2021
Reviewed by:	Cameron Mars 3 Waters Engineer BE(Hons) Environ CMEngNZ CPEng s 9(2)(a)		2 November 2021
Directed and approved for release by:	Mark Thomson Civil Engineer BE(Hons) Civil MEngNZ s 9(2)(a)		11 November 2021
Status:	FINAL – Revision 2		
Release date:	12 December 2021		
Reference no:	501827		
Distributed to:	Miles Premises Ltd		

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1. Introduction

This report has been prepared by Eliot Sinclair for Miles Premises Limited in order to characterise the hydrogeological environment at the site on the corner of Memorial Avenue and Russley Road, Christchurch. The site is proposed for development of a vehicle sales and service area and will comprise a number of buildings and road connections across the site. Stormwater is currently proposed to be disposed of into ground through a number of soakage pits. The design and location of these soakage pits is still to be determined.

A preliminary desktop investigation was carried out and reported on in August 2021. As a result of that preliminary investigation, further work was recommended to better understand the hydrogeological conditions at the site and to determine the viability of stormwater soakage to ground.

1.1. Objectives of the investigation

The objectives of the investigation were as follows:

- Install two groundwater piezometers at the site with a pressure transducer for long term groundwater monitoring
- Carry out infiltration testing at various locations across the site to determine the capacity of the ground for stormwater soakage.

1.2. Purpose of this report

The purpose of this report is to outline the findings of the investigations and to present preliminary data from the long-term groundwater monitoring.

2. Site Setting

A detailed summary of the site setting is provided in the Preliminary Hydrogeological Investigation report and is not reported on in detail again here. In summary:

- Nearest surface water bodies are over 1,000 m from the site and are spring fed streams.
- Previous investigations of the site indicate that the geology is comprised of a layer of sand and silt overlying sandy gravels to at least 8 m below ground level (bgl).
- Groundwater is widely used in the area. There are 26 wells within 500 m of the site with depths between 4 m and 30 m bgl.
- Four wells within the 500 m radius are listed as being active and used for domestic supply. These wells are screened within the unconfined upper aquifer known as the Springston Formation.
- Groundwater flow is expected to be towards the south and east.
- There are six community drinking water supply wells approximately 1 km south of the site. These wells are screened within confined aquifer units at depths between 125 m and 203 m bgl.

3. Groundwater Investigations

As part of the groundwater investigation, McMillians Drilling was engaged to install two piezometers (BH01 and BH02) to depths of approximately 10 m bgl. The location of these two piezometers is shown in Figure 1 below.



Figure 1. Piezometer Locations

Bore logs for the piezometers are provided in Appendix A.

The bore logs indicate sandy gravel to a depth of 10 m bgl overlain by topsoil and sand to depths of approximately 0.6 m bgl.

A 2 m screened section was placed at the base of the piezometer between 8 m and 10 m bgl in each piezometer. A pressure transducer water level logger was installed in BH01 at a depth of approximately 9.7 m bgl.

3.1. Groundwater Level

A site visit was carried out on 28 October 2021 to measure the water levels in each piezometer and to download the first period of groundwater monitoring from the pressure transducer. The water levels are summarised in Table 1 below.

Table 1. Groundwater Levels (28 October 2021)

Bore Number	Total Depth (m bgl)	Water Level (m bgl)	Water Level (m RL)
BH01	9.99	7.5	27.44
BH02	10.08	7.17	26.97

Initial groundwater level monitoring from the pressure transducer is shown in Figure 2 below. Note that there is no pressure transducer installed in BH02. We have assumed that groundwater level will follow a similar pattern to that of BH01, and so the water level shown in the graph is a synthetic record based on the relative water level differences measured on 28 October 2021.

It can be seen in the approximate 3.5 weeks of monitoring groundwater levels that the water level in BH01 has dropped approximately 200 mm. This is typical of this time of year, with groundwater levels typically peaking during September and beginning to lower during the Summer months. It is expected that this trend will continue into the warmer months. Ongoing monitoring of the groundwater levels will continue for the next few months to confirm this trend.

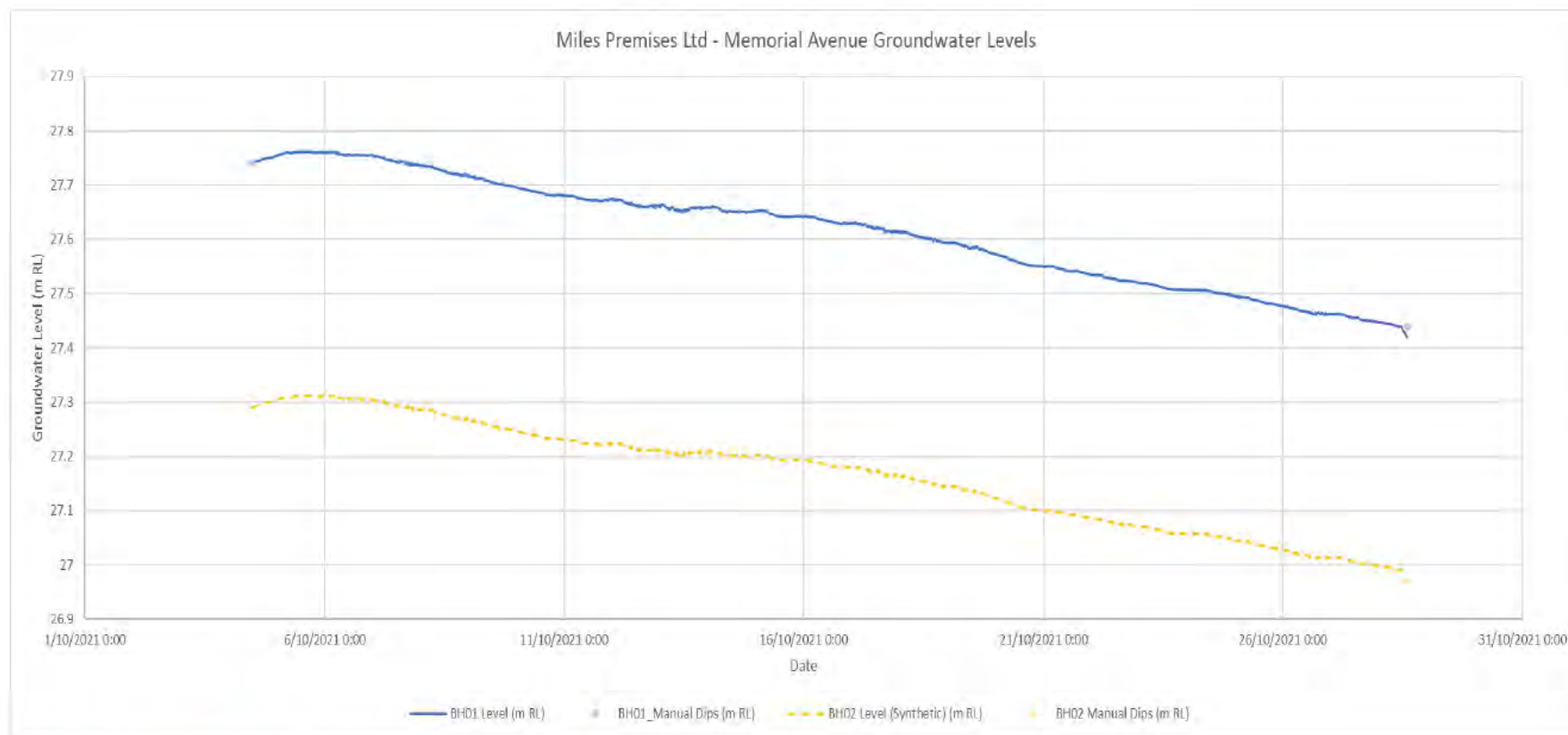


Figure 2. Groundwater Levels

3.2. Groundwater Flow Direction

The desktop investigation assumed that groundwater flows in a south and east direction. The monitoring carried out on 28 October 2021 confirms that groundwater will flow from the north in a south easterly direction. However there may still be localised pockets where the groundwater may flow in a different direction. A generalised figure showing the groundwater flow direction is provided in Figure 3.



Figure 3. Groundwater Flow Direction (orange arrow)

4. Infiltration Testing

Infiltration testing at the site was carried out in two phases. The first phase was conducted by McMillians Drilling at six test locations across the site (including the two piezometer locations). The second phase was carried out by Eliot Sinclair staff on 28 October 2021 via test pit excavation and inflow testing.

The eight testing locations are shown below in Figure 4.



Figure 4. Infiltration Testing Locations

4.1. Infiltration Rates

A summary of the infiltration rates at each of the test locations is provided in Table 2 below.

Table 2. Infiltration Rates

Test Location	Testing Depth (m bgl)	Infiltration Rate (m/hour)
BH01	3 m	34.96
BH02	3 m	25.82
BH03	3 m	0.4
BH04	3 m	17.71
BH05	3 m	4.14
BH06	3 m	10.15
Test Pit 1	3 m	16.92
Test Pit 2	3 m	11.92

The tests were carried out using a combination of methods. For locations BH01 through to BH06, McMillians carried out constant and falling head tests. Water was pumped into a 90 mm OD casing with a transducer prior to discharging via a 55 mm diameter screen. Measurement of the flow rate required to maintain a constant head was recorded. Water flow was then stopped and the water levels were recorded over time as the water receded into the bore. The soils were allowed to saturate for approximately one hour prior to testing taking place.

For the test pit locations, Eliot Sinclair staff excavated two holes to a depth of 3 m and approximately 2 m², water was initially pumped into each excavation to account for soils saturation, however, this saturation phase was short in duration due to an extremely high soil permeability and there not being sufficient water within the water cart for prolong soils saturation. During the testing phase the water within each excavation was kept at a constant head and the volume of water discharged into the excavation was recorded via a calibrated meter every two minutes. The infiltration rate was calculated by plotting the volume discharged over time and dividing by the area of the excavation to account for the equivalent water drop over time.

It should be noted that pit test infiltration rates should not be used for design purposes, and are generally fit for preliminary screening of soakage viability. Water loss from the pit occurs in the horizontal as well as vertical direction and generally requires a correction factor of 0.6 to 0.8 to account for side wall losses.

Data sheets from McMillian Drilling for the testing is provided in Appendix B.

4.2. Results Discussion

Generally the results indicate very good infiltration rates at depth across the site. BH03 is a noted exception to this. The very low infiltration rate in this location is likely due to a spatially limited area of lower permeability material. Test pits 1 and 2 which were commissioned after the results from BH03 were known demonstrates that there are high permeability gravels in that portion of the site. BH03 was characterised by a higher silt content and it is recommended that during construction, attention is made to the silt fraction in the soil at the required infiltration depth.

5. Conclusions

Where test results indicate a soakage rate of greater than 0.5 m/hour soakage is a viable mechanism for removal of stormwater. Even after considering the limitations of the tests carried out and the application of correction factors, the site conditions are well suited to soakage to ground as a primary mechanism for stormwater disposal.

The downstream community supply bores may require a short discussion about the risk to them as part of the consenting pathway. While the risk is negligible, it will require discussion as part of any consent for discharge.

The nearby domestic supply bores may also require discussion during the consenting phase. There is a risk that the stormwater discharge will impact on the quality of the water in those bores given that they are screened within the same aquifer unit as the stormwater will be discharged to.

Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a technical supporting document for a preliminary site investigations.

The report is based on:

- Desktop reviews and site investigations carried out by Eliot Sinclair and others (McMillian Drilling)
- External data from Environment Canterbury

Where data supplied by Miles Premises Ltd or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care and reasonable effort has been taken during our investigation and interpretation of subsurface conditions to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Variations in conditions may occur between investigatory locations and there may be conditions such as subsoil strata and features that were not detected by the scope of the investigation that was carried out or have been covered over or obscured over time. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

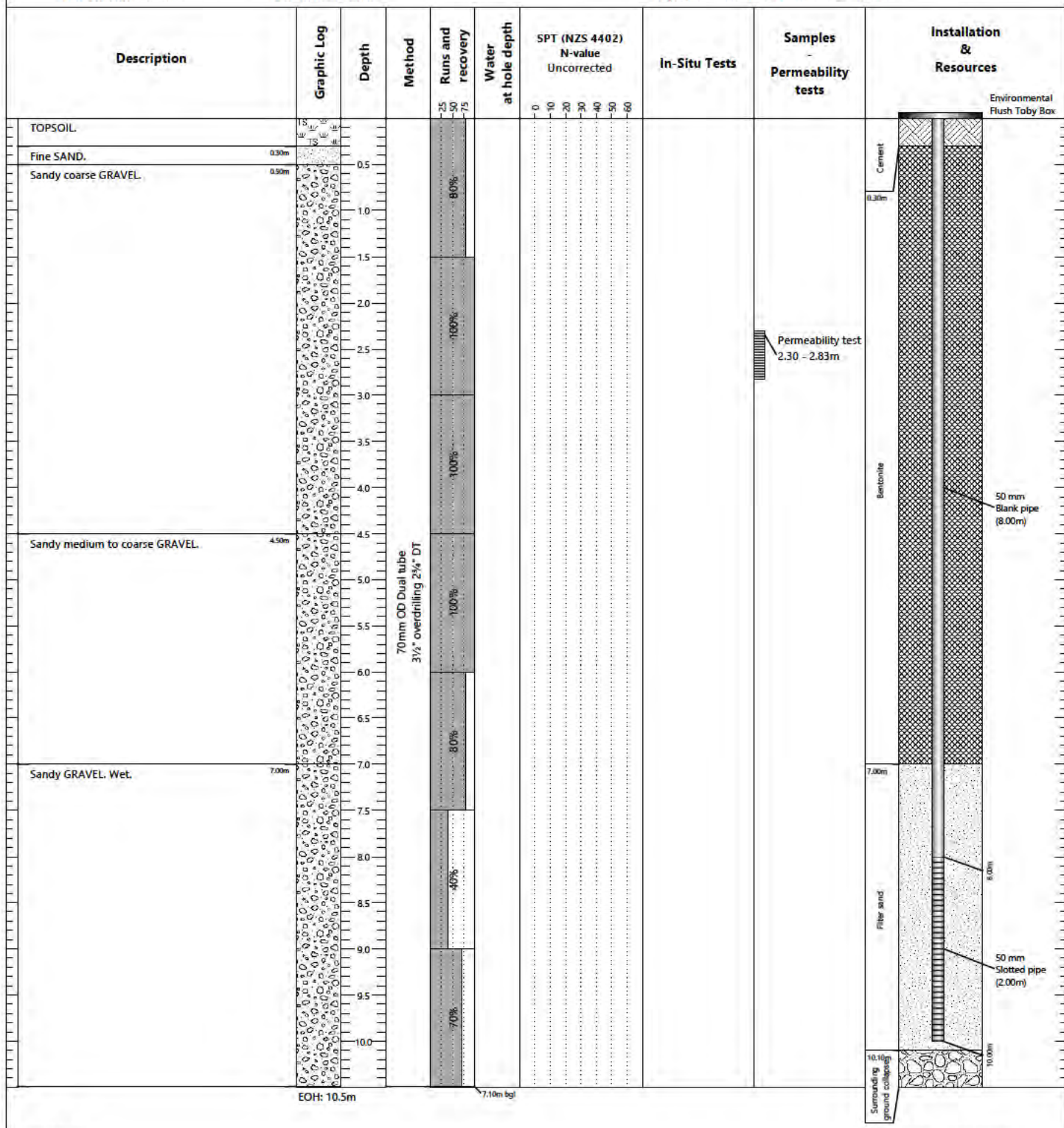
This report has been prepared for the benefit of Miles Premises Ltd for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. Bore Logs

Client:	Eliot Sinclair & Partners Ltd	Bore No.:	BH001
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Site Location: Memorial Avenue - Russley Road, Christchurch
Grid Reference: 1563662.46m E, 5184086.94m N (NZTM) - Handheld GPS
Elevation: 0.00m **Datum:** Ground

Date: 29/9/2021 - 29/9/2021
Rig Operator: P. Taulava
Equipment: AMS VTR9700D - truck



Remarks	Additional Resources:
	Core boxes: - Liners/splits: 10.5m Water added: 800 liters Concrete: 3 bags Bentonite: 1 bag Filter sand: 2 bags

Client:	Eliot Sinclair & Partners Ltd	Bore No.:	BH002
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Site Location: Memorial Avenue - Russley Road, Christchurch

Date: 4/10/2021 - 4/10/2021

Grid Reference: 1563790.01m E, 5183677.48m N (NZTM) - Map or aerial photograph

Rig Operator: P. Taulava

Elevation: 0.00m

Datum: Ground

Equipment: AMS VTR9700D - truck

Description	Graphic Log	Depth	Method	Runs and recovery	Water at hole depth	SPT (NZS 4402) N-value Uncorrected	In-Situ Tests	Samples - Permeability tests	Installation & Resources
TOPSOIL with some sand; dark brown. Sand, fine.		0.00 - 0.25		75%					Environmental Flush Tally Box
Fine SAND; light brown.		0.25 - 0.60		70%					Cement (0.30m)
Fine to coarse GRAVEL with some sand and trace of cobbles; grey. Subrounded; sand, fine to medium.		0.60 - 10.00	70mm OD Dual tube 3 1/2" overdrilling 2 1/4" DT	70% 100% 75% 70% 65% 65%				Permeability test 2.30 - 2.83m	Bentonite 50 mm Blank pipe (8.00m) 50 mm Slotted pipe (2.00m) Filter sand Surrounding ground collapse
EOH: 10.5m									

Remarks

Additional Resources:

Core boxes: -
Liners/splits: 10.5m
Water added: 800 liters
Concrete: 3 bags
Bentonite: 1 bag
Filter sand: 2 bags

Client:	Eliot Sinclair & Partners Ltd	Bore No.:	BH003
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Site Location: Memorial Avenue - Russley Road, Christchurch
Grid Reference: 1563658.74m E, 5184176.88m N (NZTM) - Handheld GPS
Elevation: 0.00m **Datum:** Ground

Date: 27/9/2021 - 27/9/2021

Rig Operator: P. Taulava

Equipment: AMS VTR9700D - truck

Description	Graphic Log	Depth	Method	Runs and recovery	Water at hole depth	SPT (NZS 4402) N-value Uncorrected	In-Situ Tests	Samples - Permeability tests	Installation & Resources
TOPSOIL.				25 50 75		0 10 20 30 40 50 60			
Sandy coarse GRAVEL with some silt.	0.00m	0.5 1.0 1.5 2.0 2.5 3.0	70mm OD Dual tube 3 1/2" overdrilling 2 1/4" DT	70% 50%				Permeability test 2.40 - 2.93m	Bentonite
No sample recovery.	3.00m	3.0 3.5	90mm OD Wash boring Blind drive	0%				Permeability test 3.40 - 3.80m	
	EOH: 3.8m				0.55m bgl				

Remarks

Additional Resources:

Core boxes: -
Liners/splits: 3m
Water added: 200 liters
Bentonite: 1 bag

Client:	Eliot Sinclair & Partners Ltd	Bore No.:	BH004
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Site Location: Memorial Avenue - Russley Road, Christchurch
Grid Reference: 1563779.43m E, 5183996m N (NZTM) - Map or aerial photograph
Elevation: 0.00m **Datum:** Ground

Date: 28/9/2021 - 28/9/2021
Rig Operator: P. Taulava
Equipment: AMS VTR9700D - truck

Description	Graphic Log	Depth	Method	Runs and recovery	Water at hole depth	SPT (NZS 4402) N-value Uncorrected	In-Situ Tests	Samples - Permeability tests	Installation & Resources
No sample recovery.	N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A	0.5 1.0 1.5 2.0 2.5	90mm OD Wash boring Blind drive	25 50 75		0 10 20 30 40 50		Permeability test 2.00 - 2.53m	Bentonite

EOH: 3m

Remarks	Additional Resources: Core boxes: - Liners/splits: 3m Water added: 200 liters Bentonite: 1 bag
----------------	---

Client:	Eliot Sinclair & Partners Ltd	Bore No.:	BH005
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Site Location: Memorial Avenue - Russley Road, Christchurch	Date: 28/9/2021 - 28/9/2021
Grid Reference: 1563938.72m E, 5183984.03m N (NZTM) - Handheld GPS	Rig Operator: P. Taulava
Elevation: 0.00m	Equipment: AMS VTR9700D - truck
Datum: Ground	

Description	Graphic Log	Depth	Method	Runs and recovery	Water at hole depth	SPT (NZS 4402) N-value Uncorrected	In-Situ Tests	Samples - Permeability tests	Installation & Resources
TOPSOIL.		0.20m	70mm OD Dual tube 3 1/2" overdrilling 2 3/4" DT	25 50 75		0 10 20 30 40 50 60			
Fine SAND; dark grey.		0.50m		80%					
Fine to medium SAND; grey.		2.80m		100%				Permeability test 2.00 - 2.53m	Bentonite
Sandy GRAVEL.		3.00m							

EOH: 3m

Remarks	Additional Resources: Core boxes: - Liners/splits: 3m Water added: 500 liters Bentonite: 1 bag
----------------	---

Client:	Eliot Sinclair & Partners Ltd	Bore No.:	BH006
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Site Location: Memorial Avenue - Russley Road, Christchurch
Grid Reference: 1563729.56m E, 5183833.45m N (NZTM) - Map or aerial photograph
Elevation: 0.00m **Datum:** Ground

Date: 28/9/2021 - 28/9/2021
Rig Operator: P. Taulava
Equipment: AMS VTR9700D - truck

Description	Graphic Log	Depth	Method	Runs and recovery	Water at hole depth	SPT (NZS 4402) N-value Uncorrected	In-Situ Tests	Samples - Permeability tests	Installation & Resources
No sample recovery.	N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A N/R N/A	0.5 1.0 1.5 2.0 2.5	90mm OD Wash boring Blind drive	25 50 75		0 10 20 30 40 50		Permeability test 2.00 - 2.53m	Bentonite

EOH: 3m

Remarks	Additional Resources: Core boxes: - Liners/splits: 3m Water added: 200 liters Bentonite: 1 bag
----------------	---

Appendix B. Infiltration Testing Data Sheets

McMILLAN Drilling	Client: Eliot Sinclair & Partners	Bore No.: BH001
	Project: Memorial Avenue - Russley Road, Christchurch	Job No.: 20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 29/09/2021 14:25:00

