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INFRASTRUCTURE SERVICING REPORT

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DISCLAIMER

This engineering report has been prepared at the specific instruction of Coniston Park Limited. It outlines the design of the preliminary infrastructure servicing for a proposed 'Plan Change' for subdivision of Lot 4 Deposited Plan (DP) 320165 and Lot 8 DP 311232, Farm Road in Ashburton.

Davis Ogilvie (Aoraki) Ltd did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited investigation of the site and have not been taken into account in the report.

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1.0 INTRODUCTION

Coniston Park Limited (the landowner/developer) are proposing a change to the Ashburton District Council (ADC) District Plan to have their land rezoned from Residential D to Residential C. As part of this 'Plan Change' process, ADC require information which demonstrates that the subject property is suitable for the proposed residential development and able to be properly serviced.

1.1 PURPOSE OF THE REPORT

The purpose of this report is to outline the preliminary infrastructure/servicing design concepts which are integral to residential development of the proposed Coniston Park site located at Farm Road, Allenton, Ashburton. The land being legally described as Lot 4 Deposited Plan (DP) 320165 and Lot 8 DP 311232, held in Record of Titles RT 79791 and RT 44314 respectively.

This design report has been prepared to summarise:

- Existing site and proposed development.
- Existing infrastructure around and within the site.
- Demonstrate feasibility of infrastructure required to service the development.
- Safety in design consideration.

1.2 SCOPE OF WORKS

The works carried out comprises the followings:

- Assessment of the potential for historical onsite activities to have resulted in ground contamination
  - Review of the Listed Land Use Register (LLUR) held by ECan;
  - Review Canterbury Map on significant ecological, historical and archaeological significance.
- Geotechnical assessment
  - Review of readily available geotechnical information from published maps
  - Site investigation and testing across the site (excavated test pits, hand auger and associated with dynamic cone penetrometers).
- Infiltration test assessment
  - Infiltration testing across the site (falling head test).
  - Infiltration test analysis (Horton's Equation)
- Existing services capacity assessment
  - Review of requirements of Ashburton District Council District Plan requirements;
  - Review of requirements of Ashburton District Council Stormwater Discharge Consents;
  - Review of existing servicing plans;
  - Assessment of existing capacity for water supply and wastewater discharge;
  - Assessment of the design demands from the proposed development for water supply, wastewater and stormwater discharge;
  - Assessment on stormwater quality discharge to groundwater and Wakanui Creek;
  - Assessment on road layout, design, connectivity and sight distance;

- Discussion with ECan on historical flooding information to the site;
- Discussion with Ashburton District Council to ascertain if water, wastewater and stormwater can be accepted into the Council network;
- Discussion with EA Networks to ascertain the capacity and ability to connect to the site.

- Preparation of this report, documenting the results of our investigations and implications for the proposed development of the site.

2.0 SITE DESCRIPTION

The site is located in Allenton, Ashburton, approximately 2.6 km northwest of State Highway 1, 1.7 km northeast of the Ashburton River and 0.7 km southwest of the Ashburton River North Branch. The land parcels (Lot 4 DP 320165 and Lot 8 DP 311232) occupy a total area of 16.32 ha and are hereon known as “the site” outlined in yellow shown in Figure 1.

Figure 1: The Proposed Development Outline in Yellow

2.1 SITE SURROUNDING PROPERTIES

The currently grassed farmland site is bounded by Farm Road to the southeast and Racecourse Road to the northeast. The site is undeveloped and relatively flat with a history of farming land use. The site is currently zoned “Residential D” (min 4000 m^2 allotment size).

The site surrounds and the zonings as per Ashburton District Planning Zones are:

North: Rural-residential life-style blocks and farmland which is currently zone Rural A

East: Rural-residential life-style blocks and farmland which is currently zone Residential D

South: Rural-residential life-style blocks and farmland which is currently zone Residential C. Argyle Park is within 500m, immediately South West of the site.

West: Modern residential lots and layout which is currently zone Residential C.

2.2 TOPOGRAPHY

The land is predominantly flat across the site. According to Google Earth and Canterbury Maps the site elevation of 111m to 113m above the mean sea level across the site.

Figure 2: Topography of the site

Near the centre of the northwest boundary, a watercourse, known as Wakanui Creek, enters the site at an acute angle and crosses in a northwest-southeast direction where it is lined by large mature trees. The channel is approximately 3 – 6 m wide, incised 0.5 – 1.0 m deep and is flowing at the time of investigation. The watercourse is classified on the Environment Canterbury (ECan) River Network 1 as a “spring-fed plains watercourse”; however, during the investigation it appears to now be mainly fed from the Ashburton River North Branch via a small channel, some 1.4 km northwest of the site, and from modified active water races. The channel exits at the southeast of the site where it crosses developed and undeveloped land in a southeast direction (parallel to Ashburton River) through the Ashburton township.

Near the westernmost end of the site (Lot 4), parallel to the northwest boundary, is a dry water race confined by stop banks and crossed by bridges. The water race source runs through farmland in the northwest before passing the site and heading southwest to the Ashburton River North Branch.

A roadside swale and channel also exist between, and parallel to, the southeast boundary and along Farm Road.