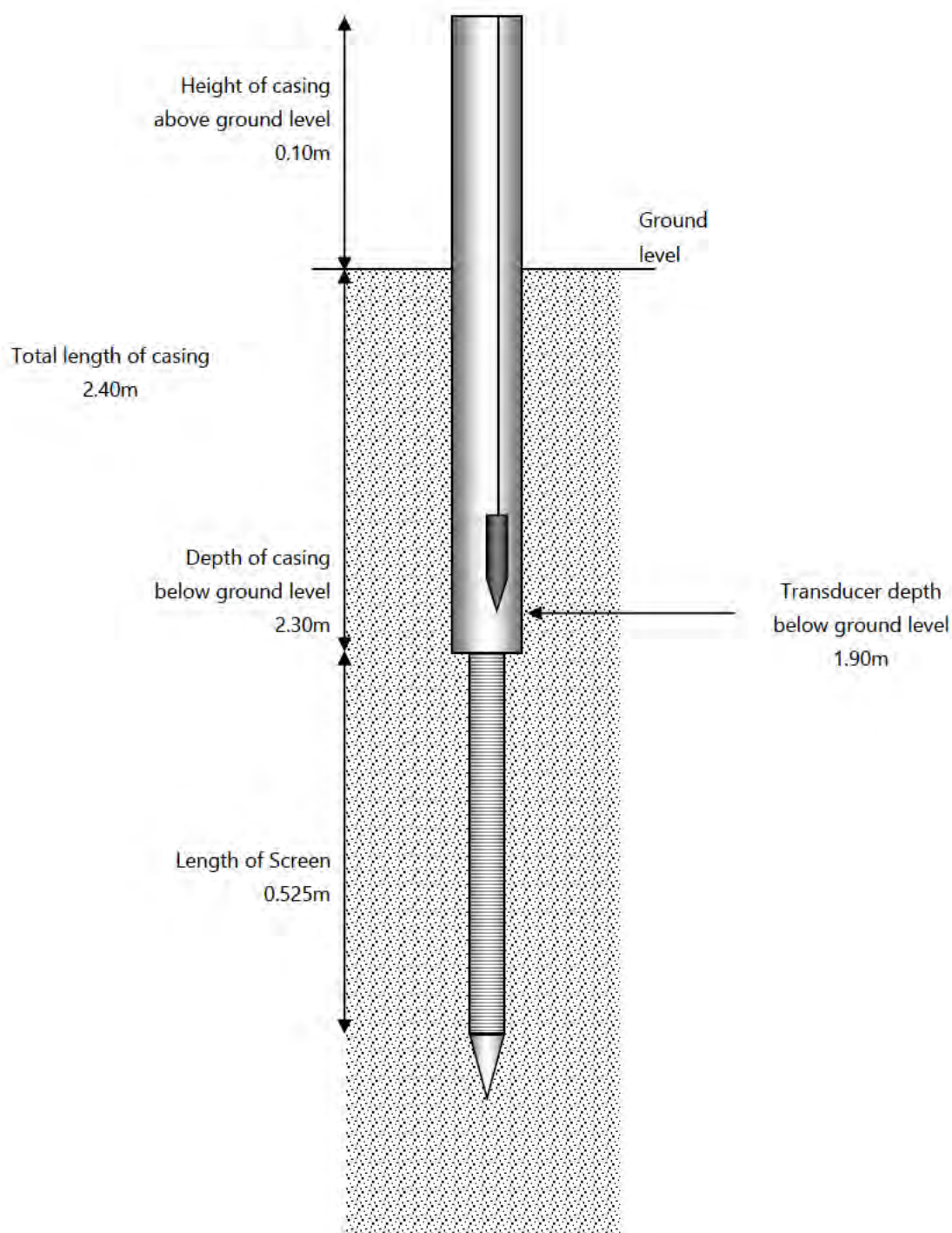
Casing size: 90mm OD; 76mm ID

Finish date: 29/09/2021 15:45:00

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added: 4,228.80l

Test Set Up





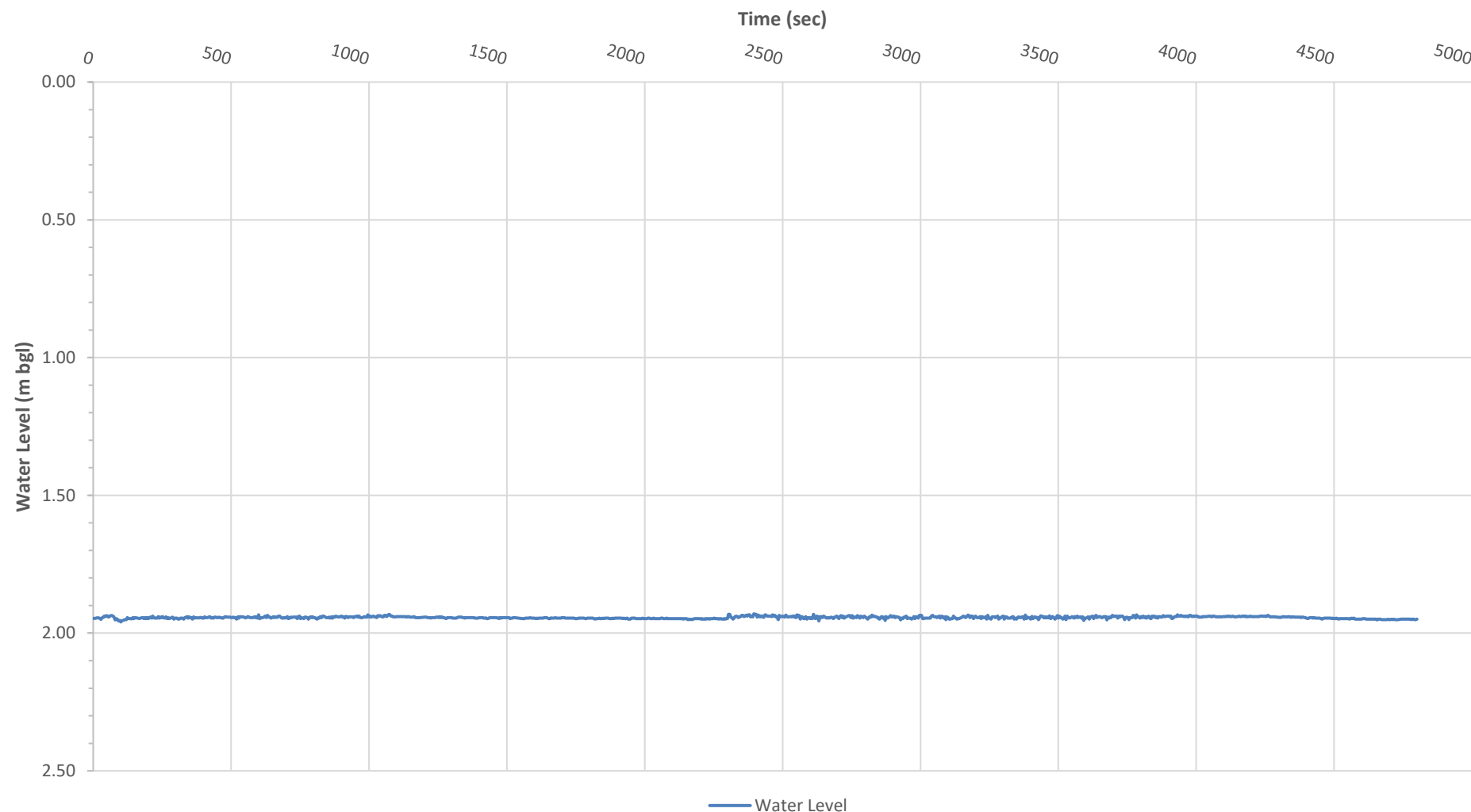
Client:	Eliot Sinclair & Partners	Bore No.:	BH001
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 29/09/2021



McMILLAN Drilling	Client:	Eliot Sinclair & Partners	Bore No.:	BH002
	Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 4/10/2021 10:20:00

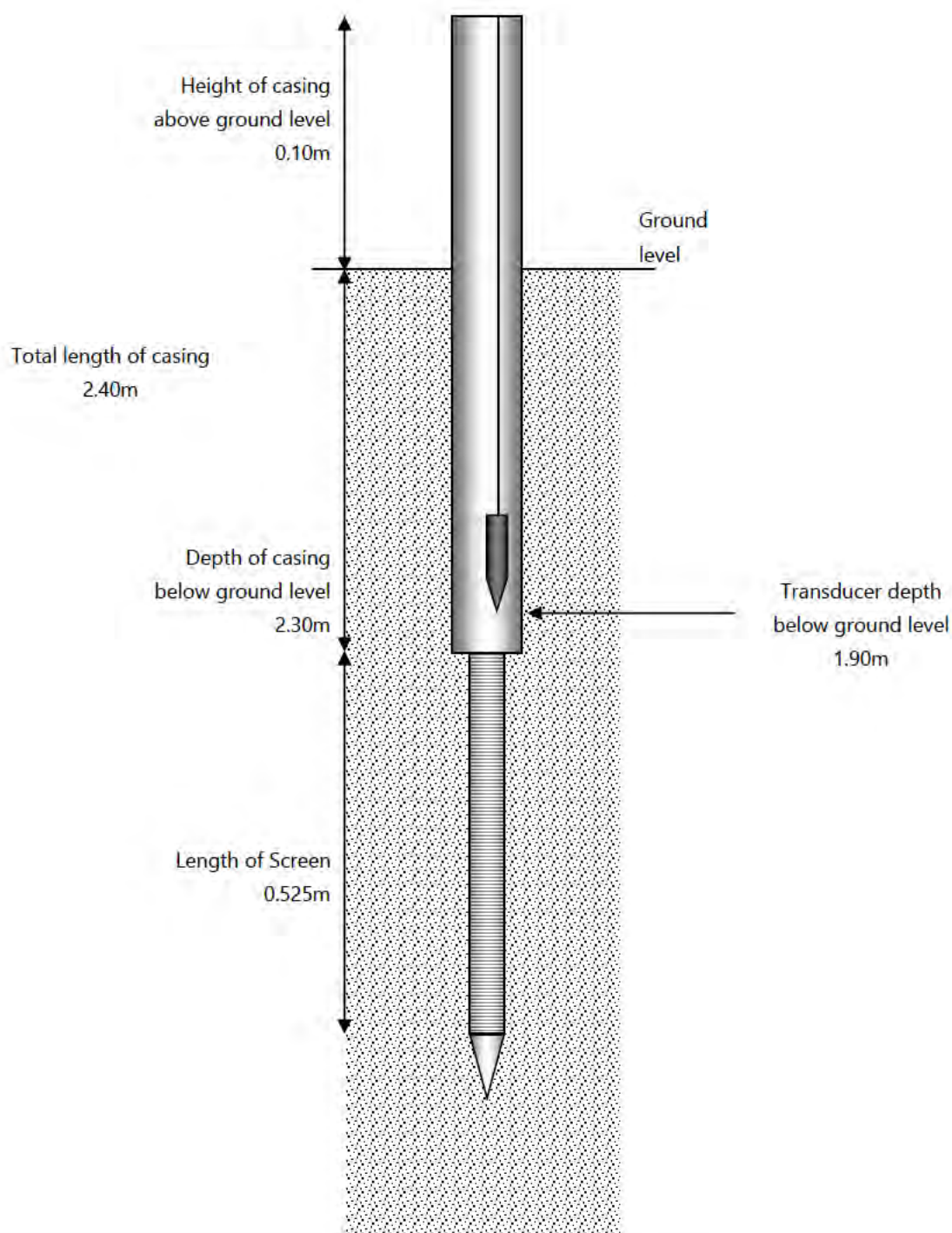
Casing size: 90mm OD; 76mm ID

Finish date: 4/10/2021 11:25:00

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added: 2,537.30l

Test Set Up





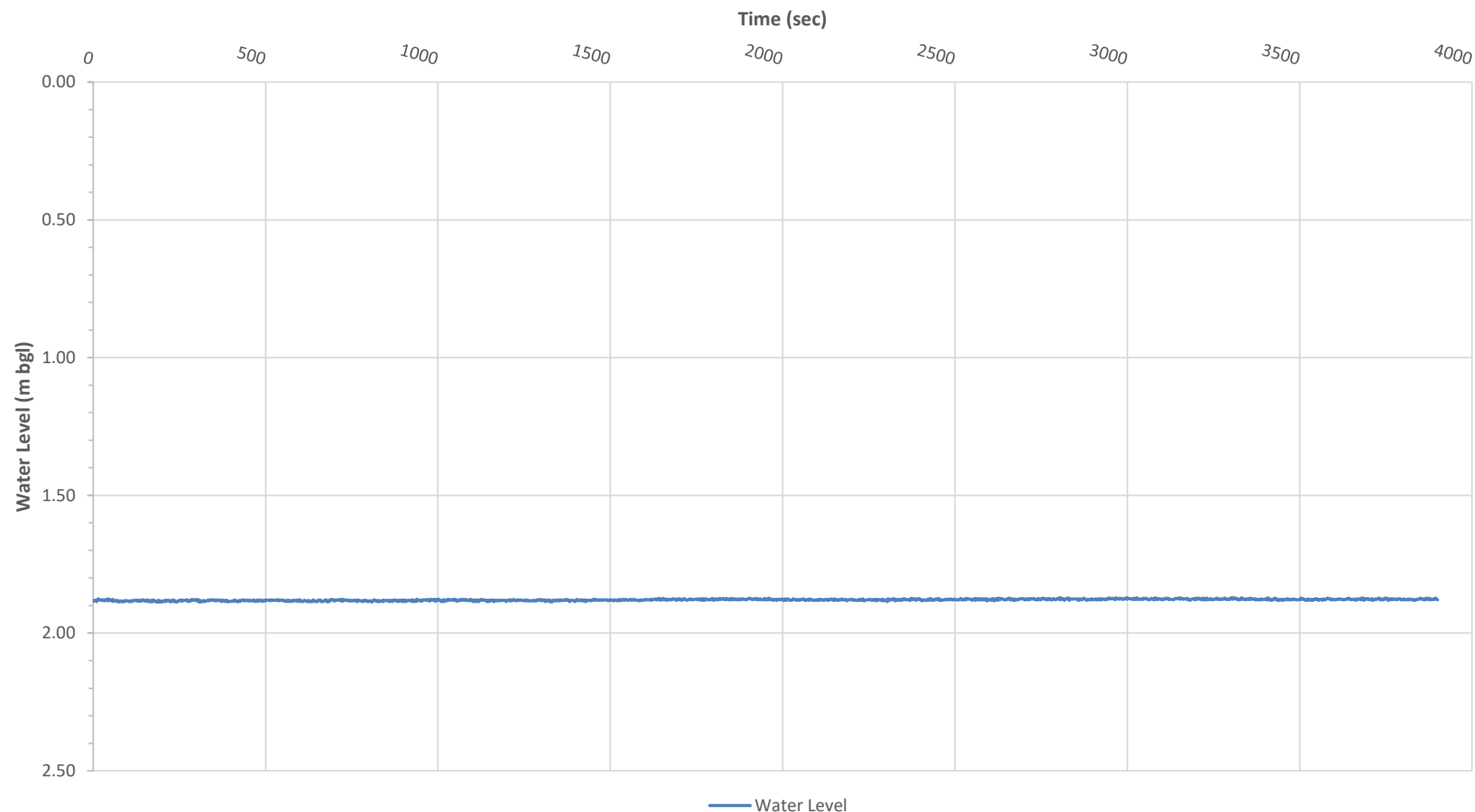
Client:	Eliot Sinclair & Partners	Bore No.:	BH002
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 4/10/2021



McMILLAN Drilling	Client:	Eliot Sinclair & Partners	Bore No.:	BH003
	Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 27/09/2021 13:10:36

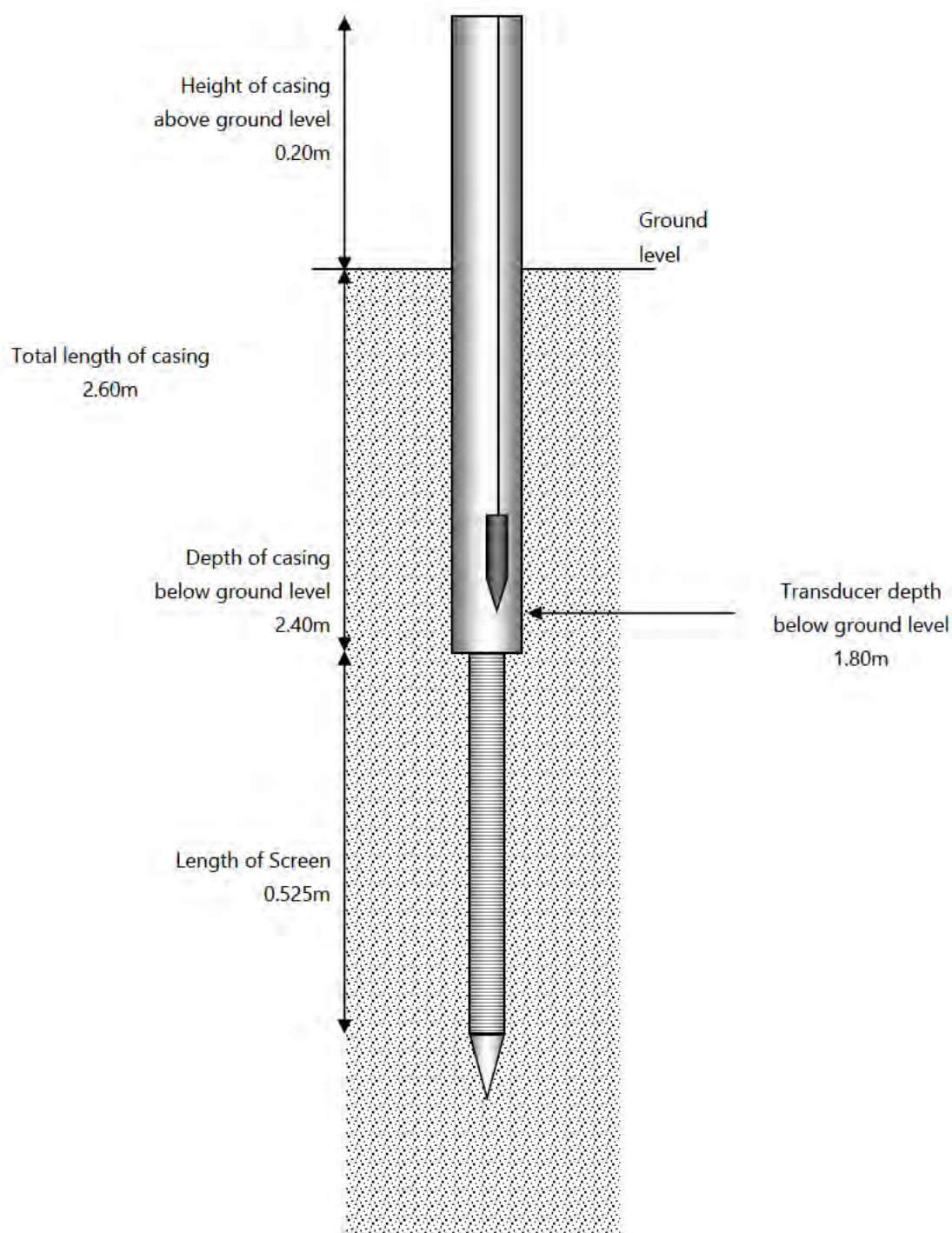
Casing size: 90mm OD; 76mm ID

Finish date: 27/09/2021 13:18:14

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added:

Test Set Up





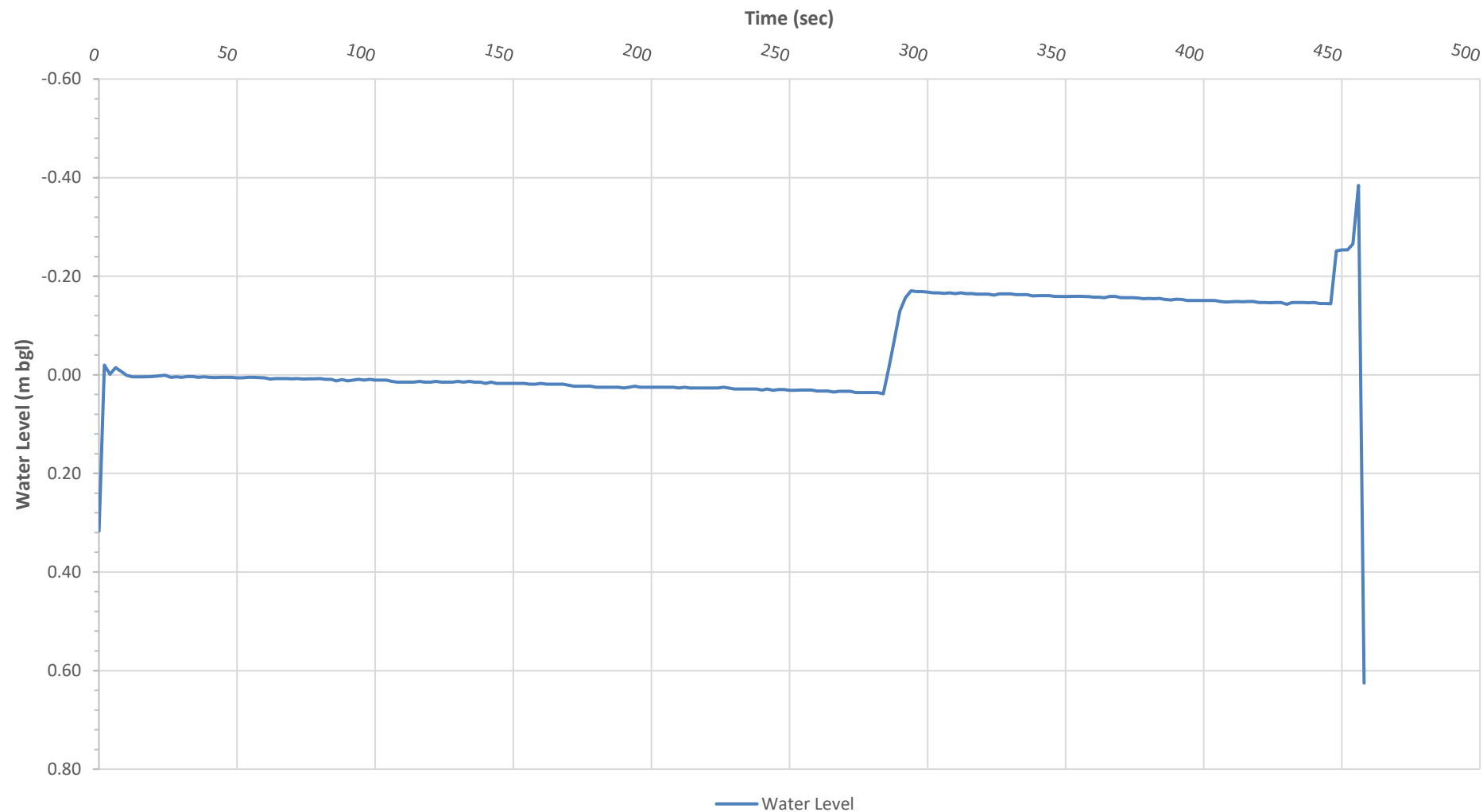
Client:	Eliot Sinclair & Partners	Bore No.:	BH003
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.40m bgl

Sensor depth: 1.80m bgl

Date: 27/09/2021

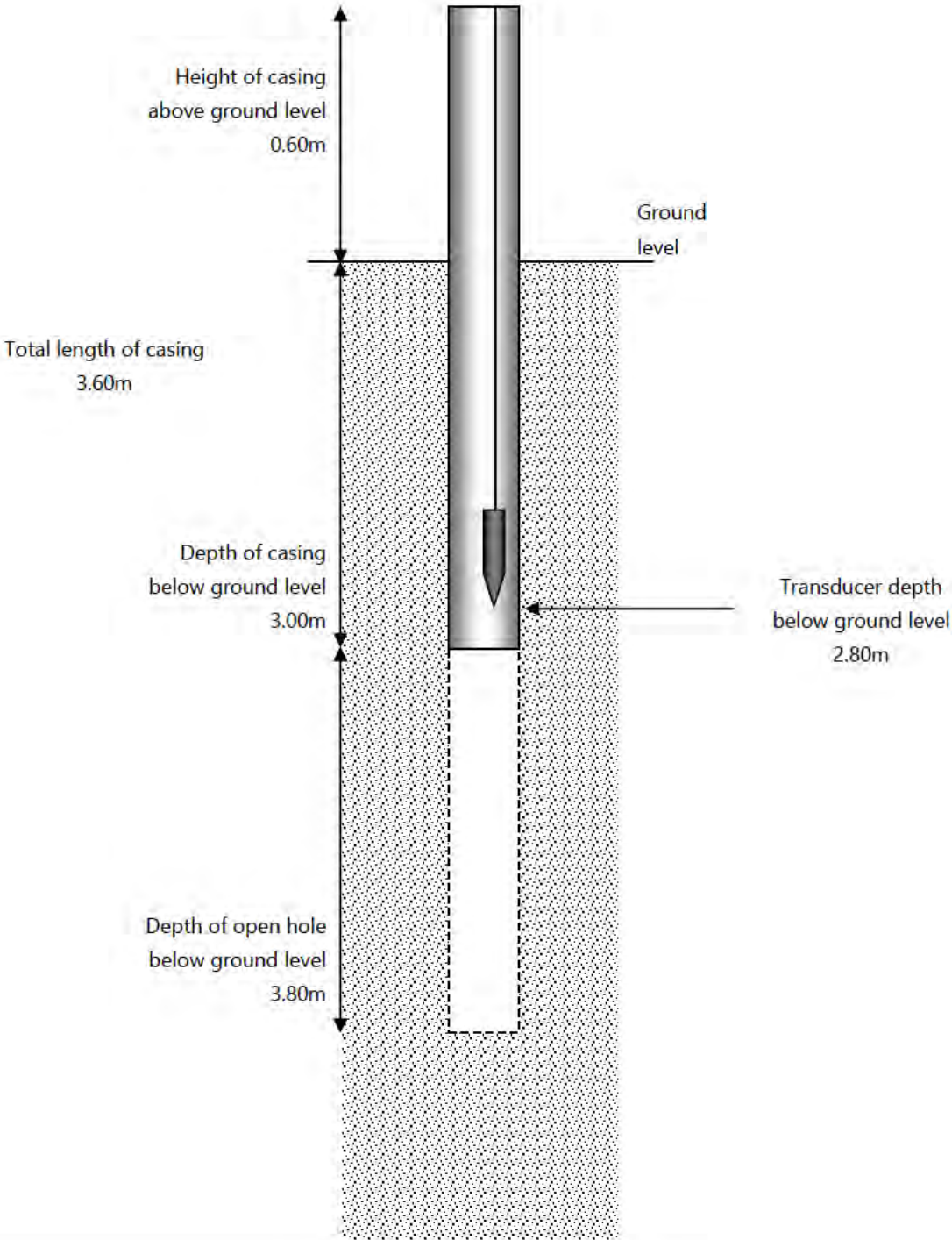


Client:	Eliot Sinclair & Partners	Bore No.:	BH003
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch	Start date: 27/09/2021 15:59:44
Casing size: 90mm OD; 76mm ID	Finish date: 27/09/2021 17:50:40
Screen size: No screen (casing only)	Water added:

Test Set Up

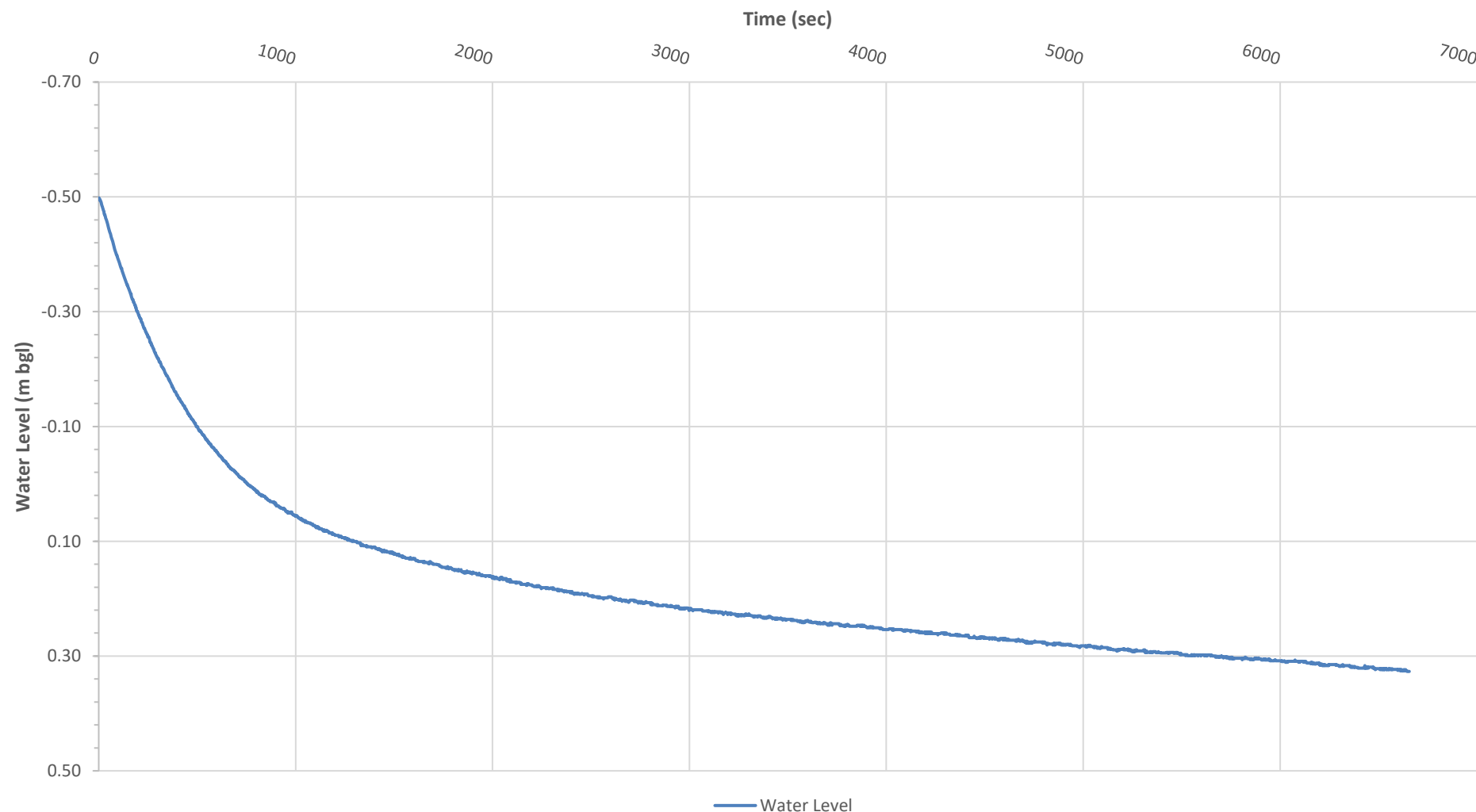


**Client:**

Eliot Sinclair & Partners

Bore No.:**BH003****Project:**

Memorial Avenue - Russley Road, Christchurch

Job No.:**20262****Constant / Falling head test****Casing depth:** 3.00m bgl**Sensor depth:** 2.80m bgl**Date:** 27/09/2021

McMILLAN Drilling	Client:	Eliot Sinclair & Partners	Bore No.:	BH004
	Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 28/09/2021 12:08:25

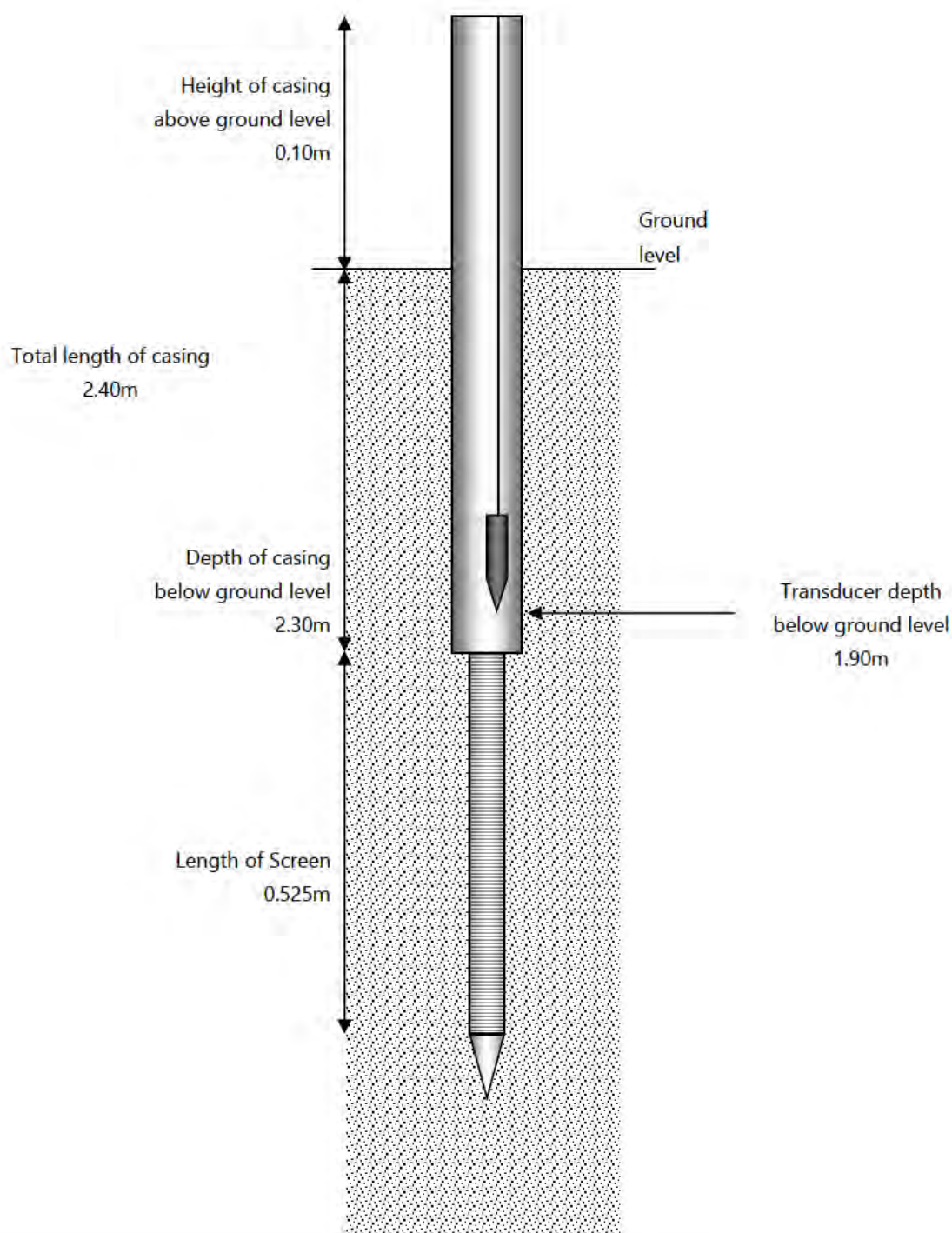
Casing size: 90mm OD; 76mm ID

Finish date: 28/09/2021 12:51:21

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added:

Test Set Up





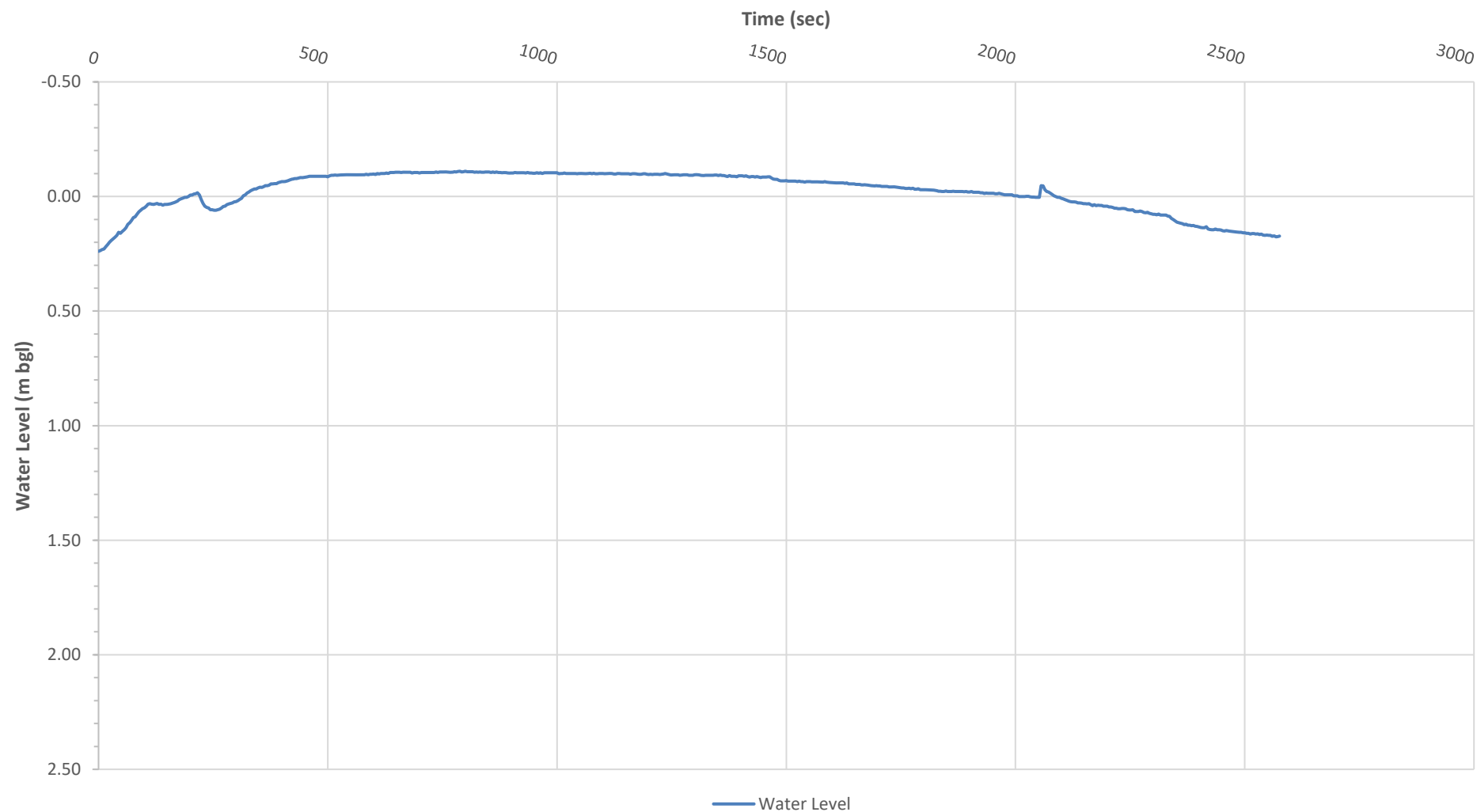
Client:	Eliot Sinclair & Partners	Bore No.:	BH004
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 28/09/2021



McMILLAN Drilling	Client:	Eliot Sinclair & Partners	Bore No.:	BH004
	Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 28/09/2021 13:13:25

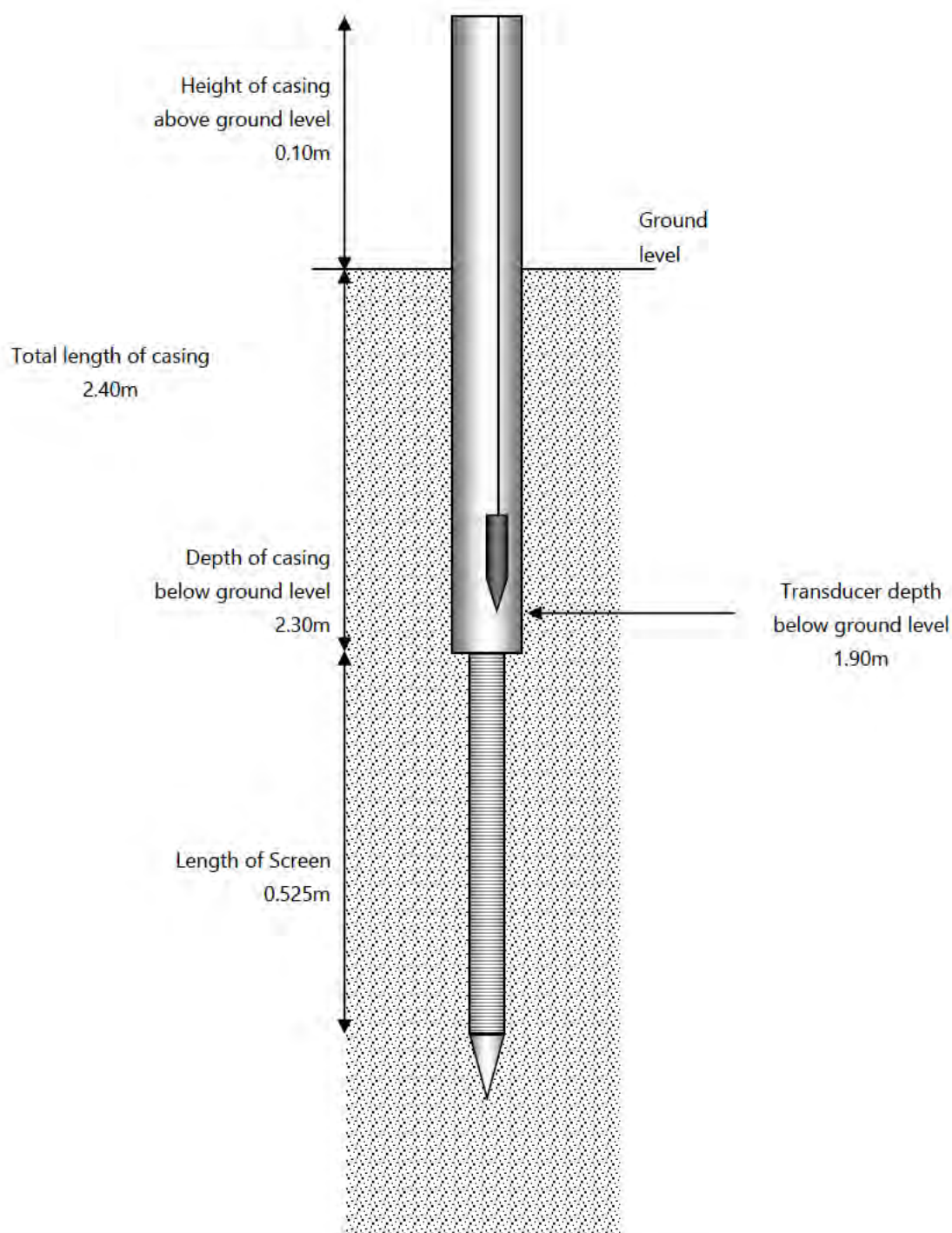
Casing size: 90mm OD; 76mm ID

Finish date: 28/09/2021 13:28:33

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added:

Test Set Up





Client:

Eliot Sinclair & Partners

Bore No.:

BH004

Project:

Memorial Avenue - Russley Road, Christchurch

Job No.:

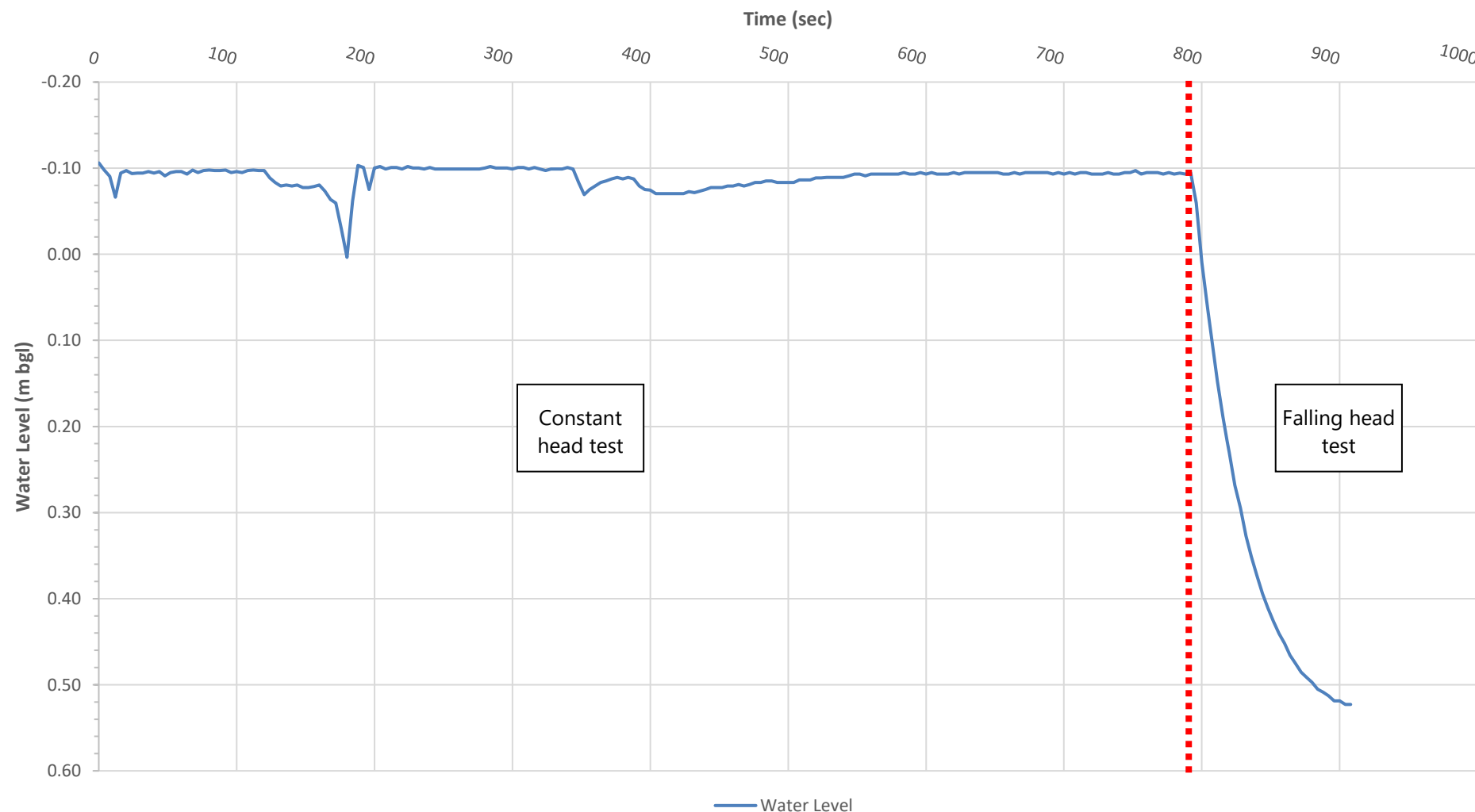
20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 28/09/2021