2.3 GEOLOGY

The findings from the Preliminary Site Investigation (PSI) and the Geotechnical Report from the published geology from GNS of the site has been identified as “Modern river floodplain / low-level degradation terraces / grey river alluvium beneath plains terrace (Q1a).”

Using ECAN’s groundwater bore logs close to the site, the logs are consistent with the published geology.

Please refer to **Appendix A – Preliminary Site Investigation (PSI)** and **Appendix B – Geotechnical Report (4330) – Farm Road, Ashburton** for the detailed geology assessment to the site.

2.4 HYDROGEOLOGY

There are 24 off-site registered active consents to take groundwater and four active discharge consents off-site within a 500m radius of the site. The piezometric contours accessed via Canterbury Maps indicate that groundwater flow in the area is generally to the southeast.

Figure 3: Nearby consents obtained from Canterbury Maps, February 2023

Please refer to **Appendix A – Preliminary Site Investigation (PSI)** for the active consents and locations.

Summary of selected nearby ECan's Groundwater well data is shown in Table 4.

Table 4: Summary of Selected Nearby ECan Groundwater Well Data

ECan Well	Dill/Read Date	Well Location (to site centre, Wakanui Creek)	Depth to Gravel	Initial GWL	Min GWL	Max GWL	Borehole elevation (LVD37)*
K37/0391	~1794	On site 270m E	No Log	2.11m	2.83m	1.56m	110.24 MSL
K37/2576	2010	295m NW	0.5m	2.94m	-	-	113.72 MSL
K37/2568	2005	215m N	3.0m	5.4m	-	-	112.30 MSL
K37/0971	1999	360m NE	1.2m	2.5m	4.0m	4.0m	111.83 MSL
K37/1424	~1945	600m E	No Log	2.6m (median)	Dry	-	110.97 MSL
K37/2444	2005	240 m W	No Log	4.0m	-	-	118.87 MSL

- Data from ECan well database, elevation accuracy <5m. Average elevation on site approximately 110 MSL LVD37

The groundwater was encountered across the majority of the site between 2.2 to 3.8m below existing ground level (EGL).

Please refer to **Appendix B – Geotechnical Report (4330) – Farm Road, Ashburton** for the detailed hydrogeology assessment to the site.

2.5 ECAN LISTED LAND USE REGISTER (LLUR)

According to Listed Land Use Register, there are no identification nor information about a Hazardous Activities and Industries List (HAIL) to the site. This does not confirm that the site is not contaminated, however, it does show there are no known historical listed land use that may have caused elevated levels of potential harmful contaminants.

There are two Hazardous Activities and Industries List (HAIL) sites within 50m of the site; the Farm Road Market Garden to the South and Racecourse Road Landfill to the east of the site. Both HAIL sites,

according to ECan LLUR statement have not been investigated and over 20m away from the sites on the opposite side of their respective roads.

Davis Ogilvie Ltd has also been engaged to undertake an environmental Detailed Site Investigation (DSI) report on site prior to any development. This has been recommended in the Geotechnical report and should be reviewed in due course, and any recommendations therein be undertaken.

Please refer to A**ppendix A – Preliminary Site Investigation (PSI)** and **Appendix B – Geotechnical Report (4330) – Farm Road, Ashburton** for the detailed ECan LLUR assessment.

3.0 EXISTING INFRASTRUCTURE

3.1 ROAD NETWORK

The road frontage to the site is Farm Road and Racecourse Road. Carters Road intersection to Farm Road is within the site vicinity. Farm Road and Racecourse Road are both secondary collector road with speed environment of 60km/h. Both of those roads are sealed and two-way traffic flow.

3.2 WATER NETWORK

There is a DN200 uPVC public watermain along Farm Road from Middle Road to Racecourse Road. The water pressure along Farm Road waterman in peak demand is around 332 kPa. There are fire hydrants located along Farm Road watermain.

3.3 WASTEWATER NETWORK

There is existing DN150 to DN225 uPVC public wastewater main along Farm Road that will convey wastewater by gravity system into public wastewater network along Farm Road, Carters Road, to the new proposed wastewater pump station located in Allens Road. The wastewater pipeline is not ready for commission and we understand the new system is programmed to be commission in August 2023.

3.4 STORMWATER NETWORK

There is roadside swale along Farm Road from the South-West of the site that conveys stormwater from the Coniston Drive catchment to Wakanui Creek. At the North-East of the development there is an unprofiled “V” shaped roadside channel along Farm Road that conveys surface runoff from Farm Road and Racecourse Road to Wakanui Creek.

The site is within Council’s existing stormwater discharge consent CRC186263 – To discharge stormwater to land and water from existing and future urban areas.

3.5 POWER AND TELECOMMUNICATION NETWORK

There is power, telecommunication and fibre optic cables along Farm Road and Racecourse Road adjacent the site.

3.6 RECREATIONAL AREA

Argyle Park is within 500m, immediately South West of the site.

4.0 PROPOSED SITE DEVELOPMENT

It is proposed the site to be re-zoned and undertake a proposed subdivision in the future.