McMILLAN Drilling	Client: Eliot Sinclair & Partners	Bore No.: BH005
	Project: Memorial Avenue - Russley Road, Christchurch	Job No.: 20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 28/09/2021 10:18:13

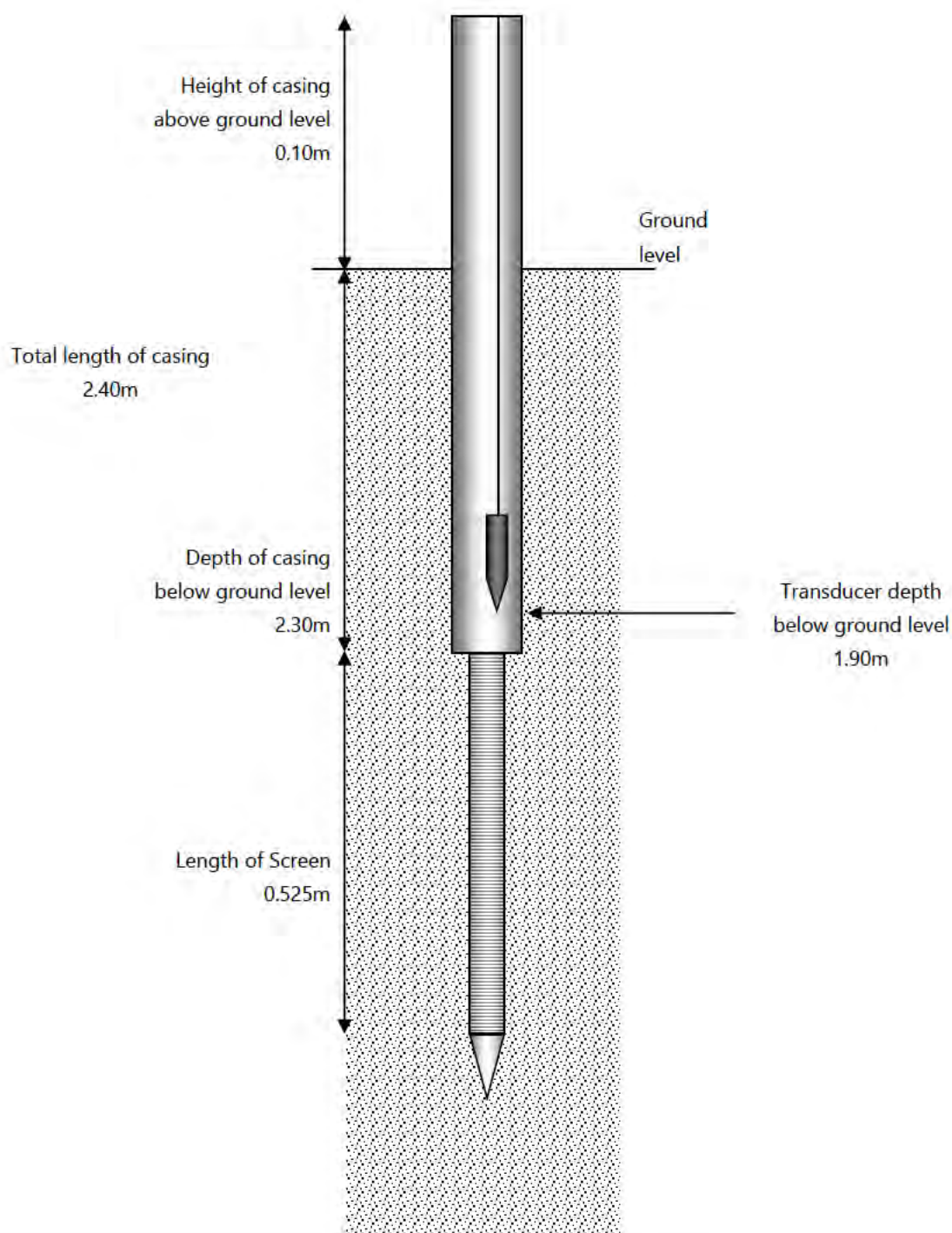
Casing size: 90mm OD; 76mm ID

Finish date: 28/09/2021 11:18:53

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added: 376,40l

Test Set Up





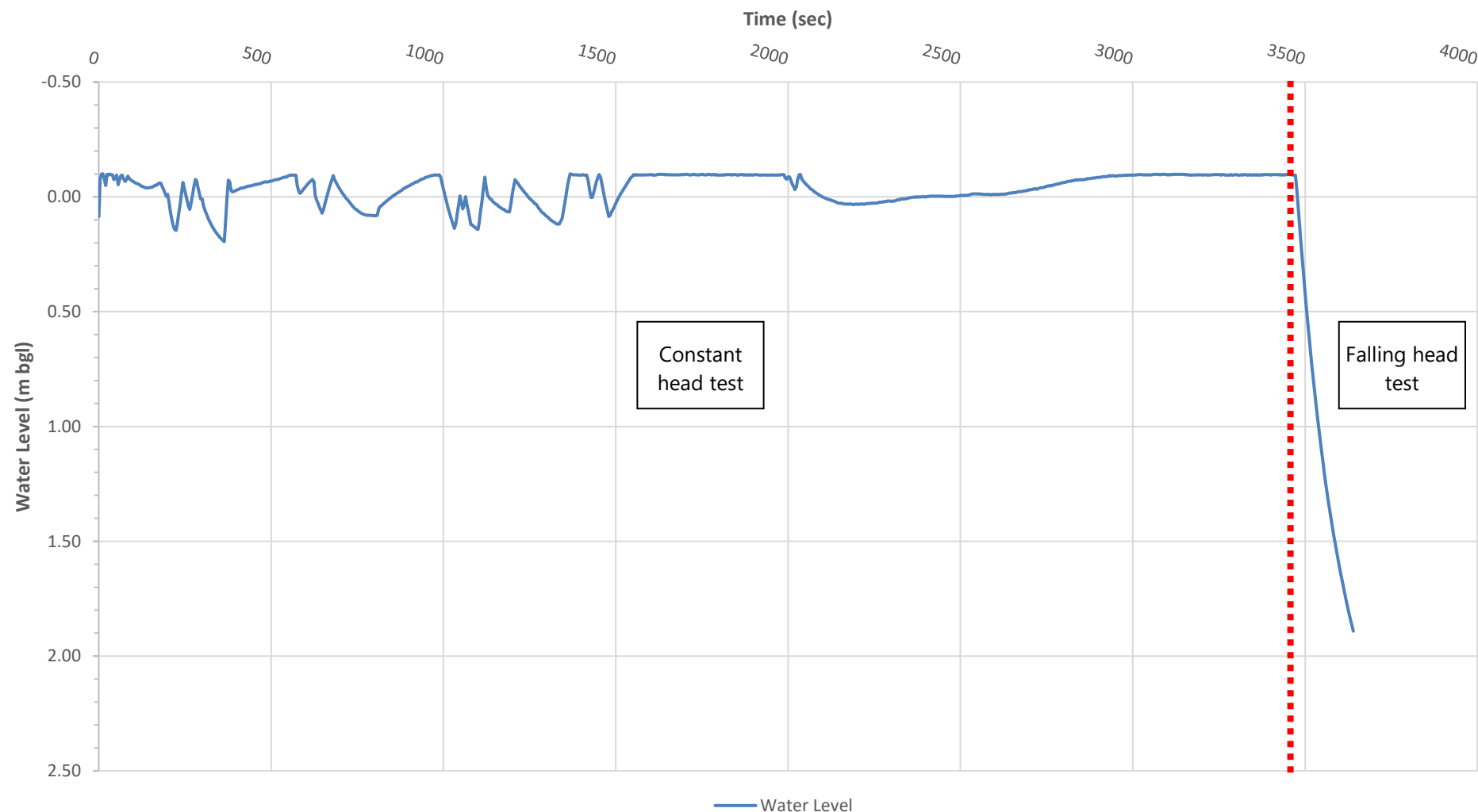
Client:	Eliot Sinclair & Partners	Bore No.:	BH005
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 28/09/2021





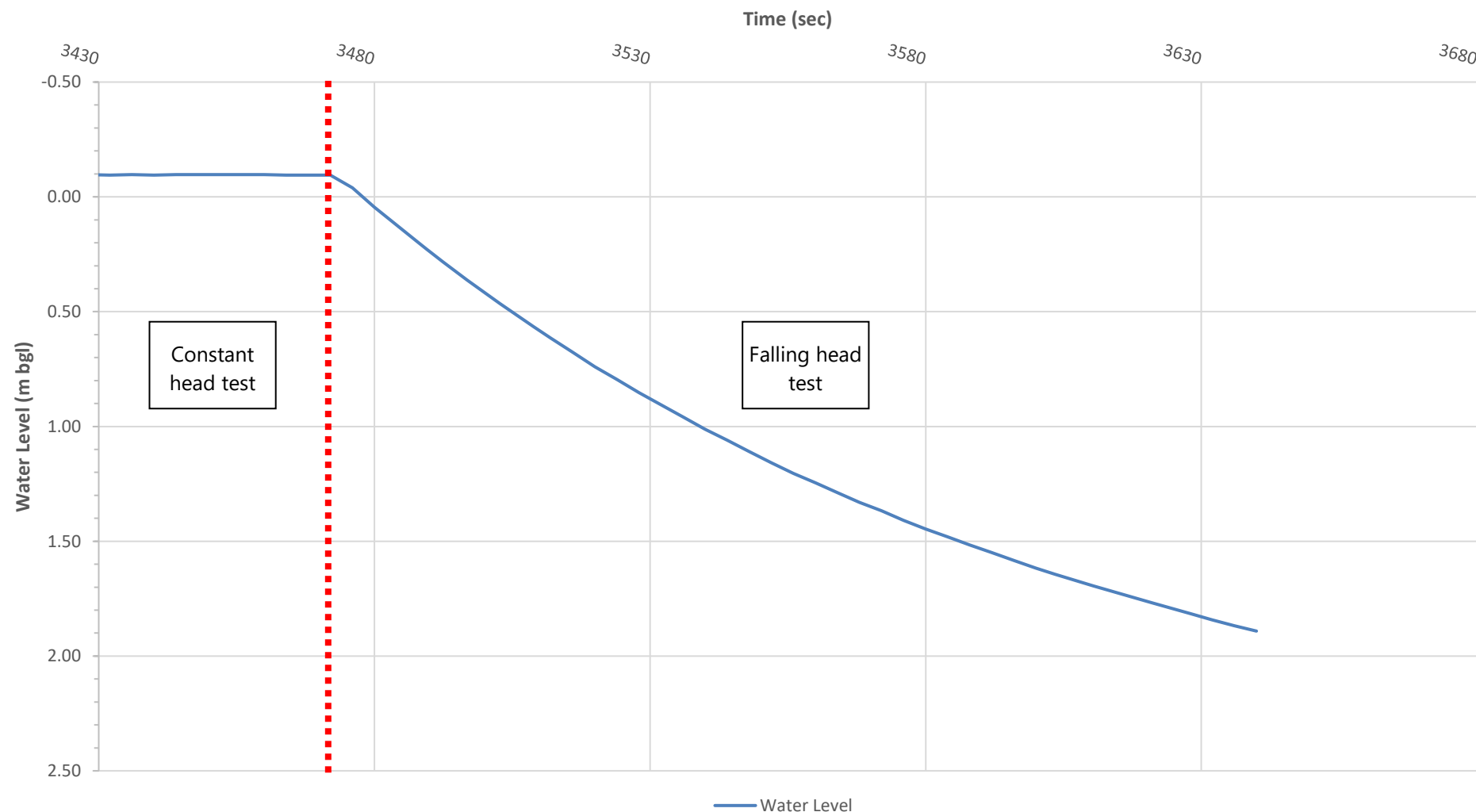
Client:	Eliot Sinclair & Partners	Bore No.:	BH005
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 28/09/2021



McMILLAN Drilling	Client:	Eliot Sinclair & Partners	Bore No.:	BH006
	Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Site Location: Memorial Avenue - Russley Road, Christchurch

Start date: 28/09/2021 14:34:17

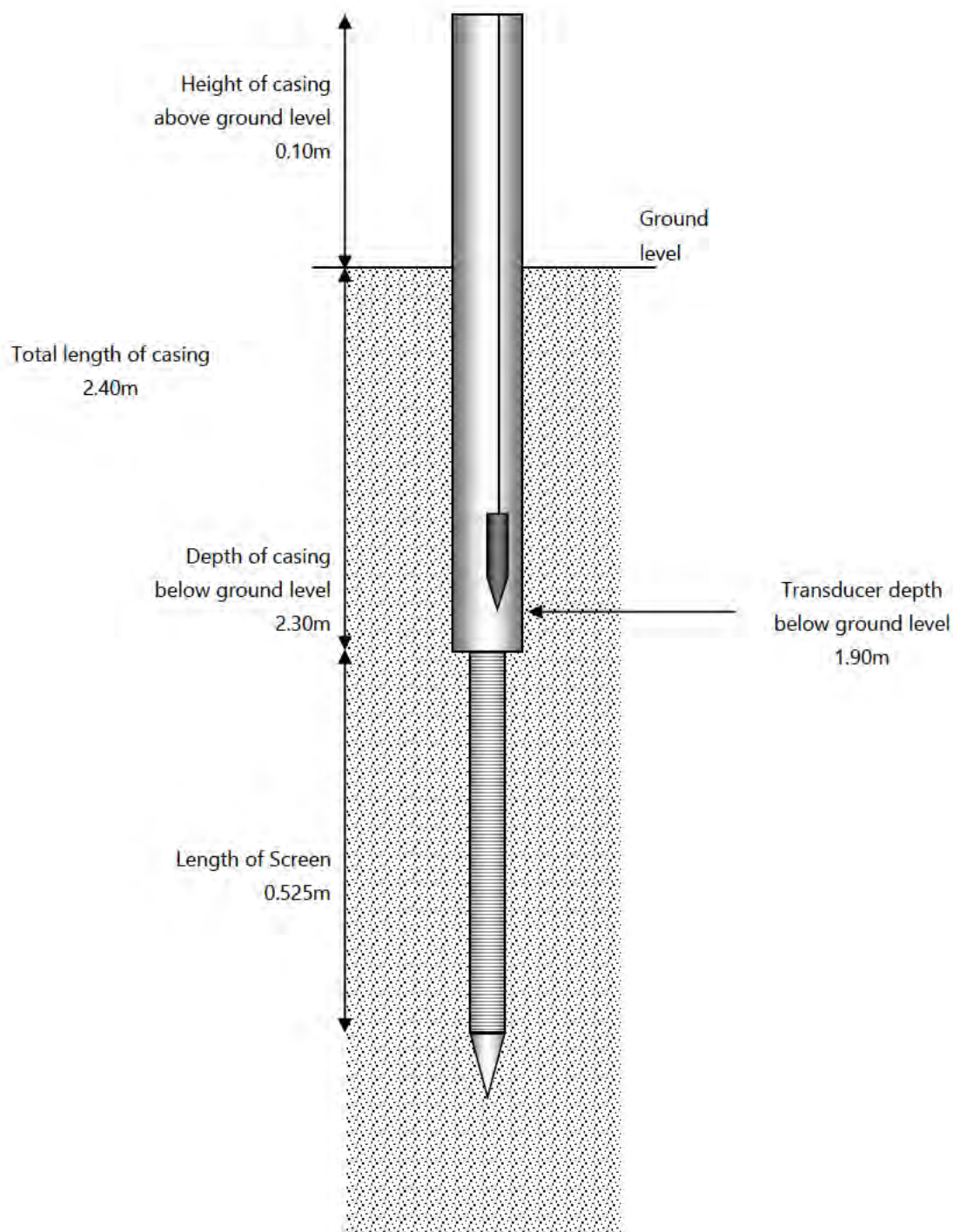
Casing size: 90mm OD; 76mm ID

Finish date: 28/09/2021 15:36:13

Screen size: diameter = 55mm; slots size = 0.5mm; slots spacing = 2mm

Water added: 950.60l

Test Set Up





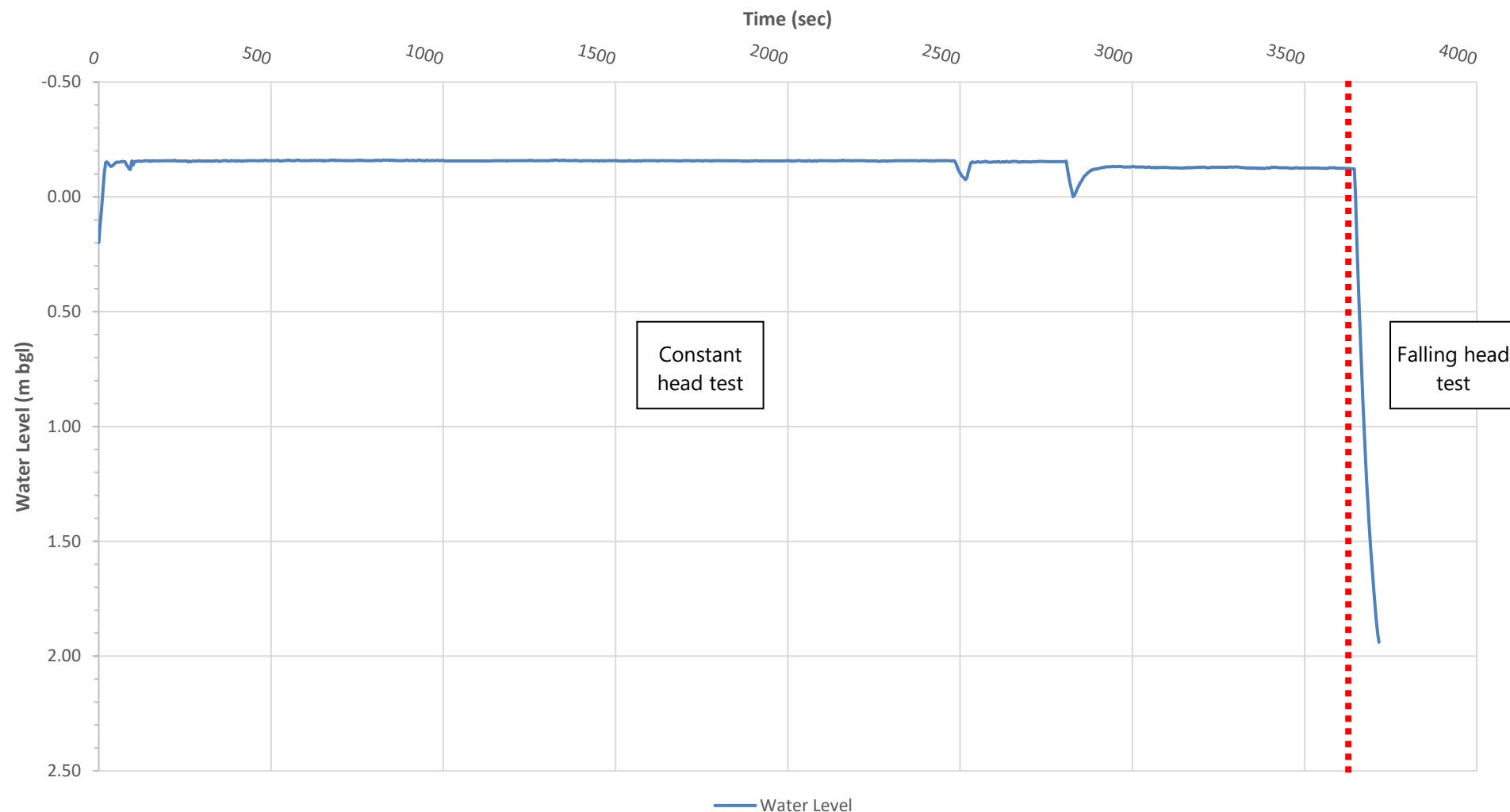
Client:	Eliot Sinclair & Partners	Bore No.:	BH006
Project:	Memorial Avenue - Russley Road, Christchurch	Job No.:	20262

Constant / Falling head test

Casing depth: 2.30m bgl

Sensor depth: 1.90m bgl

Date: 28/09/2021

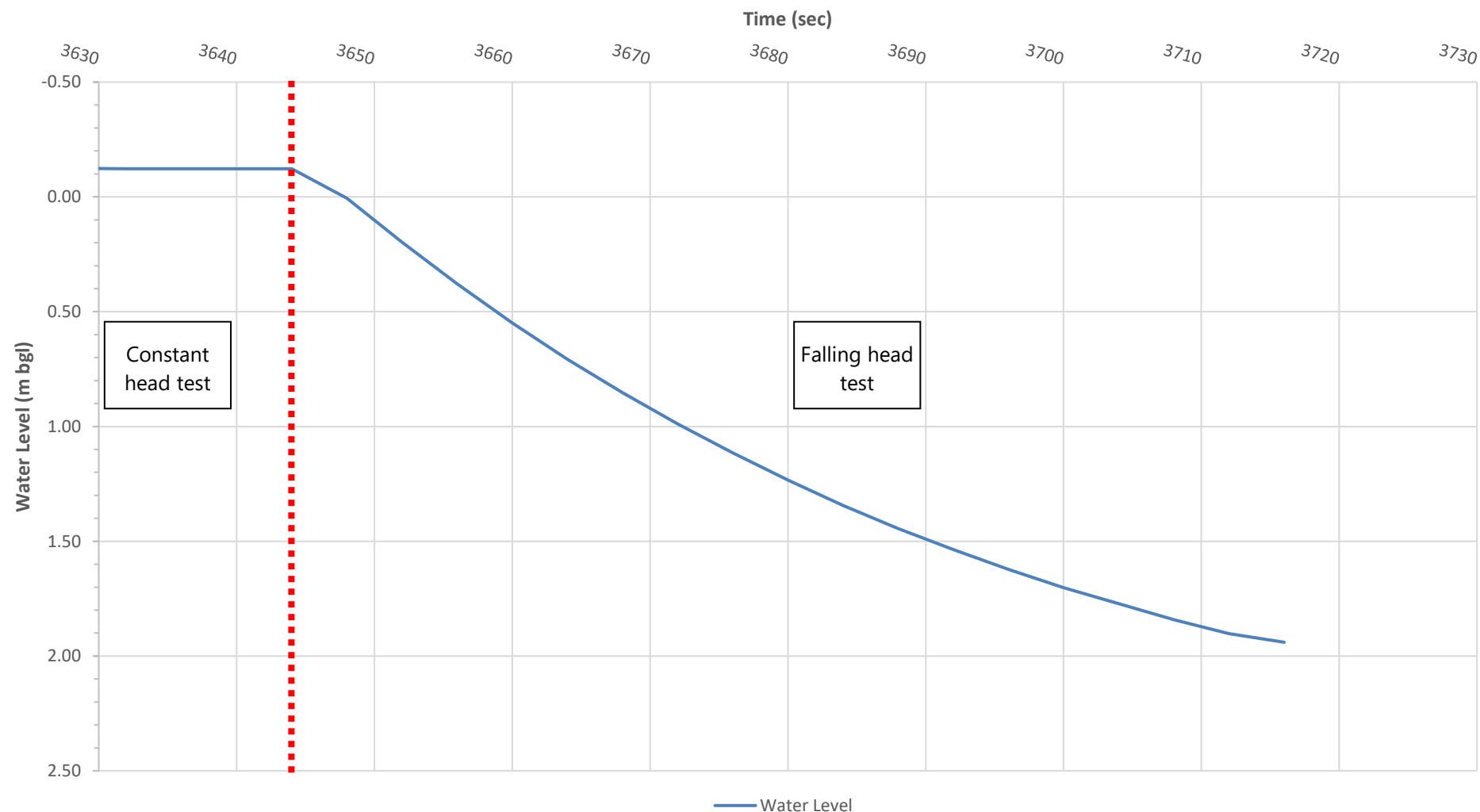


**Client:**

Eliot Sinclair & Partners

Bore No.:**BH006****Project:**

Memorial Avenue - Russley Road, Christchurch

Job No.:**20262****Constant / Falling head test****Casing depth:** 2.30m bgl**Sensor depth:** 1.90m bgl**Date:** 28/09/2021

11 March 2022

Our reference: 501827

Addendum to Hydrogeology Assessment at Memorial Avenue

1. Introduction and background

Eliot Sinclair completed an infiltration assessment relating to stormwater disposal to ground at the site on the corner of Memorial Avenue and Russley Road, Christchurch. The site is proposed for development of a vehicle sales and service area and will comprise a number of buildings and road connections across the site. Stormwater is currently proposed to be disposed of into ground through a number of soakage pits at the site.

As part of the investigation, a neighbouring bore (M35/9188) was identified as being potentially affected by stormwater discharge as this is a shallow bore which abstracts water from the unconfined aquifer which the stormwater is also proposed to discharge to. This letter is to outline the risk to that bore and proposed mitigating steps.

2. Site Environment

Bore M35/9188 is located approximately 50 m from the southern and western boundary of the development site in the location shown in Figure 1. The well is screened between 22.5 and 24 m bgl within the unconfined Riccarton gravels. The well is listed as being for domestic supply. There is no consent associated with the water take. A step test undertaken on the well in 2002 indicated that the maximum yield from the well is in the order of 0.5 l/s, with a maximum drawdown of 1 m.

Groundwater has been monitored at the site and ranges between 7.5 and 7.8 m below ground level. The groundwater flow direction is in a generally south east direction.



Figure 1. Location of neighbouring bore

3. Well Protection Zone

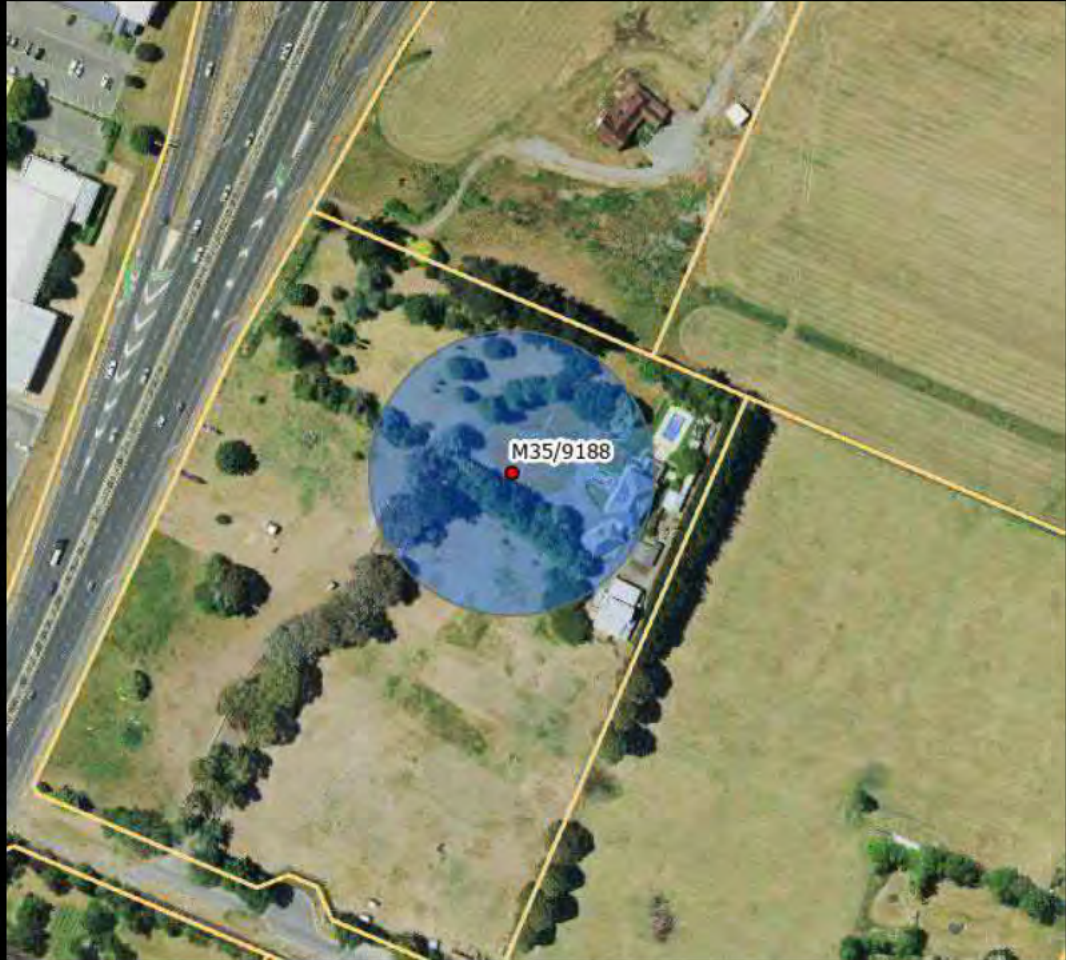


Figure 2. 50 buffer zone around well



Figure 3. 100 m buffer zone around well. Area in orange is the part of the 100 m buffer which extends into the development lots.

4. Conclusions and Recommendations

Yours sincerely

A handwritten signature in black ink, appearing to read 'Eliot Sinclair', written over a white rectangular background.

s.9(2)(a)

14-Mar-2022

Warren Haynes
Eliot Sinclair
20 Troup Drive
Addington
Christchurch 8149

Dear Warren,

Proposed subdivision – 400 Russley Road, Avonhead, Christchurch

I refer to your email/letter and your request for a letter to confirm there is capacity on the Orion network to service the electrical needs of your proposed subdivision. This letter is not suitable for 224 clearance purposes.

I confirm:

1. Orion has the capacity on the network to meet your request.
2. There are no specific connections available for this subdivision however:
 - a. A connection can be made available for the proposed commercial/industrial subdivision subject to alteration to the Orion network; and
 - b. It is likely Orion will need to either upgrade existing network or lay new cables to create these connections. We recommend the developer engages an authorised Orion subdivision designer to help you through this process and submit a suitable design proposal so that your development may connect to the Orion network.
 - c. There will be costs associated in providing the connection(s). The costs payable will be in accordance with the Orion [*extensions and connections or subdivision*] policy and will be the responsibility of the property owner.
 - d. The next step will be to engage an authorised Orion subdivision designer.
3. Orion will request an easement in gross for all over boundary existing network not currently secured by way of easement at the developers cost prior to the issuing 224 clearance.
4. To comply with Orion's network security conditions an alternative feed from adjoining developments will also be required. There must be a HV tie through the proposed subdivision to Orion's existing network in Avonhead Road.

5. All proposed new structures near or under existing overhead lines (eg house, sheds, carports, garages or any other structures) must comply with the distances stated in the New Zealand Electrical Code of Practice for Electrical Safe Distances 2001 (NZECP34:2001).
6. **IMPORTANT:** This Capacity Letter will expire upon the earlier of the date upon which a connection for each of the lots for the development has been approved and livened or 6 months from the date of this letter in the case of a residential/rural subdivisions or, 12 months in the case of a commercial/industrial subdivision.

All terms and conditions will be subject to current Orion policies and practices.

Please don't hesitate to contact the writer should you have any questions.

Yours faithfully

A handwritten signature in blue ink, appearing to read 'Paul Golding', with a large circular flourish at the end.

Paul Golding
Contract Manager (Connections)



Cameron Mars

From: Rob Armstrong <s 9(2)(a)>
Sent: Friday, 1 April 2022 1:17 pm
To: Cameron Mars
Cc: Simon Forrest; Bruce Crumpton
Subject: FW: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

[EXTERNAL EMAIL – CAUTION: This email originated from outside of Eliot Sinclair, please check the FROM address to ensure the source is trusted. If you’re unsure, please check with Helpdesk]

Cameron

See note from Bruce below re the trench route

Enable can service this development but will require the trenching back to our chamber shown below at 500 Avonhead Rd and normal Greenfield fees and a charge for the materials and labour for the extension

Is this all you require at this stage for consenting?

Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
enable.net.nz



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Save a tree. Please think before printing this email.

From: Bruce Crumpton s 9(2)(a)
Sent: Friday, 1 April 2022 1:00 pm
To: Rob Armstrong s 9(2)(a)
Cc: Simon Forrest s 9(2)(a) ; Cameron Mars s 9(2)(a) ; Phil McClintock s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

Hi Rob
To feed this development we will be looking to extend a couple of multi ducts (1x7way & 1x24way) from our chamber MHL0298 near 500 Avonhead Rd.
Its preferable to be in the berm (for ease of access) but not if we can trench share in the road it would be okay.
However we would need we would need transition into the chamber .





Bruce Crumpton
Delivery Specialist | Enable Networks Limited
enable.net.nz



Our city of possibilities.
100% owned by the people
of Christchurch.



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From: Rob Armstrong s 9(2)(a)
Sent: Friday, 1 April 2022 10:08 am
To: Bruce Crumpton s 9(2)(a)
Cc: Simon Forrest s 9(2)(a) ; Cameron Mars s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

Bruce

For the 120 metre network extension can we utilise the water trench in the road rather than the berm?

Is this acceptable architecture for us?

Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
enable.net.nz



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From: Cameron Mars s 9(2)(a)
Sent: Friday, 1 April 2022 9:39 am
To: Rob Armstrong s 9(2)(a)
Cc: Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Hi Rob,

The water supply main will be run around 2-2.5 m off the kerb in the road (Council requires the mains to be within the carriageway rather than the berm). I would be highly unlikely for Council to agree to the main being with the berm.

Thanks



Cameron Mars

3 WATERS ENGINEER

BE(Hons) Environ CMEngNZ IntPE(NZ) CPEng

s 9(2)(a)

s 9(2)(a)

eliotsinclair.co.nz

Christchurch | Rangiora | Wānaka

Queenstown | Hokitika | Nelson



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From: Rob Armstrong s 9(2)(a)
Sent: Friday, 1 April 2022 9:24 am
To: Cameron Mars s 9(2)(a)
Cc: Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Cameron

If you look at the snip below there is a 120 metre network extension in this portion shown that would need to be priced when you are closer to the development happening

If the water supply trench is used the there is a significant saving in cost from our contractor

Do I understand it to be in the berm (or is the water our in the road carriage?)

I suspect the extension, if trench provided, will be around \$10K

On that basis I can provide a letter stating we can service

Can you come back and let me know your thoughts please?



Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
enable.net.nz



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Save a tree. Please think before printing this email.

From: Cameron Mars s 9(2)(a)
Sent: Thursday, 31 March 2022 11:58 am
To: Rob Armstrong s 9(2)(a)
Cc: Simon Forrest s 9(2)(a)
Subject: FW: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Hi Rob,

Simon in his email below has just confirmed my plan provided is correct and the water supply main will run 2-2.5 m off the kerb face/edge of seal.

Thanks

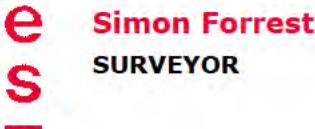


Cameron Mars
3 WATERS ENGINEER
BE(Hons) Environ CMEngNZ IntPE(NZ) CPEng
s 9(2)(a) Christchurch | Rangiora | Wānaka
s 9(2)(a) Queenstown | Hokitika | Nelson
eliotsinclair.co.nz  

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From: Simon Forrest s 9(2)(a)
Sent: Thursday, 31 March 2022 11:55 am
To: Cameron Mars s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

Yellow line is correct, will run 2 – 2.5m off the kerb face / edge of seal



Shape tomorrow

From: Cameron Mars s 9(2)(a)
Sent: Thursday, 31 March 2022 11:45 am
To: Rob Armstrong s 9(2)(a)
Cc: Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

Hi Rob,

There's been no engineering design carried out and I'm not sure at what point the new main will be brought across Avonhead Road (e.g. it may be brought across directly from the Hawthornden Intersection as I've shown below, just not sure yet).
Yellow line below shows the possible route.

Thanks



e
s
-

Cameron Mars
3 WATERS ENGINEER

Shape
tomorrow

From: Rob Armstrong s 9(2)(a)
Sent: Thursday, 31 March 2022 11:30 am
To: Cameron Mars s 9(2)(a)
Cc: Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Cameron

Can you show me a plan of the proposed route please on the northern side?

Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
enable.net.nz



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From: Cameron Mars s 9(2)(a)
Sent: Thursday, 31 March 2022 11:10 am
To: Rob Armstrong s 9(2)(a)
Cc: Simon Forrest s 9(2)(a)
Subject: FW: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Hi Rob,

Just an update on my comments below. I made an error; the existing Council water pipes are on the southern side of Avonhead Road. However, its our intention (assuming Council approves) to run the new water main on the northern side of Avonhead Road.

Thanks



Cameron Mars
3 WATERS ENGINEER
BE(Hons) Environ CMEngNZ IntPE(NZ) CPEng
s 9(2)(a)
s 9(2)(a)
eliotsinclair.co.nz

Christchurch | Rangiora | Wānaka
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From: Cameron Mars
Sent: Wednesday, 30 March 2022 3:17 pm
To: Rob Armstrong s 9(2)(a); Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

Hi Rob,

Yes, we need to upgrade the water supply main from the Hawthornden Road/Avonhead Road intersection up to the development entrance off Avonhead Road. This new water supply main will be run on the southern side Avonhead Road (replacing the existing in this location).

Thanks

From: Rob Armstrong s 9(2)(a)
Sent: Wednesday, 30 March 2022 2:43 pm
To: Cameron Mars s 9(2)(a); Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Cameron

Will any other services need to be trenched in the blue circle below?



Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
enable.net.nz



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From: Cameron Mars s 9(2)(a)
Sent: Wednesday, 30 March 2022 1:29 pm

To: Rob Armstrong s 9(2)(a) ; Simon Forrest s 9(2)(a)
Subject: RE: [#501827] GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Hi Rob,

No issues with regards to the road through Lot 4, the road is going to be a services easement and during the construction of Lots 1, 2 and 3 we need to bring water and wastewater services up from Avonhead Road (I'm not sure about power yet), so you'd be able to bring coms up.
Timing wise, they're aiming for this construction season (end of 2022). We will be lodging subdivision consent shortly (end of the month).

Thanks



Cameron Mars
3 WATERS ENGINEER
BE(Hons) Environ CMEngNZ IntPE(NZ) CPEng
s 9(2)(a) Christchurch | Rangiora | Wānaka
s 9(2)(a) Queenstown | Hokitika | Nelson
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From: Rob Armstrong s 9(2)(a)
Sent: Wednesday, 30 March 2022 12:52 pm
To: Cameron Mars s 9(2)(a) ; Simon Forrest s 9(2)(a)
Subject: FW: GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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Cameron, Simon

Two questions re the development

You will see that we are creating a path for a network extn to feed into the development (below) but Avonhead road is our preferred target

What is the chance that the road through lot 4 would be built in time to reach lots 1,2,3? (or any other service via the lot 4 road)?

Secondly, what timing is likely for first service required by?

thanks

Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
enable.net.nz



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From: Rob Armstrong s 9(2)(a)
Sent: Wednesday, 30 March 2022 12:41 pm
To: Bruce Crumpton s 9(2)(a)
Cc: Lee Jansen s 9(2)(a); Paul Boeyen s 9(2)(a)
Subject: RE: GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

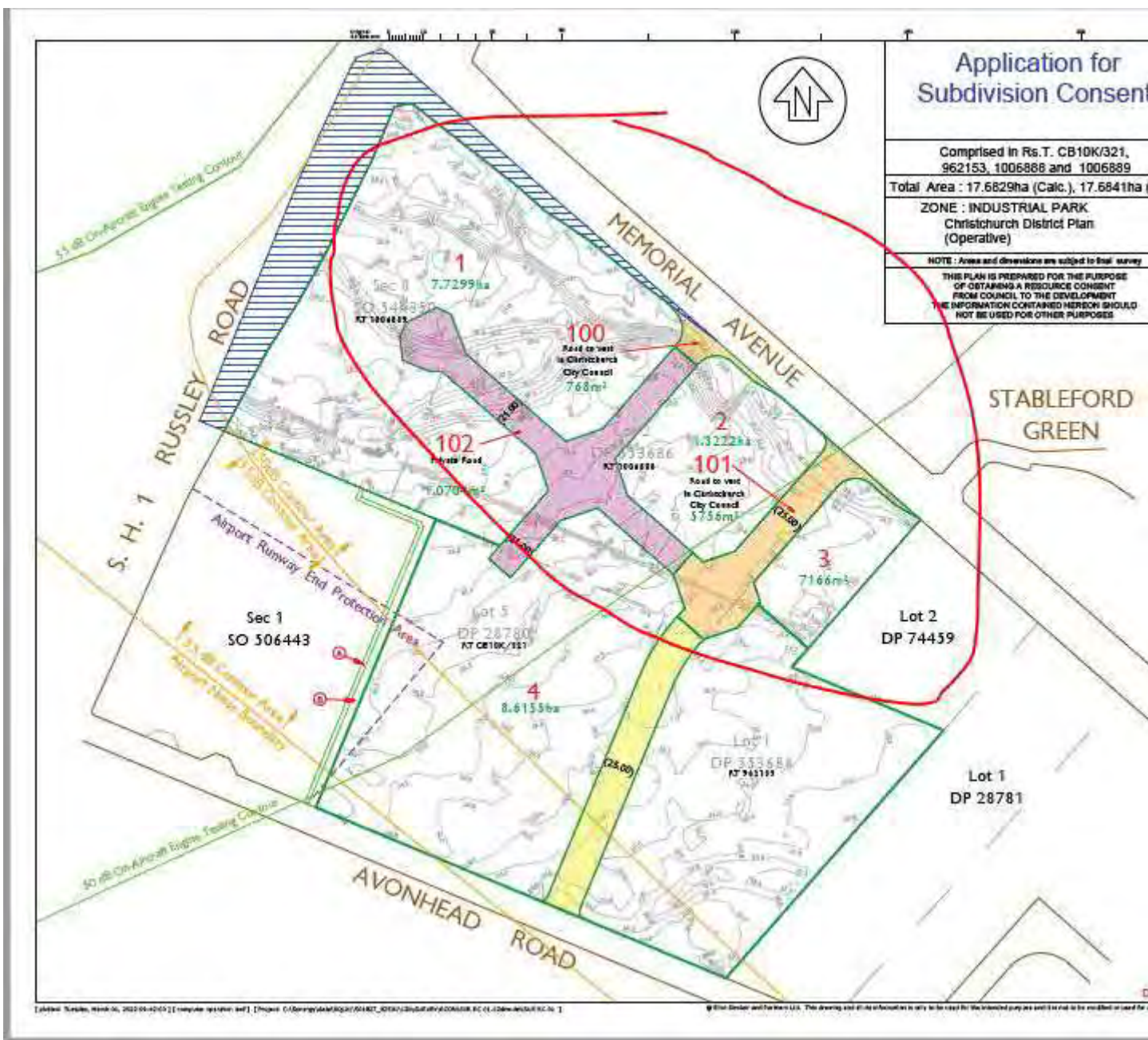
Hi Bruce

Thanks for the feasibility

They have stated that lots 1,2,3 are to be subdivided first but you have shown a NE as coming off Avonhead Road, (meaning coming through lot 4)

Is this our only option or can we come through via Memorial?

PS The area in the NE is within coverage so I am assuming this is termed as augmentation as far as a Business case is concerned? (Lee may want to answer this)





Rob Armstrong
Business Development Manager | Enable Networks Limited
M s 9(2)(a)
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From: Enable Fibre Broadband s 9(2)(a)
Sent: Wednesday, 30 March 2022 11:56 am
To: Rob Armstrong s 9(2)(a)
Subject: Re: GF FEASIBILITY Cnr Memorial Ave and Russley Rd FN1085

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##- Please type your reply above this line -##

Bruce Crumpton (Internal Support)

Mar 30, 2022, 11:56 GMT+13

Private note

Hi Rob,

Yes we can serve this but it will require ...

1. A 120m network extension along Avonhead Road to reach the entrance of the development
2. The installation of a new Ericsson Cabinet (PA784) Inside the development (along with its associated ducts)
3. The installation of 1200m of 144f cable to feed the new cabinet.
4. Re-grouping & outage of existing cabinet (PA690) feeder cable onto PA686 group to free up fibre for the new cabinet

Refer attached PDFs for sketches of the proposed NE & On-property works.

.....

Attachment(s)
[PA784 NetworkExtension LayPlan v1.pdf](#)
[PA784 MemorialAve Avonhead LayPlan-v1.pdf](#)

.....

Rob Armstrong (Internal Support)

Feb 22, 2022, 10:08 GMT+13

Private note

Armando

can we service this area of 18 units/ complexes

Can come off either Memorial or Avonhead Roads

There will be a minimum of 18 connections, there could potentially be multiple tenants within the areas.
At this point the only confirmed areas are the buildings around the corner of Russley Rd and Memorial Ave.

Yes, you can come off either Memorial Ave or Avonhead Rd, the area shown as lot 102 will become a formed road in stage 2, it will be used for the purpose of services for stage 1.

and a traffic light controller at red x

Cameron Mars

From: McDonald, Michele s 9(2)(a)
Sent: Wednesday, 13 October 2021 8:29 am
To: Julian, Ross; Mark Thomson
Cc: Simon Crundwell; Cameron Mars; Warren Haynes
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

[EXTERNAL EMAIL]

Dear All

Yes it is.

Regards

Michele McDonald
Team Leader Asset Planning WWW
Asset Planning - Water & Wastewater

 s 9(2)(a) 
s 9(2)(a) 
Te Hononga Civic Offices, 53 Hereford Street, Christchurch
 PO Box 73014, Christchurch 8154
ccc.govt.nz

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City Council 

From: Julian, Ross s 9(2)(a)
Sent: Monday, 11 October 2021 12:48 pm
To: Mark Thomson s 9(2)(a) McDonald, Michele s 9(2)(a)
Cc: Simon Crundwell s 9(2)(a) Cameron Mars s 9(2)(a) Warren Haynes
s 9(2)(a) >
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Hi Mark,
Yes that is my understanding.
Michele is probably best placed to confirm that one for you.
Cheers, Ross.