The proposed concept scheme plan for the Coniston Park subdivision shows approximately 167 proposed low-medium density residential lots, associated roading, stormwater reserve and recreational reserve area surrounding Wakanui Creek as shown in Figure 5 and **Appendix C – Concept Scheme and Design Plans.**

Figure 5: Concept Scheme Plan (Plan 30625-PL01)

5.0 PROPOSED INFRASTRUCTURE DEVELPMENT

5.1 EARTHWORKS

The overall site is relatively flat. Water, wastewater, stormwater, power and telecommunication infrastructure will be trenched excavation for pipe or duct installation. The trenches will be backfilled with site material and imported material where necessary.

In Figure 6, the major cut-excavation area will be the construction of two proposed stormwater soakage basins with 1.5m depth from existing ground level. The major fill-excavation area will be formation of the road and upgrading the existing crossing to road crossing across Wakanui Creek.

Figure 6: Excavation (Cut and Fill) Heat Map

Subject to detailed design the estimate volume of earthworks is shown below:
The estimate of cut-excavation volume ranges from 6,500 to 7,000m^3.
The estimate of fill-excavation volume ranges from 5000 to 5,500m^3.

All earthworks will be undertaken in accordance with the requirements of NZS 4431:2022 (Engineered fill construction for lightweight structures), and Environment Canterbury consent requirements. The general dust, erosion sediment control plan (DESCP) that could be applied to contain the sediments within the earthwork site are:

1) Silt fencing or super silt fences.
2) Sediment retention pond.
3) Sufficient vegetation riparian buffer along the creek
4) Stockpiling soil as far away from nearby waterbodies.
5) Dust management / suppression

Beside Wakanui Creek across the site, there are no ecological, cultural and archaeological significance with the site indicated in Canterbury Map and Ashburton District Plan. Any unforeseen discovery will be cover off with Accidental Discovery Protocols.

Final design, volumes, plans and a detailed dust, erosion and sediment control plan will be provided to Council during the engineering approval process.

5.2 PROPOSED WATER NETWORK

A potable water main network will be constructed within the site to service the new allotments. A new water supply main, including fire hydrants, ridermain will be required with connections to the existing public water reticulation along Farm Road.

It is proposed the site will have two new connections to the public watermain along Farm Road that is extended into the West side of the site and loop back to the public watermain at the East side of the site. This will ring-main the site providing a “two-feed system” with a minimum pipe size of 150mm internal diameter.

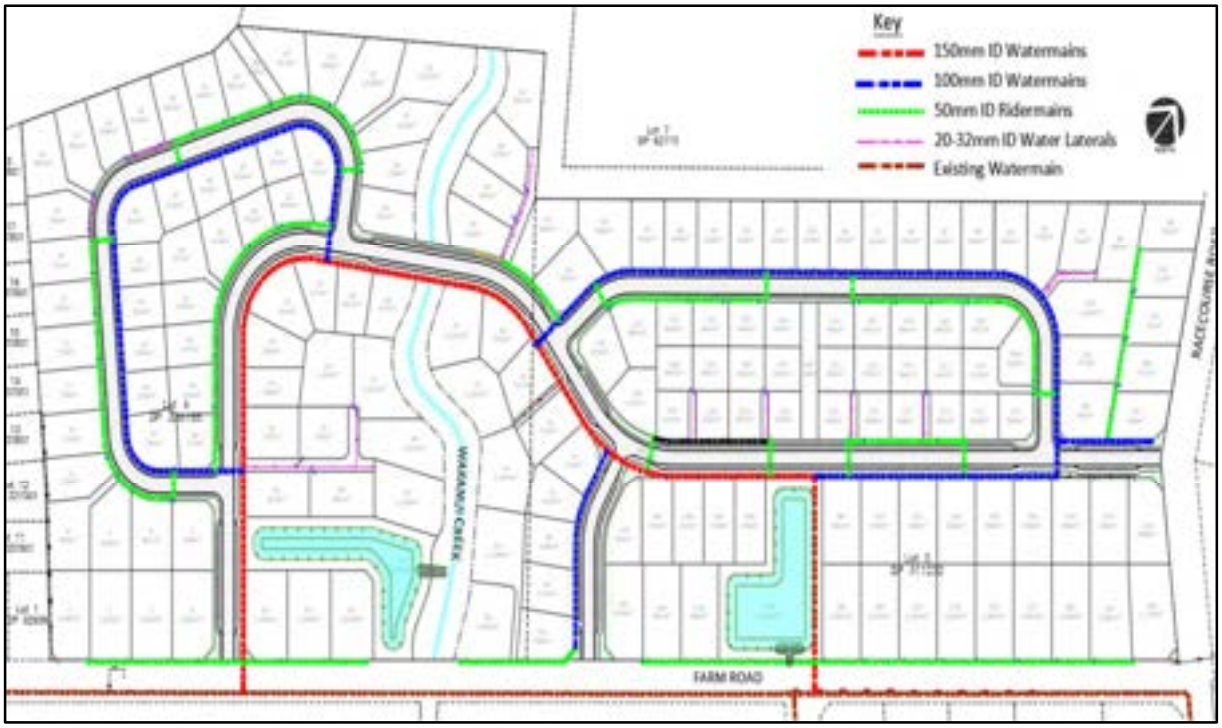

Figure 7: Proposed conceptual watermain connection and network within the site

If the public water network were to be extended in the future to the North of Racecourse Road, the 100mm internal diameter watermain in the road reserved has been considered in the design to allow future connection to provide additional water network capacity, resilience and security of water supply to the site.