Ross Julian

Project Manager
Three Waters & Waste



s 9(2)(a)

s 9(2)(a)



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PO Box 73014, Christchurch 8154



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City Council



From: Mark Thomson s 9(2)(a)
Sent: Monday, 11 October 2021 12:26 PM
To: Julian, Ross s 9(2)(a) McDonald, Michele s 9(2)(a) >
Cc: Simon Crundwell s 9(2)(a) Cameron Mars s 9(2)(a); Warren Haynes s 9(2)(a)
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Hi Ross

Thanks for that, much appreciated.

To confirm – is that the last section of the Avonhead Road sewer physical works?

Regards
Mark

Mark Thomson

CIVIL ENGINEER

BE (Hons) Civil MEngNZ

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From: Julian, Ross s 9(2)(a) >
Sent: Monday, 11 October 2021 8:54 a.m.
To: McDonald, Michele s 9(2)(a) Mark Thomson s 9(2)(a)

Cc: Simon Crundwell <s 9(2)(a)>; Cameron Mars <s 9(2)(a)> Warren Haynes
s 9(2)(a)
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

[EXTERNAL EMAIL]

Morning Mark,
With regards to the Avonhead Road sewer:
Yes the tender process has now been completed for the third stage (Kingham Place down to the bend in the road by Burnside Park).
We are just in the process of signing the contract with the successful contractor.
The intention is that construction will start in January 2022, after the Christmas holidays.
Construction should be complete by around June 2022.
These timings could change slightly, but should give you a fair idea of the situation.
Thanks, Ross.

Ross Julian
Project Manager
Three Waters & Waste

 s 9(2)(a) 7
 s 9(2)(a)
Te Hononga Civic Offices, 53 Hereford Street, Christchurch
PO Box 73014, Christchurch 8154
 ccc.govt.nz



From: McDonald, Michele <s 9(2)(a)>
Sent: Friday, 8 October 2021 2:34 PM
To: 'Mark Thomson' <s 9(2)(a)> Julian, Ross <s 9(2)(a)>
Cc: Simon Crundwell <s 9(2)(a)> Cameron Mars <s 9(2)(a)> Warren Haynes
s 9(2)(a)
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Dear Mark
The project manager is Ross Julian and will ask him to respond to your question.

Regards

Michele McDonald
Team Leader Asset Planning WWW
Asset Planning - Water & Wastewater


s 9(2)(a) 
 s 9(2)(a) 
 Te Hononga Civic Offices, 53 Hereford Street, Christchurch
 PO Box 73014, Christchurch 8154
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From: Mark Thomson s 9(2)(a) 
Sent: Friday, 8 October 2021 12:03 pm
To: McDonald, Michele s 9(2)(a) 
Cc: Simon Crundwell s 9(2)(a)  ; Cameron Mars s 9(2)(a)  ; Warren Haynes s 9(2)(a) 
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Hi Michele

Further to the below and my phone message just now, are you in a position to advise on construction timing for the Avonhead Road sewer (assuming that the tender process is completed)?

Thanks and regards



Mark Thomson
CIVIL ENGINEER
BE (Hons) Civil MEngNZ
s 9(2)(a)  Christchurch | Rangiora
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From: McDonald, Michele s 9(2)(a) 
Sent: Friday, 30 July 2021 2:59 p.m.
To: Simon Crundwell s 9(2)(a) 
Cc: Mark Thomson s 9(2)(a) 
Subject: RE: [#501827] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

[EXTERNAL EMAIL]

Dear Simon – this work is at design stage. Please however note that the District Plan does provide for ‘some’ discharge to be received i.e. before the Upper Riccarton project is complete. We are close to tendering on the Avonhead sewer upgrade. In my opinion, there is enough progress on both projects to allow the development to proceed – the resource consent application will have to request a deviation from the District Plan, if needed....

Regards

Michele McDonald
Team Leader Asset Planning WWW
Asset Planning - Water & Wastewater

 s 9(2)(a)
 s 9(2)(a)
Te Hononga Civic Offices, 53 Hereford Street, Christchurch
 PO Box 73014, Christchurch 8154
ccc.govt.nz



From: Simon Crundwell s 9(2)(a)
Sent: Friday, 30 July 2021 1:01 pm
To: McDonald, Michele s 9(2)(a)
Cc: Mark Thomson s 9(2)(a)
Subject: RE: [#438081] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Hi Michele,

I am relooking at this development. Could you please provide an update on the programmed construction timeframes for the Upper Riccarton Interceptor (if not already completed)?

Regards

Simon Crundwell
CIVIL ENGINEER
BE(Hons) Civil



s 9(2)(a)
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From: Mark Thomson
Sent: Tuesday, 17 March 2020 12:41 pm
To: 'McDonald, Michele' <s 9(2)(a)>
Cc: Warren Haynes s 9(2)(a) >
Subject: RE: [#438081] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Thanks Michele, much appreciated

Regards
Mark

From: McDonald, Michele s 9(2)(a)
Sent: Monday, 16 March 2020 2:14 p.m.
To: Mark Thomson s 9(2)(a)
Cc: Warren Haynes s 9(2)(a) >
Subject: RE: [#438081] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme

Dear Mark – the following update:

Avonhead Road Sewer – Stage 1 link has been built and Stage 2 of upgrade is 95% complete (up to Kingham Place). Stage 3 (final) will be tendered in next few months – funding cash flow is up to FY2022 (June 2022) but once tendered, there is a high likelihood that the construction will be finished in next year.

Upper Riccarton – Design is underway. Funding allocated up to FY2023 for completion.

Regards

Michele McDonald
Team Leader Asset Planning WWW
Asset Planning -Water & Wastewater

s 9(2)(a) 
s 9(2)(a) 
 Te Hononga Civic Offices, 53 Hereford Street, Christchurch
 PO Box 73014, Christchurch 8154
 ccc.govt.nz



From: Mark Thomson s 9(2)(a)
Sent: Friday, 13 March 2020 9:14 a.m.
To: McDonald, Michele s 9(2)(a)
Cc: Warren Haynes s 9(2)(a)
Subject: [#438081] Memorial Ave Investments Ltd (Cr. Memorial/Russley/Avonhead) - downstream sewer upgrade works programme
Importance: High

Dear Michele

We have previously spoken about the Avonhead Road and Riccarton Interceptor sewer upgrade works referenced by rule 16.6.6.2.6 of the District Plan.

Can you please confirm current programmed construction timeframes for the Upper Riccarton Interceptor and the Avonhead Road sewer? Last we spoke in mid-2019 these were FY22/23 & FY21/11, respectively.

I have also just left a message on your phone as well.

Thanks and regards
Mark Thomson BE Civil (Hons) MEngNZ
Civil Engineer

Eliot Sinclair

surveying | engineering | planning | landscape architecture | urban design

s 9(2)(a) | 20 Troup Drive, Tower Junction | PO Box 9339, Christchurch 8149 | www.eliotstinclair.com

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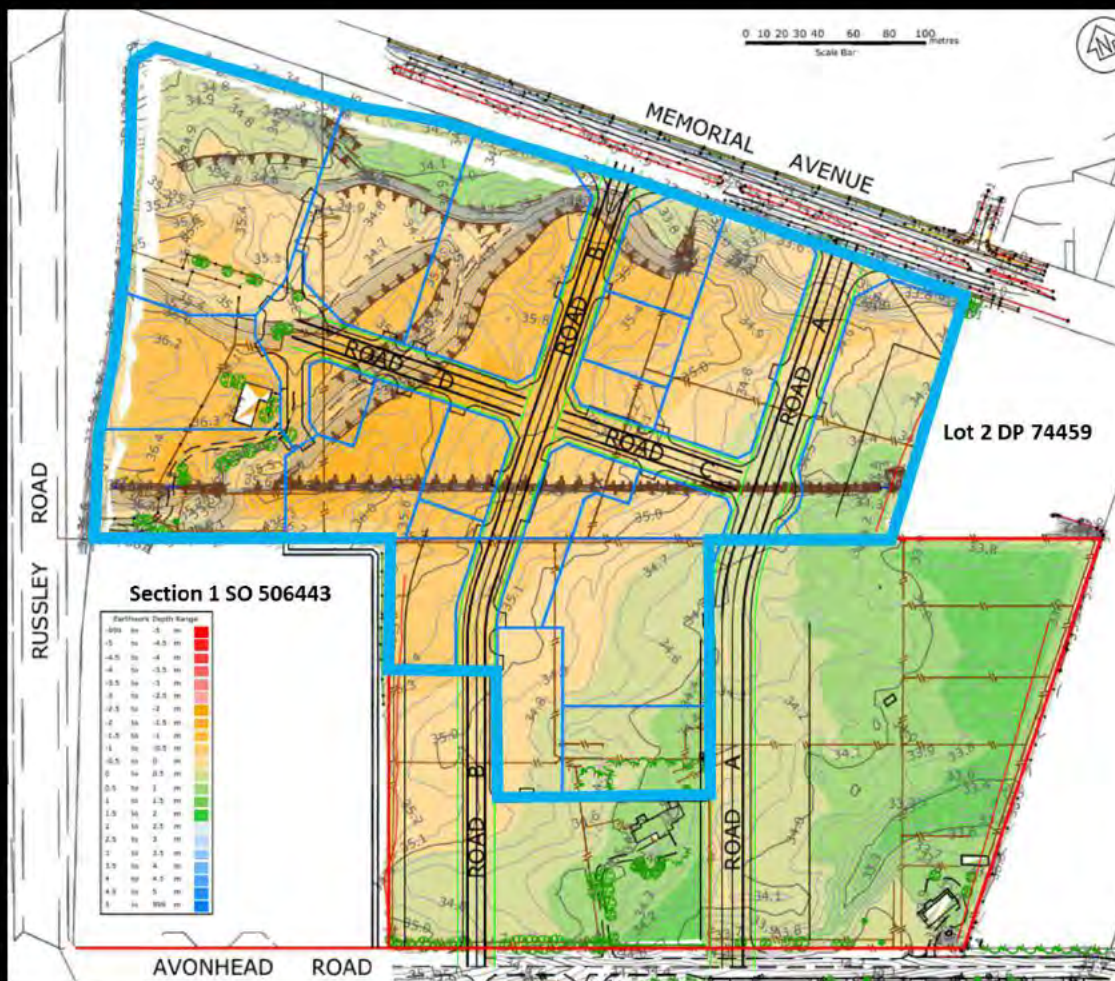
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Stormwater Meeting Minutes



Stormwater Meeting Minutes



Cameron Mars

From: Cameron Mars
Sent: Wednesday, 17 November 2021 11:58 a.m.
To: Brian Norton
Cc: Mark Thomson
Subject: [#501827] Miles Memorial Ave Development Stormwater Meeting Minutes

Hi Brian,

Thanks for meeting with myself and Mark yesterday to discuss the Miles block stormwater.

As the meeting was only 10 minutes, I just thought I'd cover of the minutes via this email to save on paper work. If you've got any additions or comments re the minutes please just sing out.

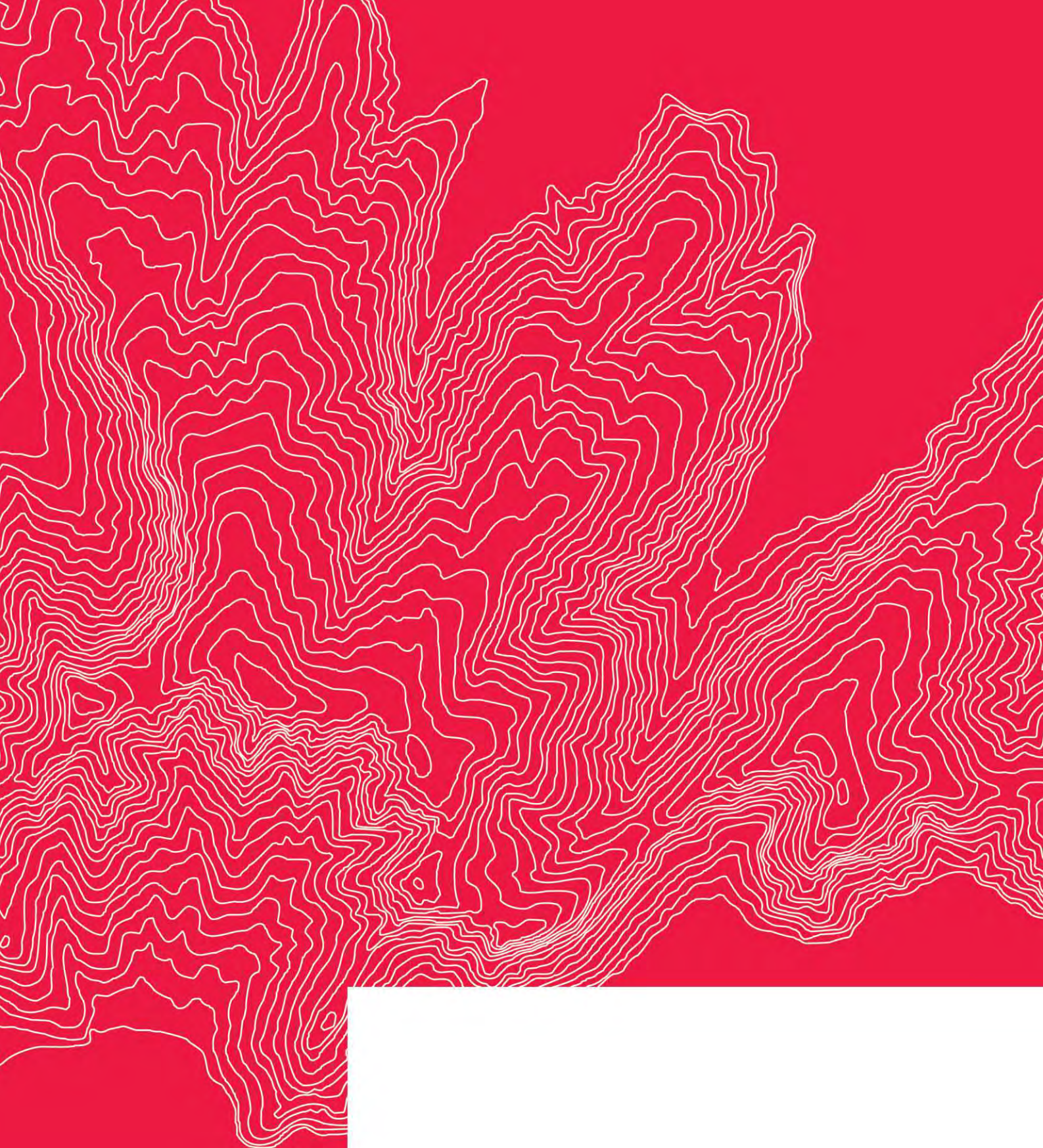
Meeting Time: 1pm

Date: 16 Nov 2021

Attendees: Brian Norton, Cam Mars, Mark Thomson

1. The site has been split into Stage 1 (northern half of site with frontage to Memorial Ave) & Stage 2 (southern part of site with frontage to Avonhead Road).
2. No change to Stage 1 as per previous discussions. Main road running between Memorial Ave and Avonhead Road will be vested and remaining Stage 1 area to remain in private ownership with onsite stormwater treatment and disposal.
3. Stage 2 could potentially be broken up and sold but what may happen with this land area is very much an unknown.
4. The main road to be vested will still have two rain gardens and soakage pits (one at either end), these would ideally be within the road reserve.
5. There is no Council requirement for a Stormwater Management Area (soakage basin) servicing the full Stage 2 area at this stage (e.g. during the design of Stage 1, the Stage 2 area stormwater requirements don't need to be considered as the land will remain as pasture). It was agreed that as there is too much of an unknown with the Stage 2 zone, the stormwater design within this area can be reviewed and designed at a later date.

Thanks



Erosion Sediment and Dust Management Plan



Memorial Avenue Industrial Park
Prepared for Miles Premises Limited
501827

Erosion Sediment and Dust Management Plan

Memorial Avenue Industrial Park

Prepared for Miles Premises Limited

501827

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
Prepared by:	Joshua Purdon Civil Engineer BE (Hons) Civil s 9(2)(a)		4 April 2022
Reviewed by:	Cameron Mars 3 Waters Engineer BE(Hons) Environ CMEngNZ CPEng s 9(2)(a)		20 April 2022
Directed and approved for release by:	Cameron Mars 3 Waters Engineer BE(Hons) Environ CMEngNZ CPEng s 9(2)(a)		20 April 2022
Status:	Draft		
Release date:	20 April 2022		
Reference no:	501827		
Distributed to:	Miles Premises Limited Christchurch City Council Canterbury Regional Council		

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Appendix A. Engineering Drawings

Appendix B. Resource Consent Documents

Appendix C. Programme of Works and Schedule

Appendix D. Sample ESDM Monitoring Sheet

1. Introduction

This Erosion, Sediment and Dust Management Plan (ESDMP) has been prepared in accordance with the following documents:

- Subdivision Consent RMA/XXXX/XXX.
- Environment Canterbury (ECan) Resource Consents:
 - CRCXXXXXX: Construction Phase Stormwater Discharge Consent.
- ECan Erosion and Sediment Control Toolbox for Canterbury (2022).
- Ministry for the Environment Dust Guidelines (2001).

[SECTION TO BE UPDATED ONCE CONSENTS ARE GRANTED]

1.1. Project Scope

Eliot Sinclair and Partners (ESP) Limited have been engaged by Miles Premises Limited to prepare an ESDMP for the construction and earthworks associated with the Memorial Ave Industrial Park development located at 475 Memorial Avenue, 400 Russley Road and 500 & 520 Avonhead Road, Christchurch.

The purpose of this ESDMP is to provide the earthworks staging, methodology, extent, description and schedule/program of works. The ESDMP also details the necessary measures required to mitigate environmental issues associated with earthworks' activities, thereby minimising or preventing undue erosion and the risk of sediment laden stormwater discharges entering any drain or waterbody, protection of the surrounding environment from dust emissions and mitigating any other environmental issues that may arise during the construction works.

Appendix A provides the Erosion Sediment Control Plan (Drawing).

Should modifications of this plan be required due to unforeseen circumstances, this ESDMP must be updated and circulated to those responsible for implementing and monitoring the ESDMP. Any proposed changes affecting the overall construction or protection measures philosophy must be notified to the Engineer, ECan and Christchurch City Council (CCC) for any necessary approvals prior to the implementation of the changes.

The proposed erosion, sediment and dust management (ESDM) measures have been developed with reference to the ECan (2022) Erosion and Sediment Control Toolbox for Canterbury and the Ministry for the Environment (2001) Dust Guidelines.

The following documents are located within the Appendices:

Appendix A : Engineering Drawings

Appendix B : Resource Consent Documents

Appendix C : Programme of Works and Schedule

Appendix D : Sample ESDM Monitoring Sheet

1.2. Project Overview

The Miles Premises Limited development will ultimately establish an industrial park complex with one private road and two roads to be vested in Council. Generally, site earthworks will be restricted to the formation of carriageways, utility services and three waters installation, cut and fill earthworks for the site contouring and to provide an even development platform, and the installation of stormwater treatment and soakage pit facilities.

1.3. Resource Consents

1.3.1. Christchurch City Council

Subdivision Consent RMA/2022/XXXX has been issued for the site and Conditions XX to XX specifies erosion, sediment and dust management requirements.

1.3.2. Environment Canterbury

Resource Consents have been granted for the following:

- CRCXXXXXX for the discharge of construction phase stormwater into land.

1.3.3. Contractor Responsibilities

The Contractor is to read all consent documents and is to ensure adherence with the consent requirements at all times.

Appendix B contains the CCC and ECan Resource Consent documentation.

2. Site Description

2.1. Location

The site is located in western Christchurch and is bounded by Memorial Ave to the northeast, established residential and commercial Lots to the southeast, Avonhead Road to the southwest and Russley Road to the Northwest, as shown in Figure 1.



Figure 1. Site Location Plan

2.2. Topography

The site is mostly flat to gently undulating grassed paddocks. A disused stock water race extends from west to east across the mid-part of the site. There are three dwellings and various outbuildings located across the site.

2.3. Geology

The site topsoil has been extensively investigated and generally comprises of 0.25 m to 1.0 m thickness of silty topsoil overlying interbedded layers of river silts, sands, and sandy gravels to around 15 m below ground level (bgl). The average depth of topsoil was calculated to be 0.41 m.

2.4. Hydrogeology

Groundwater monitoring (onsite and nearby wells) indicates a seasonal groundwater fluctuation range between 7-10 m bgl.

Infiltration testing was carried out at 8 locations across the site, at a 3 m depth, and recorded rates ranging from 4 m/hour to 35 m/hour.

3. Proposed Works

3.1. Overview

Generally, site earthworks will be restricted to the formation of carriageways, utility services and three waters installation, cut and fill earthworks for site contouring and to provide an even development platform, and the installation of stormwater treatment and soakage pit facilities.

Lots 1 – 3, the private road and the collector road are proposed to be earthworked as part of Stage 1.

Lot 4 is for future development and it is not intended that earthworks will be required in this area, except for services installation in the easement corridor to Avonhead Road. However, it should be noted that there might be a requirement to place or use either subsoil or topsoil on Lot 4 during the Stage 1 earthworks; this will be dependent upon the earthworks consent, earthworks detailed design and the construction methodology.

Roads will be cut below the allotments and there will be a 1 in 7 batter from the road boundary up to the ground level inside the Lots.

Sections will drain to the roads at a minimum 1 in 500 grade.

All bulk filling will be compacted in accordance with NZS 4431:1989 and all fill testing will be carried out by an independent laboratory.

The total earthworks volume is approximately 141,000 m³.

Should there be excess top or subsoils these will be carted offsite and a temporary Traffic Management Plan will be required.

3.2. Construction Sequence

The methodology and timing of land disturbing activities must be such to minimise the potential for erosion, sediment and dust generation. The general construction sequence will be as follows:

- Pre-construction planning and site layout;

- Construction of site access, haul road and adjacent silt fences;
- Construction of sediment control zone/s for stockpiles and storing construction materials (utilising sediment fences and/or bunds);
- Demolition and removal of fence lines and where necessary vegetation (this work will be staged to minimise the erosion potential and may not necessarily be carried out at the start of the construction activities; TBC by the Contractor);
- Construction of clean and dirty water cut of drains. The later to discharge to the temporary soakage basins on site. Clean water diversion drains can discharge to adjacent grassed areas;
- Strip and stockpile topsoil from the construction area/s
- Earthworks for road construction;
- Installation/earthworks for stormwater, sewer, water supply and telecommunications infrastructure, including backfilling to subgrade level;
- Cut and fill earthworks for industrial allotments;
- Install other erosion and sediment control measures as required (maybe staging dependant);
- Re-top soiling and grassing/vegetation around bare/earth worked surfaces (will be staged throughout works as and when required);
- Irrigate newly sown areas, if necessary, to encourage establishment;
- Remove diversion measures from around completed/stabilised work zones; and
- Progressively remove erosion and sediment control measures.