Fire hydrant hydrants and spacing will be in accordance with SNZ 4509 and the water main layout will be in accordance with ADC requirements. Final details and design will be provided through the engineering approval process.

Please refer to **Appendix C – Concept Scheme and Design Plans** for the feasible water pipe reticulation design.

5.2.1 WATER DESIGN AND CALCULATION

EPANET water model was used to model the water reticulation of the site. The design water modelling parameters is shown in Table 8.

Model	EPANET
Hydraulic Calcs	Darcy Weisbach equation
Pipe Roughness	0.015
Average Daily Demand per property*	980 L/property/day
Peak Daily Demand per property*	2230 L/property/day
Leakages per property*	150 L/property/day
Number of Property	167
Fire Fighting	2 x Fire Hydrant at 12.5 L/s each (total 25 L/s)
Minimum Pressure in property (FH)	12m (120 kPa)
Minimum Pressure in watermain (FH)	12m (120 kPa)

** Information provided by Ashburton District Council.*

Table 8: Water model design and simulation parameters

ADC have no specific information on the watermain pressure along Farm Road near the site, therefore pressure information from the nearby network was provided by ADC which allows for a pressure correlation to the watermain along Farm Road.

The water pressure that was used for correlation is from a monitored point at 239 Racecourse Road shown in Table 9.

	Pressure in the main at various Demand Flow			
Council Asset ID	0L/min	810 L/min	1500L/Min	Maximum flow
ASH2008DWWHY6986	332 kPa	307 kPa	274 kPa	274 kPa

Table 9: 239 Racecourse Road Water Network Pressure

We estimate the current Farm Road average pressure is 300kPa and minimum water pressures to be 274 kPa and that internal modelling will then allow main sizing so that SNZ PAS 4509:2008 – New Zealand Fire Service – Fire Fighting Water Supplies Code of Practice (SNZ 4509) Requirements can be met.

Table 10 shows the pressure ranges for a number of peak demand scenarios using a “two-feed system”.

Farm Road Main Pressure at 300 kPa	
Pressure range within property for no Fire Fighting	270 – 300 kPa
Pressure range within property during Fire Fighting	210 – 300 kPa
Pressure range of watermain in the site for no Fire Fighting	270 – 300 kPa
Pressure range of watermain during Fire Fighting	220 – 300 kPa
Farm Road Mains Pressure at 274 kPa	
Pressure range within property for no Fire Fighting	240 – 270 kPa
Pressure range within property during Fire Fighting	180 – 270 kPa
Pressure range of watermain in the site for no Fire Fighting	250 – 270 kPa
Pressure range of watermain during Fire Fighting	190 – 270 kPa

Table 10: Peak Demand scenario in two-feed system to the site

Table 11 shows the worst-case (fire-fighting) scenario during peak demand of the site in a “one-feed system”. The network within the site will still have sufficient residual pressure to meet the minimum operating pressure parameters.

Farm Road Mains Pressure at 300 kPa	
Pressure range within property during Fire Fighting	160 – 300 kPa
Pressure range in watermain during Fire Fighting	170 – 300 kPa
Farm Road Mains Pressure at 274 kPa	
Pressure range within property during Fire Fighting	130 – 270 kPa
Pressure range in watermain during Fire Fighting	140 – 270 kPa

Table 11: Peak Demand scenario in one-feed system to the site

Please refer to **Appendix D – Farm Road Water Model Report (EPANET)** for model scenario outputs.

5.3 PROPOSED WASTEWATER NETWORK

The entire site can be serviced via a gravity network with DN150 uPVC SN16 pipe at minimum grades of 1 in 182 (0.55%) as per NZS 4404:2010 to ensure self-cleaning of grit and debris can be achieved. All wastewater laterals will be minimum DN100 SN16 uPVC on a minimum grade of 1.65%.

Manhole structures will be precast concrete manhole will be design and installed in accordance to AS/NZS 4058, NZS 3109 and NZS 4404 standards. Stepped rung will be included to all manhole structures.

The site is separated into three wastewater catchments (Orange, Pink and White). Two new wastewater connections via new manholes in public wastewater main along Farm Road are proposed to service the Western (Orange) and Eastern (Pink) sub-catchment respectively as shown in Figure 12. The proposed lots that have Farm Road frontage (White catchment) will connect directly to the existing public wastewater main along Farm Road.

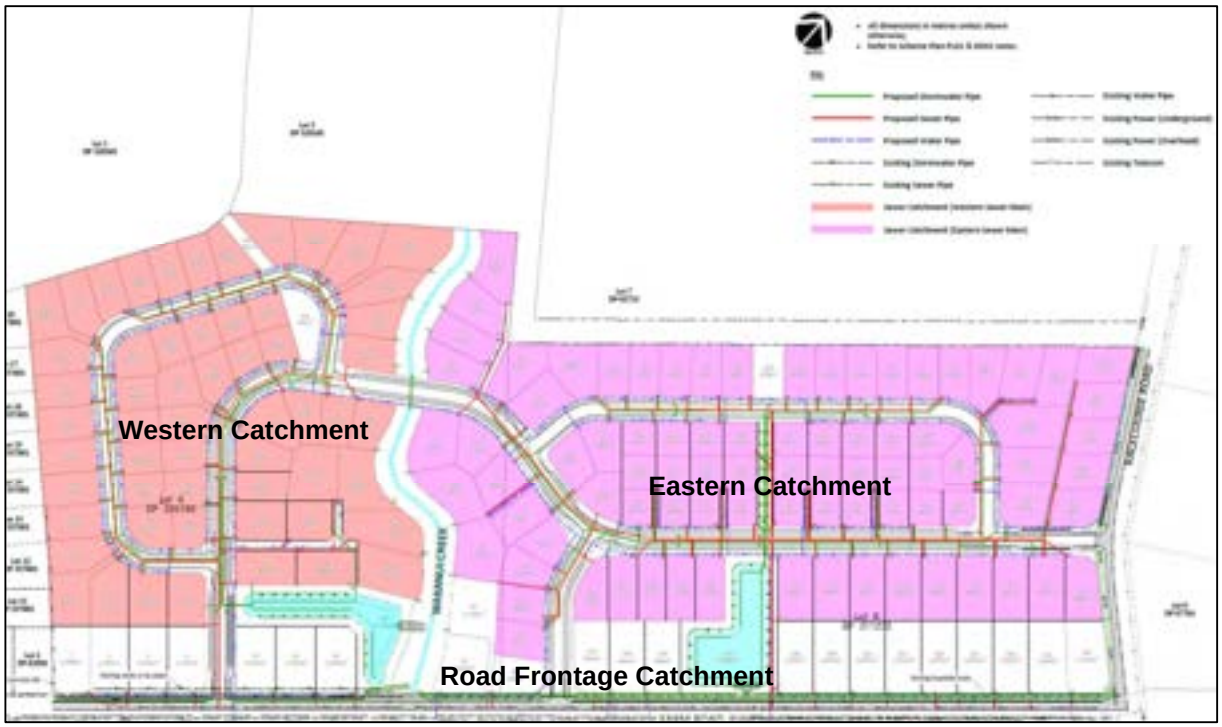

Figure 12: Proposed conceptual wastewater sub-catchments, connections and network within the site

Feasibility design shows reticulation will comply with the capacity, and cover requirements of NZS 4404:2010 and ADC engineering standard and specifications. Final details and design will be provided through the engineering approval process.

Currently the new public wastewater main along Farm Road is programmed to be commission around August 2023.

Please refer to **Appendix C – Concept Scheme and Design Plans** for the wastewater pipe reticulation feasibility design.

5.3.1 WASTEWATER DESIGN AND CALCULATIONS

Wastewater design flow parameters is as per NZS 4404:2010 for residential flows.

(i) Average dry weather flow of 250L per day per person

(ii) Dry weather diurnal Peaking Factor of 2.5

(iii) Dilution/infiltration factor of 2 for wet weather

(iv) Number of people per allotment = 2.5

Sub - Catchment	No. Allotments serviced	Peak Wet Weather Design Flow (L/s)	Internal Pipe Size	Pipe Material	Grade to the main	Maximum Pipe Capacity (L/s)
Western (Orange)	57	2.06	150 mm	uPVC	0.55%	13.35
Eastern (Pink)	87	3.15	150 mm	uPVC	0.55%	13.35

Table 13: Pipe Flow and Capacity

The calculation shows in Table 13 shows DN150 uPVC pipe at 0.55% grade has sufficient capacity to convey the wastewater from the site into the new public wastewater main along Farm Road.

NZS 4404:2010 has noted that in practical terms, in a catchment not exceeding 250 dwelling units, and where no pumping station is involved, DN150 pipes laid within the limits of minimum grades for wastewater pipes and for property connections and permanent ends will be adequate without specific hydraulic design.

5.4 PROPOSED STORMWATER NETWORK

Geotechnical and Infiltration investigations, were carried in March 2023 to carry out geotechnical assessment and soakage capabilities for the site.

Appendix B – Geotechnical Report (43340) – Farm Road, Ashburton provides detail geotechnical assessment to the site.

Appendix E – Infiltration Test Memorandum Report provides soakage locations, testing and analysis. The falling-head infiltration test method was carried out to the 13 locations across the site.

From the geotechnical and infiltration report, part of the site has identified to have a soakage rate suitable for discharge to ground for stormwater management. It is difficult to identify specific allotments that could be discharge to ground, however, it is an option that can be considered. The landowner will need to carry out additional infiltration tests to ensure stormwater discharges to ground can meet the Building Code E1/VM1. Figure 14 below shows the general delineation of areas based on the infiltration test results that may be suitable for soakage (Green area) and areas that may not be suitable for soakage (Red area).