Soakage basin decommissioning will take place only after earthworks completion and stabilisation of all exposed surfaces, thus ensuring there will be no sediment laden run-off to nearby drains or neighbouring properties (stormwater infrastructure).

3.3. Earthworks Restrictions

This ESDMP requires the following restrictions:

- Subsoil stockpiles will be limited to 4 m in height.
- Topsoil stockpiles will be limited to 2 m in height.
- The excavation depth shall not exceed 4 m bgl.

3.4. Contractor Responsibilities

3.4.1. General

The Contractor must ensure that all staff at the site are trained in, and understand the requirements of this ESDMP, before work commences. This includes all appendices to the plan, and in particular associated resource consent conditions.

A copy of this ESDMP and any associated resource consent are to be kept onsite and made available to all personal working onsite at all times.

The Contractor is to ensure that all ESDM measures are maintained and operating in a satisfactory condition at all times, in accordance with the maintenance requirements specified by this plan.

Should the Contractor wish to adjust the ESDM practises specified within this plan, the Contractor must consult with the Engineer, CCC and ECan to discuss the appropriateness of the changes. The Engineer, CCC and ECan will assess the impact of the changes and, if necessary, recommend additional ESDM measures to further mitigate possible effects on the surrounding environment. It is a

specific requirement of this plan that the Contractor update the ESDMP drawings to reflect any such alterations and that any such alterations be maintained in satisfactory working order.

3.4.2. Programme of Works

The Contractor must provide to the Engineer a detailed programme of the work to be undertaken at the site and methodology. The programme/methodology will be reviewed with the Engineer, ECan and CCC to determine its appropriateness, and changes will be made where necessary.

The Contractor must stage the construction work to minimise the surface area exposed at any one time. This is to minimise the areas subject to surface erosion due to rainfall, flows of stormwater, and also to minimise wind erosion and generation of dust during dry conditions.

Where possible, earthworks requiring truck and vehicle movements on unpaved areas of the site should be programmed to be undertaken during dry weather conditions, unless measures are implemented to mitigate possible effects on the surrounding environment due to flows of stormwater off site.

The ESDMP will be implemented continually, until construction has been finished and grass and other vegetation is established on exposed surfaces.

Appendix C provides the programme of works.

3.4.3. Notification

The Contractor must notify CCC, ECan and the Engineer overseeing the construction, not less than 2 working days prior to commencement of each stage of works.

ECan must be notified at least 10 working days prior to the commencement of works in accordance with Resource Consent CRCXXXXXX.

3.4.4. Site Security

The Contractor must provide an effective means of preventing unauthorised vehicle access to the site whilst construction work is progressing. This is to prevent dust generation and sediment from being transported off site by unauthorised vehicle movements and to protect the ESDM measures whilst the site is unoccupied.

3.4.5. Site Access

Vehicle access to the site will be off Memorial Ave and Avonhead Rd via an established ballast and shaker silt removal area.

Construction vehicle usage of these accesses will be limited during the earthworks operations because the vehicles will generally remain onsite (and overnight) unless maintenance or refuelling is required.

Refer to the Erosion Sediment Control Plan located in **Appendix A** for the entrance location off Memorial Ave and Avonhead Rd.

3.4.6. ESDM Maintenance

The Contractor shall prioritise the installation, maintenance and replacement, where necessary, of ESDM measures required under this ESDMP, ahead of any further work on-site, until such a time as the control measures effectively ensure that sediment is not being transported off site by stormwater flows, equipment movements, or as airborne dust.

3.5. Storage and Use of Fuel and Lubricants

There will be no storage of fuel or lubricants, refuelling, or lubrication of vehicles and machinery within 20 m of any surface water or open excavation down to groundwater. All necessary work on vehicles and machinery shall be kept to a minimum while on site. All maintenance of machinery will occur off site at an area properly designed to handle such work.

All fuels, lubricants or any other hazardous material will be stored onsite securely.

3.6. Proximity of Works to Sensitive Receptors

Residential activities within 200 m of areas where earthworks are proposed to be undertaken have been identified as sensitive receptors with respect to dust discharges.

The potential to generate dust will be minimised through the following:

- Minimising the area of exposed soils;
- Minimise stock piling of soil;
- Employing dust suppression techniques to minimise dust; and
- Minimising work carried out in windy conditions. When the wind reaches speeds where dust is visibly being transported from the site, work will cease until either:
 - o suitable dust suppression can be established to allow work to continue; or
 - o the wind drops to a level where dust is not being transported off site.

4. Discovery of Soil Contamination or Artefacts

If any contaminated soil or suspected contaminated soil is found during earthworks on the site, work must cease and the Engineer notified so soil sampling can be arranged. ECan and CCC will also be notified. Once the extent and type of contamination is known, remediation measures will be determined in conjunction with ECan and CCC.

Site earthworks will cease should there be any evidence of Kōiwi Tangata (human bones) or artefacts. The Contractor or the Engineer will immediately advise ECan and the relevant runanga or representative of the disturbance. The Historic Places Trust and Heritage NZ shall be notified and a response obtained before work recommences.

5. Erosion Prevention Measures

5.1. ESDM Implementation

The control measures outlined in this ESDMP will need to be implemented before bulk earthworks commence. The control measures shall be maintained by the Contractor until grass and vegetation are re-established across the site and the Engineer confirms that the control measures are no longer required.

Appendix A provides the ESDMP drawings.

5.2. Vehicle Access

The Contractor should ensure that any stabilised site entrance is a minimum of 5 m long to allow at least one full revolution of a truck tyre. Shaker ramps must be deep enough so that the material

dropped from one vehicle is not picked up by the next. Stabilise with rock the section of access road between the shaker ramp and the adjacent road. Runoff from the shaker ramp must be directed away from Memorial Ave or Avonhead Rd via a small bund or cut of channel and directed into the site.

5.3. Haul Roads

Vehicle movements around the earthworks' areas must be via stabilised haul roads. Typically haul roads are generally 5 m in width and stabilised via a minimum 100 mm depth of compacted metal course, such as AP40 or AP65 placed over exposed surfaces. The metal must be sized to avoid entrapment in/between vehicle tyres. Haul road construction should commence as soon as practical to provide erosion control protection.

5.4. Minimise Land Disturbance

Works shall be planned to minimise the land disturbance, including any minor vegetation removal. The following points should be considered to minimise land disturbance:

- Do not disturb areas of the site that are not scheduled for work to commence.
- A maximum of 5 ha land disturbance at any one time. Disturbed areas are to be stabilised prior to moving on to the next area.
- Carefully schedule and phase construction. Avoid earthworks during wet periods. Use temporary cover measures (gravel, mulch, polymer or other manufactured coverings) whenever construction is halted for an extended period.
- Phase site earthworks to limit the amount and time of an area's exposure. Exposed areas should be stabilised immediately following the completion of earthworks.
- Avoid delays and work expeditiously on any part of the site. Sow grass upon the completion of any sequence and prior to moving onto the next phase.

5.5. Earthworks during Wet Conditions

Construction vehicle usage of Memorial Ave and Avonhead Rd will be limited during the earthworks operations because the vehicles will generally remain onsite unless maintenance or refuelling is required. However, as a general note movement of equipment off the site during wet weather should be suspended until conditions are more favourable, unless mitigation measures such as tyre washing or cleaning are undertaken to ensure that vehicle movements off-site do not result in sediment being transported onto the adjacent road.

5.6. Earthworks during Dry Conditions

The operation of earthmoving equipment and vehicles across dry site conditions can mobilise silt into airborne dust. In addition, high wind conditions across exposed (bare soil) surfaces can also cause dust problems. Measures such as watering of exposed surfaces, application of a stabilising polymer to exposed surfaces and sowing completed surfaces with topsoil, grass and straw mulch immediately after construction work is completed, shall be undertaken to control dust generation during dry site conditions.

Bulk earthmoving operations should not be undertaken during periods of strong winds, especially when site conditions are dry, unless effective measures to prevent and control the generation of dust are provided, such measures must be discussed with the Engineer, CCC and ECan for approval.

5.7. Preservation of Existing Surfaces

Well-established grass provides an excellent means of sediment and contaminant removal from surface stormwater run-off. Where possible, well-established grassed areas should be preserved for as long as practical.

5.8. Clean Water Diversion

Stormwater run-off from upstream adjacent land, flowing into any part of the construction site, must be diverted around any exposed excavations, if possible, using drains of an acceptable cross sectional area and grade, excavated into the topsoil. The site is reasonably flat and it may also be possible to divert and clean water via bunds or sediment logs onto open pasture.

5.8.1. Design requirements

- The clean water diversion drains must be lined to prevent contamination of the clean water. Lining can be via coconut or wool matting. However, a copolymer is recommended for ease of application and cost.
- Outlets must discharge water so that the erosion hazard to downslope lands and waterways is no greater than before the development started, up to the design storm event.
- Clean water diversion drains must be monitored to ensure they are operating at an acceptable standard, have adequate capacity and are not resulting in sediment deposition into the clean water.
- Where it is considered that diversion drains are necessary the engineer shall be consulted to provide clean water diversion drain dimensions (also refer to Table 1).

Stormwater collected in the clean water diversion drain must be piped beyond any exposed excavations, so that clean stormwater does not flow across disturbed or excavated surfaces. All diversion pipes will need to be constructed with temporary splash pads to prevent scour and erosion at their outfall. The clean water diversion outfall must be constructed to include energy dissipation structures that will allow the water to be dissipated via sheet flow rather than a concentrated channel flow.

5.9. Dirty Water Diversion (Cut-Off Drains or Bunds)

Trapezoidal shaped cut-off drains (or v-drains) can be constructed or bunds within the work site to divert dirty water, from disturbed areas, if required. Internal cut in roading is also considered an effective means of transporting dirty water discharges.

A standard dirty water diversion arrangement may be used with the following requirements:

- If necessary, the drain must be lined to avoid scour and erosion of the drain banks and bed. Copolymer is recommended.
- The drain grade must be as even as possible.
- The drain must discharge to a soakage basin.
- Bunds, if used, must be well compacted and stabilised.
- If necessary, the outlet must be stabilised to avoid scour and erosion of the soakage basin banks.
- Design (upon consultation with the engineer) drop out pits within the dirty water diversion (excavated hole within the drain bed) to allow heavier sediment particles to settle out. Drop out pits are approximately 0.5 m to 1.0 m wide and approximately 0.5 m deep.
- Dirty water diversion drains must be monitored to ensure they are operating at an acceptable standard, have adequate capacity and are not resulting in sediment deposition into the clean water.

- For small catchments a series of v-drains can be utilised and used to divert water into a larger cut-off drain.
- The engineer must be consulted for confirmation of the cut of drain dimensions.

5.10. Stockpiles

Until removed and compacted, stockpiles will need to be moistened by irrigation or stabilised using polymer chemical dust suppressants or vegetation. Topsoil stockpiles must be not greater than 2 m in height and subsoil stockpiles must be not greater than 4 m in height. The side slope will be kept to a minimum but will not be greater than the natural slump angle of the dry material.

Several methods are available for the management of stock piles depending on the length of time the stockpile is to remain on site:

- Irrigation – suitable for short term stockpiles (i.e. days to weeks).
- Application of mulch or stabilising polymer dust suppressants – suitable for medium term stockpiles (i.e. weeks to months). Re-application may be required.
- Vegetation by spreading grass seed or other fast establishing seed – suitable for longer term stabilisation (i.e. months). This may not be possible depending on weather and soil conditions in which case a medium term solution may be required until vegetation can be established.
- A bund or silt fence should be placed around any soil stockpile should there be a risk of runoff leaving the site confines or entering any clean water diversion drain. Any runoff should be directed to a large pasture area where it can infiltrate through the soil profile or the runoff should be directed to a soakage basin.

5.11. Grass Seeding

Completed cut and fill areas must be reinstated with topsoil immediately and sown with grass seed which can be via drilling or hydroseeding. Drilling is the more cost effective option and a copolymer can be applied over the seed if considered necessary. The area of planting/seeding must be maintained to encourage stabilisation of the disturbed surface, including watering of the seeded areas during dry summer conditions.

Seeding is designed to permanently stabilise soil on disturbed areas to reduce sediment and run-off to downstream or off-site areas. In order to maximise germination and growth rates, the preferred seeding windows for both temporary and permanent grassing are autumn (March and April) and spring (September, October and November). If irrigation is available, grassing may be carried out throughout the summer.

Whilst seeding during winter and summer is not ideal, if this does occur, a cereal such as rye corn or wheat can be added to the mix to give some quick cover. Protective straw mulch, a bonded fibre matrix, or a vegetation promotion blanket must also be used during these months in order to maximise soil protection and plant survival rates. Hydromulch is not an acceptable alternative during summer and winter.

5.11.1. Seeding Construction Specifications

The Contractor must seek professional advice on the preferred seed mix for the soil types. It is also recommended that a representative top soil sample or samples be collected and analysed at a laboratory to define the soil constituents (e.g. pH and nutrients) which will help the selection of the correct seed mix.

5.12. Grass Irrigation Requirements

Summer seeding and planting programmes need a watering or irrigation regime. This must deliver a volume at least equal to the daily potential evapotranspiration (PET) rate shown in Table 1 and must be continued until natural rainfall provides the necessary soil moisture levels for plant survival.

Mean average monthly rainfall and PET data has been collected from Christchurch, Kyle St EWS (agent number 24120), for the period 1989-2022).

Table 1. Mean Monthly Rainfall and PET (NIWA, 1989 – 2022)

Month	Rainfall (mm)	PET (mm)	Surplus/Deficit (mm)
Jan	37	149	-112
Feb	41	114	-73
Mar	47	84	-37
Apr	63	48	15
May	71	27	43
Jun	72	15	57
Jul	57	18	39
Aug	61	31	30
Sep	36	60	-23
Oct	51	94	-43
Nov	40	126	-86
Dec	57	140	-83
Total	633	906	-273

6. Dust Management

The soils underlying the site are prone to generating dust once vegetation is removed. It is imperative that the Contractor be able to provide effective dust control, including during periods when earthworks operations cease and there are bare soils present. The following dust control measures, in conjunction with erosion and sediment controls, aim to reduce the generation and transport of dust from disturbed soils.

6.1.1. Water Supply and Storage

The Ministry for the Environment (2001) recommends an application rate of up to one litre per square metre per hour for effective dust suppression. The period in which maximum dust suppression is required is approximately four hours per day, which equates to 40 m³ per hectare per day.

Potentially, the Contractor might not be permitted to utilise the CCC hydrants. Should this not be possible the Contractor will be required to provide water storage basins or tanks of an acceptable capacity.

Potentially the Contractor could install a bore specifically for a water supply. However, consent requirements or permissions will need to be reviewed upon selection of the preferred methodology.

6.1.2. Sprinkling/Irrigation

Dust control will be via a water tanker or sprinkler system over all areas of exposed soils and the topography allows these methods to be applied to any part of the site.

6.1.3. Chemical Stabilisation

Stabilised matrix chemicals are a quick and effective method to provide medium term solutions to dust control. This method requires the spreading of chemicals to glue smaller soil particles together, to form larger wind resistant particles. There are various dust suppressant chemicals available, however only chemicals that have been granted a Global Resource Consent by ECan can be used.

6.1.4. Physical Dust Control Barriers

Vegetation provides coverage to surface soils and slows wind velocity at the ground surface, thus reducing the potential for dust to become airborne. This is generally achieved through sowing of fast establishing species or hydroseeding.

Mulch or matting can be a quick and effective means of dust control for a recently disturbed area and can be used where conditions are unsuitable for establishing grass. Care must be taken with the mulch variety selected to ensure that it will not itself be disturbed by windy conditions.

Natural or constructed wind breaks or barriers can reduce wind velocity through a site and therefore reduce the possibility of suspended particles. Wind breaks can comprise of trees or shrubs left in place during site clearing or constructed barriers such as a wind fence, tarp curtain, hay bales, crate wall or sediment fence.

The Contractor must ensure that hay bales and mulch are secure during high winds; hay bales can be tied down or staked in place.

7. Sediment Control Measures

7.1. Sediment Retention Soakage Basins

All construction water runoff (channelled by cut off drains or internal roading) must be directed to one or more onsite forebays, which will allow sediment to settle out prior to discharging to one or more soakage pits or basins. The contractor must ensure that no construction water runoff enters the stormwater pipe network; the only acceptable means of discharge is via soakage into the underlying soils. Clean runoff may also be discharged to an onsite soakage pit or basin, if considered necessary; however, clean water runoff must be kept separate from the construction water, so it does not become contaminated and so that the construction water soakage system capacity is not exceeded.

Appendix A provides the proposed sediment soakage basin layout; this will be discussed with the Contractor and altered if considered necessary.

The underlying free draining gravels are estimated as being around 3 m below ground level and therefore the basin design depth can be 2 m and an additional, smaller and deeper, boulder filled soakage pit can be sited within the basin bed and at a depth such that it is within the free draining gravels.

The spillway between the forebay and the soakage basin should be lined with a geotextile or building plastic to prevent erosion.

The overall soakage system design will be discussed with the contractor and modifications made where necessary. Whilst site investigations have provided a good indication of the underlying depth of the free draining gravels, the exact depth will not be known until the basins are constructed.

7.2. Sediment (Silt) Fences

A sediment fence is a temporary barrier of woven geotextile fabric that is used to capture predominantly coarse sediment carried in sheet flow. Sediment fences are best used as part of a systematic approach to managing erosion and sedimentation in combination with other control measures.

- Sediment fences are to be constructed as per the ECan ESC Toolbox for Canterbury (2022), with the following measures being adhered to:
- The sediment fence will be of woven geotextile;
- Reinforcing chain mesh will be installed behind the fence for strength, as required;
- Will be sighted parallel to the contour;
- Fence height above ground will be no less than 400 mm;
- Minimum depth of fabric buried below ground will be 200 mm;
- The fence will be supported with steel waratah posts (with plastic safety caps) or by 50 mm tandalised timber posts;
- Minimum post length will be 800 mm, driven 400 mm into the ground;
- Maximum post spacing will be 2000 mm;
- 500 mm (vertical height) upslope return at each end of the fence so that water does not outflank the ends of the fence;
- The maximum length of individual sediment fences shall not exceed 50 m;

- The fabric will be secured to the upslope side of posts and support wires; and will be fastened with wire ties, heavy gauge wire staples or gang nails; and
- The trench will be backfilled over the toe of the fabric and thoroughly compacted.

Figure 2 shows the correct sediment fence layout.

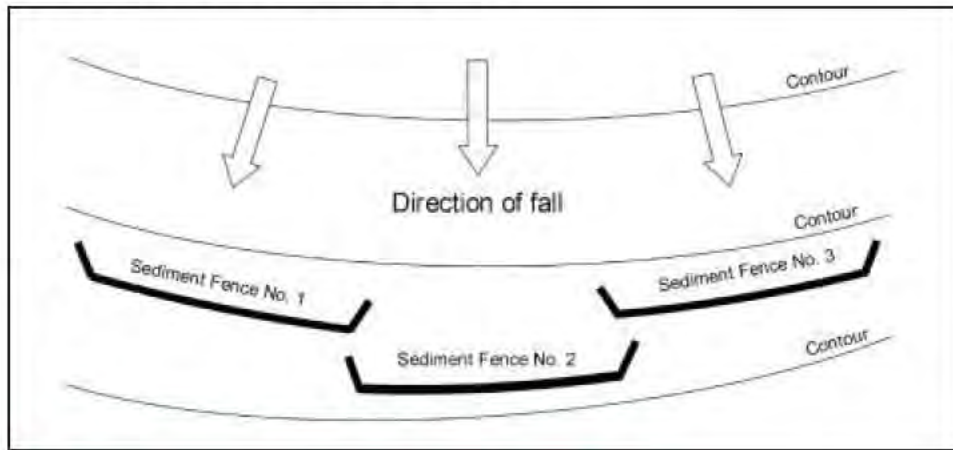


Figure 2. Sediment Fence Location (ECan ESC Toolbox, 2019)

Figure 3 provides further sediment fence construction details.

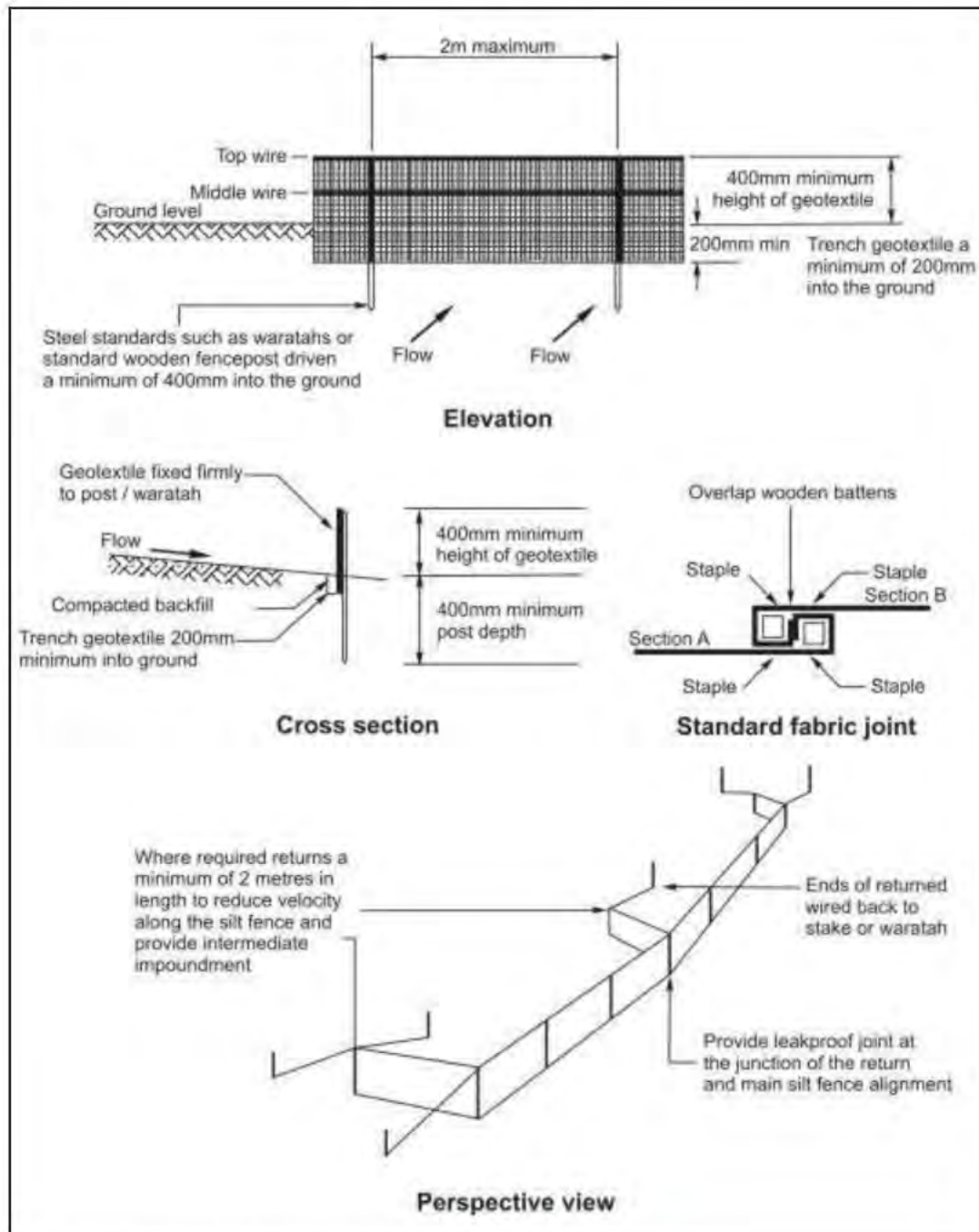


Figure 3. Sediment Fence Construction Details (ECan ESC Toolbox, 2019)

7.3. Sediment Socks

Sediment socks are not shown on the proposed ESDM drawings (**Appendix A**), however should the Contractor, during the earthworks operations, consider their use beneficial due to unforeseen run-off or sediment control, they may be utilised for small areas and upon consultation with the Engineer, CCC or ECan.