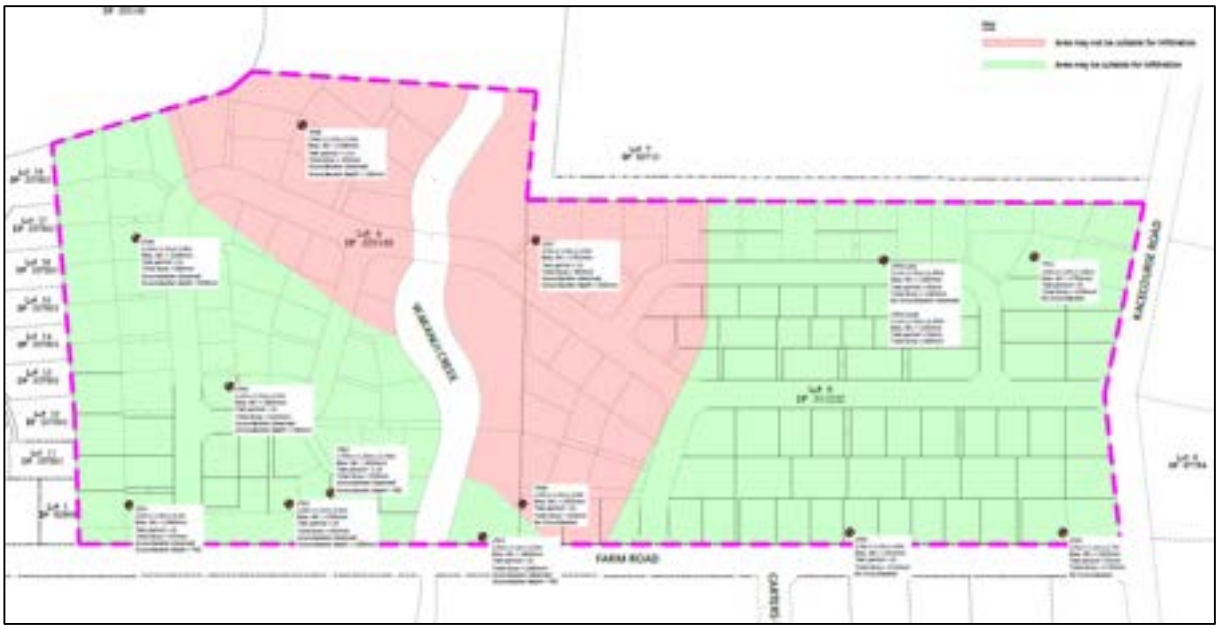

Figure 14: Potential soakage area (Green), unsuitable soakage area (Red)

The proposed discharge to ground is not within any Drinking Water Protection Zone. The closest bore with Drinking Water Protection Zone is K37/1703 approximately 300m southwest from the site location as shown in Figure 15.

Figure 15: Drinking Water Protection Zone shown in purple circle

There are 24 off-site registered active consents to take groundwater within a 500m radius of the site which has been identified in **Section 2.4** within this report.

Active bore BY21/0456 is the closest with approximately 100m distance to the site. There is public water network in vicinity and the surrounding area is being supplied by Council water supply. It is likely domestic water is supplied from Council network to this site and uses the bore as stock or irrigation water purposes.

Implication of the groundwater quality impact and bores separation from the site stormwater discharges to ground are discussed in **Section 5.4.3** and **Section 5.5** within this report.

The proposed stormwater network will be designed with sufficient capacity to collect runoff from all allotments, adequate treatment and attenuate prior to discharging to ground and Wakanui Creek. This is to ensure the site stormwater infrastructure has sufficient capacity if all allotments choose to manage their stormwater within their site.

Two proposed public stormwater soakage basins on each side of the creek will be designed to provide stormwater first flush treatment and attenuation.

The soakage basins will be designed generally in accordance with Christchurch City Council Waterways, Wetlands and Drainage Guide (WWDG), engineering best practices and the principles as shown in Figure 16.

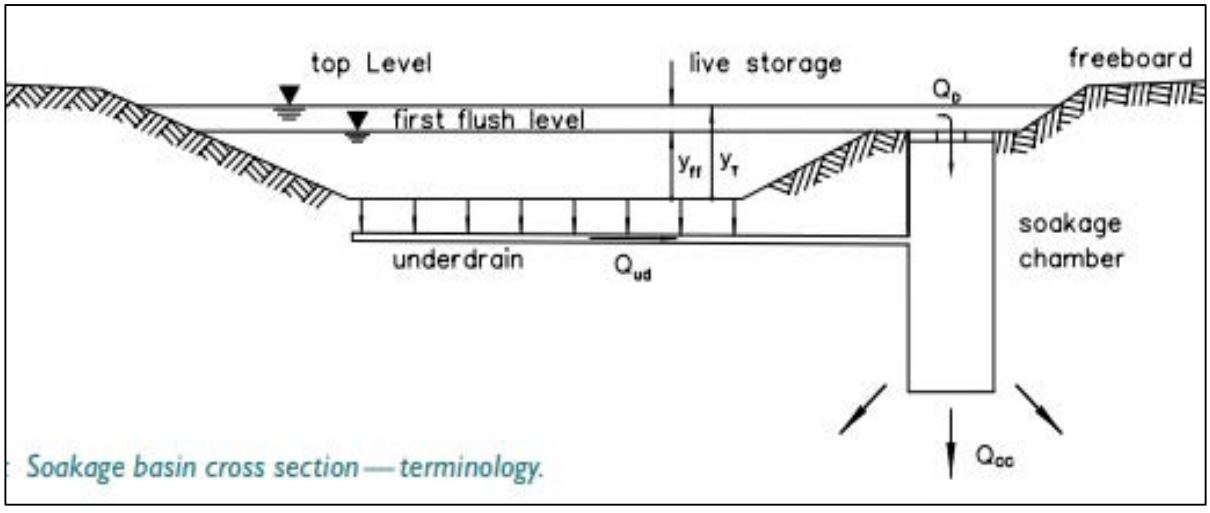

Figure 16: WWDG Typical soakage basin cross section

Gravity stormwater reticulation has been designed in accordance with the NZS 4404:2010 which will convey stormwater runoff collection from each allotment and road reserve to the respective proposed stormwater soakage basin.

To minimise reticulation and global attenuation sizes, it is proposed that each allotment will be required to install a rain tank of a minimum 5000L storage. The tank will have 24mm discharge orifice size to provide stormwater attenuation prior to discharge to the stormwater reticulation or into the Wakanui Creek. Example of a 5000L slim line rain tank is shown in Figure 17.

(Source: https://www.watertankfactory.com.au/water-tanks/5000-litre-slimline-steel-water-tank-skinny/)

Figure 17: 5000L slimline rain tank

Manhole structures will be precast concrete manhole will be design and installed in accordance to AS/NZS 4058, NZS 3109 and NZS 4404 standards. Stepped rungs will be included to all manhole structures.

There are two stormwater sub-catchments in this development, each with associate treatment and attenuation system. The stormwater attenuation and treatment basins are shown in light blue shown in Figure 18.

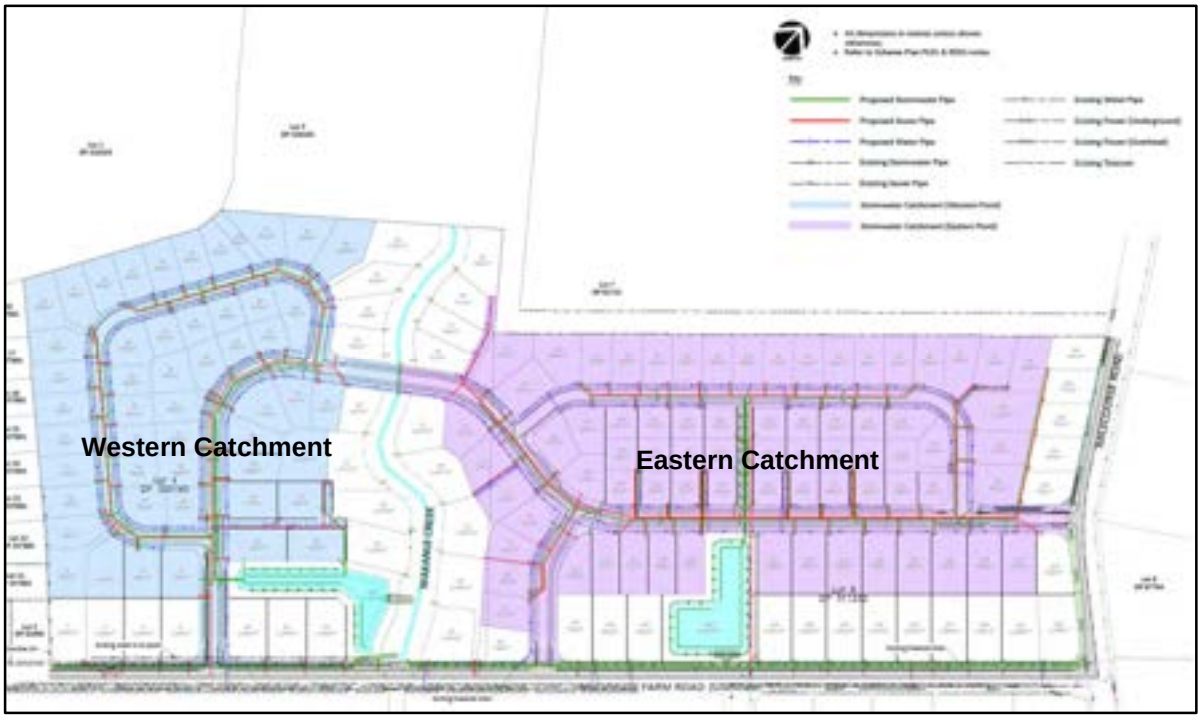

Figure 18: Proposed conceptual stormwater sub-catchments and network within the site

The conceptual infiltration/soakage basin plan is shown in Figure 19. The first flush volume shown as highlighted blue area will be collected and treated within the soakage basin by sedimentation and filtration. The solid blue line is the maximum pond water level for attenuation and any discharge to the overflow weir is the pre-development discharge flow to Wakanui Creek.