Sediment socks are useful within cut of drains for reducing sediment loads, providing velocity reduction and scour protection. They must not span the full width of a cut off drain (or they will act as a dam), rather they should span 1/3 or 1/2 of the drain width in a staggered arrangement and should be configured upon consultation with the Engineer.

Sediment Socks, also known as Coir Rolls or Straw Wattles are made from fibrous organic material rolled inside a tubular mesh sock. Sediment socks may be used to minimise the transport of sediment from the cut and fills areas on slopes down gradient. Sediment socks must be placed downslope of exposed soil areas and around temporary material spoil and stockpiles.

If sediment socks are used on slopes they should be installed from the bottom of the slope and working upward, to capture any sediment unintentionally released during installation. Install the socks along the contour, perpendicular to the slope direction. The ends of each sock should be turned upslope a minimum of 150mm vertically, to prevent runoff from flowing around the end of the roll. When socks are installed abutting each other, overlap the ends at least 150mm to create a tight join, to prevent sediment from escaping. Remove rocks, clods, or other obstructions so the sock has direct contact with the soil. Stake the socks using two biodegradable wooden stakes, one on each side of the sock, placed every 1m to 1.5m apart, driven into the ground perpendicular to the slope. Do not use waratahs or steel stakes to secure socks in case these are inadvertently left behind at the end of construction and present a hazard to animals or people.

Coir rolls that are laden with captured sediment, or begin to decompose due to moisture and age, will need to be replaced with new rolls, as required, or as directed by the Engineer.

8. Monitoring and Maintenance

8.1. Responsibility for Inspection and Maintenance

Monitoring and maintenance of the selected ESDM measures are critical towards the success of preventing erosion and sediment transport. Maintaining a daily or weekly checklist of practices to inspect for deficiencies are critical to the success of preventing erosion and sediment migration.

Successful implementation of the ESDM measures outlined in this report relies on the assignment of various roles and responsibilities to individual personnel who can be held accountable. The roles and responsibilities are outlined in the following table and described in the following sections.

Table 2. ESDM Roles and Responsibilities

Responsibility	Contact Details	Role Summary
Design	Eliot Sinclair Ph. (03) 379 4014	Provide approved design and specifications for construction.
	Cameron Mars Mob. 027 208 2307	Design and specify appropriate ESDM measures in accordance with this report. Liaise with Contractor and advise on ESDM measures to suit preferred construction methodology.
Construction Contractor	TBC	Amend ESDMP plan to suit proposed construction methodology and submit to CCC and potentially ECan prior to starting works on-site. Install, maintain and operate the ESDM measures.
On Site Monitoring During Construction	TBC	Periodic reviews of ESDM measures. Inspection of ESDM measures before rain or wind is forecast and after rainfall. Review construction programme and weather conditions and amend ESDM measures to suit.

8.2. Monitoring and Maintenance Requirements

8.2.1. Pre-Construction

The Engineer, in association with the Contractor, will develop an inspection and reporting procedure in accordance with the requirements of this ESDMP and any relevant consent document. The appropriate monitoring and reporting program to be developed must be consistent with the site characteristics, earthworks activity and potential environmental risks associated with the work to be performed.

8.2.2. During Non-Work Periods

The Contractor must continue to monitor and maintain all ESDM measures during periods when work on site ceases (for any unforeseen reason) and until the reinstated areas are sufficiently stabilised to allow ESDM measures to be decommissioned.

8.3. Monitoring and Maintenance Overview

Monitoring and maintenance of the selected ESDM measures are critical towards the success of preventing erosion and sediment transport. Maintaining a daily or weekly checklist of practices to inspect for deficiencies are critical to the success of preventing erosion and sediment migration.

A sound inspection and maintenance strategy will include the following:

- Verify that the cut-off drains or bunds and sediment fences (if used) are at low points below disturbed areas. Verify the run-on drains or bunds are at low points to capture and disperse upstream catchment run-off prior to reaching any of the disturbed areas.
- Inspect and maintain reinstated areas.
- Inspect temporary sediment barriers such as sediment fences, and bunds after every rainfall. These barriers should only be used in areas where sheet flow runoff occurs. Sediment fences are ineffective if the runoff is concentrated in rill or gully flow.
- Inspect the soakage basins to ensure they do not have a high sediment accumulation and that all components are in operation.
- The Contractor will inspect all erosion and sediment control devices at least once a week and at least once a day during rainfall events. The Contractor will perform any repairs or maintenance immediately, in order to ensure effective erosion and sediment control.
- The Contractor will maintain a record of all inspections and maintenance activities at the project site. This record will be made available to CCC, ECan or the Engineer upon request. Refer to Appendix D for an example inspection checklist.
- The Contractor will be responsible for the implementation, regular inspection and maintenance (repair, cleaning and modification) of the ESDM system during the earthworks period.

Performance inspection and maintenance for each measure will be carried out in accordance with the ECan Erosion and Sediment Control Toolbox (2022). An overview of the programme is given below.

Where maintenance of ESDM measures is required, priority will be given to this work before other works continue on the site.

8.4. Daily Maintenance

After completion of work each day, the site supervisor shall inspect:

- Any drains, bunds or sediment fences (if used) that are damaged will need to be reinstated as necessary. Any drains that are filled with sediment or damaged will also be reinstated as necessary.
- Soakage basins to ensure all components are operational.
- Newly reinstated and seeded areas will be inspected daily to check the watering requirement of the new seed and to ensure damage has not occurred within the reinstated area.
- The dust suppression irrigation is operational and sufficient water is available.
- The stabilised site entry is operational. Any mud tracked onto the road must be swept up and spread elsewhere onsite.
- Review weather forecast and plan accordingly.

These measures will need to continue should there be any period in which work stops.

8.5. Weekly Inspection of Control Measures

All measures will be inspected at least weekly, and inspection documented on a check sheet (these measures will need to continue during site close down periods).

All measures will be maintained in good working order; if repair is necessary, it will be initiated within 24 hours of inspection.

- The diversion systems shall be inspected for erosion or sediment scour and repaired or protected immediately after damage has occurred.
- Sediment fences (if used) must be inspected for tears, fabric clogging, to see if fabric is securely attached to the posts, loose wires or supports, leaking joints, overtopping, outflanking and/or undercutting. Sediment will be removed when the depth exceeds 30% the height of the fence.
- Reinstated and seeded areas will be inspected for bare spots, washout and unhealthy growth.
- Soakage basins to ensure they do not have undue sediment build up, inlets and outlets are free draining, there is no scour and erosion and that all components are operational.

8.6. Inspection Before and Immediately Following Rainfall and During Wind Events

All measures will be inspected before and immediately following rainfall events that generate runoff, or wind events that may generate dust, with any required maintenance undertaken immediately, or additional methods implemented to ensure ESDM is maintained on the site during the rainfall event.

8.7. Maintenance during Large Storm Events

Site monitoring shall be undertaken during heavy rainfall events. The person undertaking this monitoring shall be able to inspect and repair/replace any control measures that are not working effectively.

The responsible person will need to implement additional control measures in the event of system overload to ensure that effects of overland flows of stormwater are effectively mitigated.

8.8. Dust Complaints Procedure

Should any dust complaints be received, they will be investigated immediately, and measures taken to minimise the dust being generated from the site.

The Contractor will keep written records of any complaints received. Details to be kept include the following:

- Date and time of the complaint;
- Location of discharge reported;
- Contact details of who the complaint was received from;
- Weather conditions at the time of the complaint;
- Likely cause of the discharge; and
- What corrective action was taken to address the complaint.

This information will be made available to the Engineer, CCC or ECan upon request.

8.9. Record of Maintenance

A record of inspection and maintenance shall be kept, as appended (example only), and made available upon request to CCC or ECan monitoring staff, or the Engineer. A sample Inspection Monitoring Sheet is provided in Appendix D.

9. Decommissioning

ESDM measures will be decommissioned only after earthworks activities have ceased and all areas upstream (or downstream) of the installed ESDM measures have been stabilised. Each measure will be decommissioned in accordance with the procedures given in the ECan Erosion and Sediment Control Toolbox (2022). Any areas disturbed by the decommissioning of measures will be stabilised via one of the methods discussed in this report, such as mulching, erosion control mats or reseeded with quick germinating grasses. All rehabilitation programmes implemented are subject to inspection and repair until they are fully established and form part of the permanent features.

10. References

Environment Canterbury (2018). Erosion & Sediment Control Toolbox for Canterbury.
<http://esccanterbury.co.nz/>

Ministry for the Environment (2001). Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions. Wellington.

Disclaimer

This plan has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as an Erosion, Sediment, and Dust Management Plan (ESDMP).

The plan is based on:

- The Environment Canterbury Erosion Sediment Control Toolbox for Canterbury (2022).
- Ministry for the Environment Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions (2001).

Where data supplied by Miles Premises Limited or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of site conditions to ensure that the conclusions drawn, the design for the erosion, sediment and dust control measures to be provided on-site, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site or considered all site-specific construction methods that may be used by the Contractor. Variations in conditions may occur between investigatory locations and there may be conditions such as subsoil strata, groundwater, springs and other environment features that were not detected by the scope of the investigation that was carried out or have been covered over or obscured over time and some detail can only be considered and included on the basis of in-situ monitoring and adjustments. Furthermore, in order to be effective, the on-site plan will need to be implemented by a Contractor experienced in erosion, sediment and dust control management. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this plan.

The exposure of conditions or materials that vary from those described in this plan, or the requirement to vary construction methodologies for site specific conditions, may require a review of our recommendations. The Contractor will be required to monitor its performance and shall report to Eliot Sinclair any adjustments that are necessary to the plan to confirm the validity of these adjustments, their effective operation and requirement to re-issue the plan should any of these occur. It is not acceptable for unmonitored or unmanaged implementation of control measures to be used. The erosion, sediment and dust control measures may only be changed according to the provisions set out in the Resource Consent.

This plan has been prepared for the benefit of Miles Premises Limited, Canterbury Regional Council and Christchurch City Council for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this plan, in whole or in part, for any other purpose or by any other party.

Appendix A. Engineering Drawings



Original A1 size mm 0 10 30 50 100 150 200 300

Memorial Ave

Stabilised site entrance

Silt socks to be placed around all new and existing stormwater sumps

Soakage pit

Cutoff drain

Deer type silt fence

Stockpile zone

Deer type silt fence

Stabilised site entrance

Avonhead Rd

DISCLAIMER:
This erosion, sediment, and dust management plan (ESDMP) provides the design outline for the erosion, sediment, and dust control measures to be provided on site. It is not possible at the design stage to anticipate and include all site-specific construction methods that will be used by the Contractor, as some detail can only be included on the basis of in-situ monitoring and adjustments. The information provided in this erosion, sediment, and dust management plan is accurate to the best of the knowledge and professional expertise at the time of its release. In order to be effective on-site the plan will need to be implemented by a contractor experienced in erosion, sediment, and dust control management, who will be required to monitor its performance and seek changes to the ESDMP where site specific conditions or construction methodologies are varied. The Contractor shall report to the Engineer any adjustments that are necessary to ensure its effective operation due to the state of the site or changes to conditions on-site. It is not acceptable for unmonitored or unmanaged implementation of control measures to be used. The erosion, sediment, and dust control measures may only be changed according to the provisions set out in the Resource Consent.

LEGEND	
	Stockpile zone
	Soakage pits
	NZTA Designation Area
	Stabilised site entrance
	Deer type silt fence
	Site works
	Cutoff drain

Notes:

1. Stockpile locations will be confirmed once a contractor has been engaged.
2. Topsoil stockpiles shall not exceed 2.0 m in height to protect the integrity of the soil microbes.
3. Stockpiles shall be placed as far as practicable from internal boundaries adjoining residential properties.
4. Dust emissions shall be appropriately managed within the property boundary at all times. Methods such as water carts or sprinklers shall be used on any exposed areas.
5. The roads to and from the site shall remain tidy at all times.
6. All erosion and sediment control measures shall be constructed in accordance with the Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury.
7. Exposed soils as a result of site disturbance shall not exceed 5 ha at any time.
8. The Contractor is to read and be familiar with the conditions of all Christchurch City Council and Environment Canterbury consent documents.
9. This erosion and sediment control plan is to be updated as and when any changes to the protection measures result.
10. The Contractor is to confirm any changes to this erosion and sediment control plan with the Engineer for approval.

Rev.	Description	Drawn	Date
A	For Consent	JKFP	31.03.22

Name	Date	Surveyed:	Survey Date:
Designed JKFP	31.03.22	-	-
Drawn JKFP	31.03.22	Coord System:	-
Drg. Chk JCM	20.04.22	-	-
Proj. Mgr -	-	Calibration:-	-
Design Review	Date	Origin of Levels:	-
-	-	-	-
Approved	Date	-	-
-	-	Datum:-	-

Client
Miles Premises Limited

Project Title
Memorial Ave Industrial Park
461, 475 Memorial Ave; 400 Russley Rd; 500 Avonhead Rd

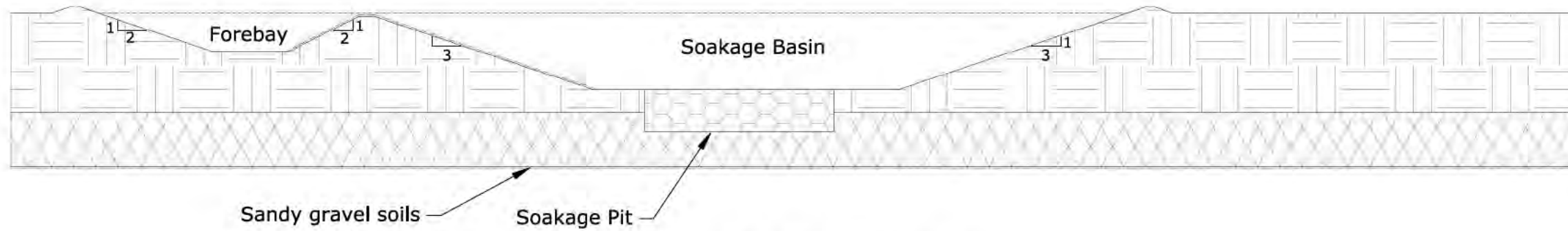
Drawing Title
Erosion & Sediment Control Plan
Site Layout

Scales
1:1000 [A3]

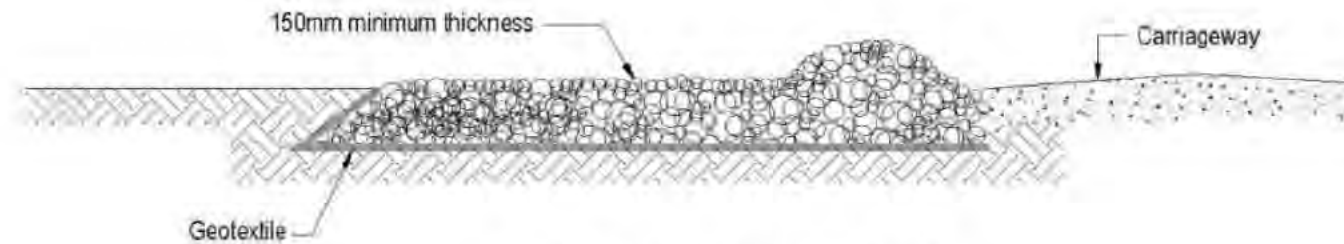
Project No.	Set No.	Sht No.	Rev.
510827	E2	01	A

**eliot
sinclair**

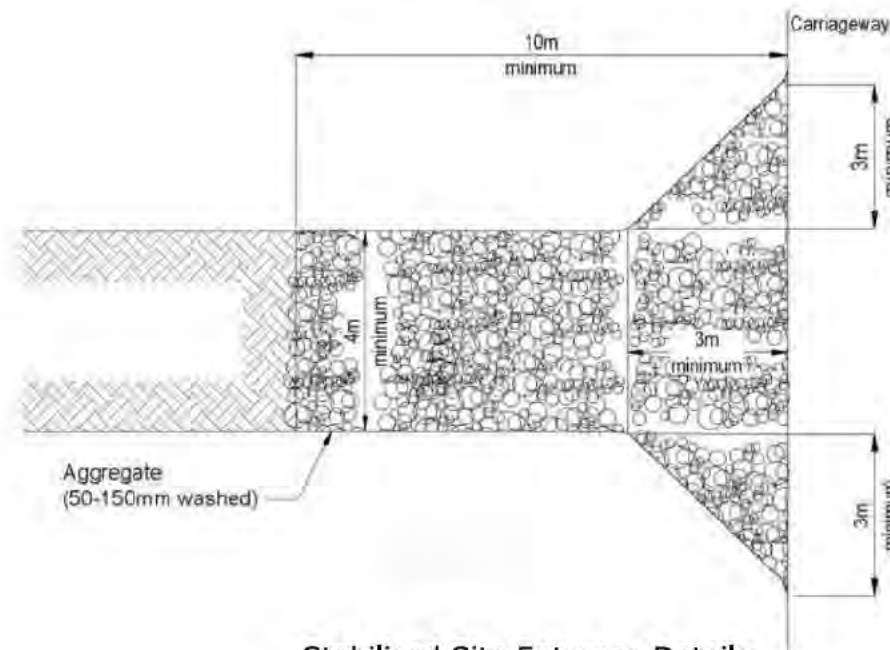
For Consent



Soakage Basin Typical Details
Not to Scale



Stabilised Site Entrance Details
Side Elevation
Not to Scale



Stabilised Site Entrance Details
Plan View
Not to Scale

DISCLAIMER:
This erosion, sediment, and dust management plan (ESDMP) provides the design outline for the erosion, sediment, and dust control measures to be provided on site. It is not possible at the design stage to anticipate and include all site-specific construction methods that will be used by the Contractor, as some detail can only be included on the basis of in-situ monitoring and adjustments. The information provided in this erosion, sediment, and dust management plan is accurate to the best of the knowledge and professional expertise at the time of its release. In order to be effective on-site the plan will need to be implemented by a contractor experienced in erosion, sediment, and dust control management, who will be required to monitor its performance and seek changes to the ESDMP where site specific conditions or construction methodologies are varied. The Contractor shall report to the Engineer any adjustments that are necessary to ensure its effective operation due to the state of the site or changes to conditions on-site. It is not acceptable for unmonitored or unmanaged implementation of control measures to be used. The erosion, sediment, and dust control measures may only be changed according to the provisions set out in the Resource Consent.

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1. Stockpile locations will be confirmed once a contractor has been engaged,
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Rev.	Description	Drawn	Date
A	For Consent	JKFP	31.03.22

	Name	Date	Surveyed:	Survey Date:
Designed	JKFP	31.03.22	-	-
Drawn	JKFP	31.03.22	Coord System:	-
Drg. Chk	JCM	20.04.2022	-	-
Proj. Mgr	-	-	Calibration:-	-
Design Review	-	-	Origin of Levels:	-
-	-	-	-	-
Approved	-	-	-	-
-	-	-	Datum:-	-

Client
Miles Premises Limited

Project Title
Memorial Ave Industrial Park
461, 475 Memorial Ave; 400 Russley Rd; 500 Avonhead Rd

Drawing Title
Erosion & Sediment Control Plan
Typical Basin Details

Scales
Not to scale

Project No.	Set No.	Sht No.	Rev.
510827	E2	02	A

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For Consent

Appendix B. Resource Consent Documents

To be included once the appropriate consent documents have been granted.

Appendix C. Programme of Works and Schedule

The programme of works and schedule will be included within this ESDMP once a Contractor has been selected and has provided the documentation.

Appendix D. Sample ESDM Monitoring Sheet

**MEMORIAL AVENUE INDUSTRIAL PARK: EROSION, SEDIMENT AND DUST MANAGEMENT
MONITORING SHEET (EXAMPLE ONLY)**

Date: _____	Time: _____	Description of current weather, and weather over last 24 hours: _____	Inspected by: _____
Earthworks: Erosion & Sediment Control Measures (Example Only)			

Check condition of:		Y/N	Comments	Action required? Y/N
Diversion Drains/Bunds	Are there signs of erosion or wear of the diversion structures? Do banks show any signs of erosion or wear? Is the minimum height of the bund acceptable? Other (please describe).			
Stabilised Site Exit & Temporary Access	Has sediment filled the voids of the rock apron? Is silt runoff occurring from metal course? Is sediment being transported onto any right of way or road? Other (please describe).			
Stripping & Stockpiling	Is dust effectively suppressed during and after stripping operations? Is stormwater runoff being directed to stabilised areas, the soakage basins or low lying areas? Are stockpiles protected from wind erosion and generation of dust? For extended stockpiling: Is the surface hydro-seeded or polymer bonded? Is a survey plan completed detailing location and volumes of stockpiles? Other (please describe).			

Check condition of:		Y/N	Comments	Action required? Y/N
Filling & Re-topsoiling	Is runoff from the area of earthworks directed to a low lying area or the soakage basin? Is the subsoil surface compacted? Are topsoiled areas of filling re-vegetated, gravelled or stabilised with mulch? Is watering required? Other (please describe).			
Construction of Vehicle Routes	Are haul routes surfaced with metal course? Is the surface in good condition? Has sediment accumulated over the metal course surface? Are all other vehicle routes surfaced with a minimum 100mm depth of metal course? Other (please describe).			
Soakage Basins	Do the basin/s have a sediment accumulation exceeding 30% of the basin volume? Is there a build-up of litter or any other matter in the basins? Are the underlying soakage pits functioning or are they blocked with sediment and need replacing? Other (please describe).			
Dust Suppression	Is there sufficient water stored for dust suppression? Are there visible signs of dust? Is polymer required? Is the irrigation system working to a satisfactory standard?			

Check condition of:		Y/N	Comments	Action required? Y/N
	Other (please describe).			

PHOTO FOLDER LOCATION:	
Please attach copy of current ESCMP and scan to appropriate folder location.	