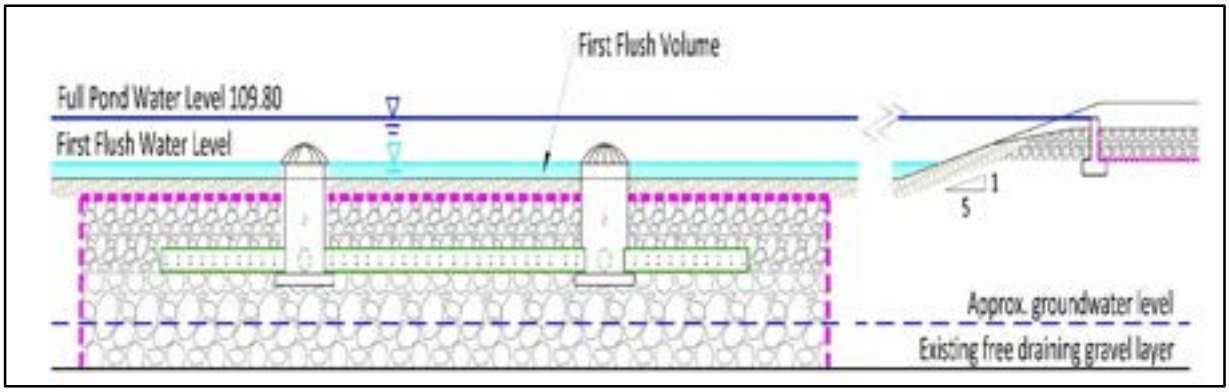

Figure 19: Conceptual infiltration basin cross section

In principle, the soakage basin is designed to treat the first 25mm first flush rain depth, store and soak the additional flow from the post-development to ensure the total flow discharging into Wakanui Creek is less than or equal to the pre-development flow.

There is an existing stormwater swale at the Western side of Farm Road within the site which collects and convey stormwater discharge from the existing DN525 concrete (RCRRJ) stormwater main to Wakanui Creek as shown in Figure 20.

Figure 20: Existing DN525 Pipe (Green line) and Swale (Red line)

The site has multiple road frontages from allotments and road access crossing to the existing swale. Coniston Park Ltd ideally would like to convert the existing swale into a pipe network with similar pipe diameter to the upstream network in order to maximise the development area and provide better accessibility direct onto Farm Road. Existing and/or proposed easement(s) will need to be confirmed to protect the relevant infrastructure/pipeline.

It is anticipated to have further discussion with Council to finalise the preference for this section of pipework or conveyance system.

Please refer to **Appendix C – Concept Scheme and Design Plans** for the typical stormwater pipe reticulation, soakage basin design and secondary flow.

5.4.1 STORMWATER DESIGN AND CALCULATIONS

The following design parameters have been used for the stormwater flows for the relevant design storm to meet the ADC stormwater discharge consent (CRC186263).

Rain Intensity Data: NIWA High Intensity Rainfall Design System (HIRDS) V4
Climate Change (CC): RCP 8.5 for period 2081-2100
Primary reticulation design storm: 10% AEP + CC
Secondary reticulation design storm: 2% AEP + CC
Critical Duration for Mill Creek Catchment: 48hrs

Rainfall intensities have been sourced from HIRDS for 10% and 2% AEP + RCP 8.5 Scenario for the period 2081-2100 shown in Table 21.

Duration	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h
Depth (mm)	10%	11.7	14.8	17.3	23.5	32.5	54.3	74.4	99.6	130
Rainfall Intensity (mm/hr)	10%	70.0	44.3	34.7	23.5	16.2	9.05	6.20	4.15	2.71
Depth (mm)	2%	18.4	23.1	26.9	36.2	49.4	81.4	110	146	189
Rainfall Intensity (mm/hr)	2%	110	69.2	53.8	36.2	24.7	13.6	9.19	6.08	3.93

Table 21: HIRDS for 10% and 2% AEP + 8.5 RCP Scenario for the period 2081-2100

The stormwater pipework will be design using the primary reticulation design storm. The stormwater soakage basin will be designed using the secondary reticulation design storm and to attenuate 2% AEP 48hrs duration + CC.

The soakage basins are designed to discharge additional flows from the site into the ground. High factor of safety was used to each soakage basin to account for long-term creep effectiveness reduction of soakage, groundwater influences to soakage rate and capacity. From **Appendix D – Infiltration Test Memorandum Report**, infiltration rate for each soakage basin can be derived as shown in Table 22.

	Western Soakage Basin	Eastern Soakage Basin
Infiltration Test Pit Number	STP2	STP4
Test Infiltration Rate	420 mm/hr	1200 mm/hr
Factor of Safety	3	4
Design Infiltration Rate	140 mm/hr	300 mm/hr

Table 22: Design Infiltration Rate for each Soakage Basin

The runoff coefficient for each surface is as below which are used to calculate the weighted post-development coefficient runoff factor for each sub-catchment respectively:

Sealed and hardstand area (e,g road) = 0.9
Roof surface = 0.9
Grass = 0.3

Therefore, the critical period for soakage basin volume and the soakage pit storage area can be calculated with each 2% AEP duration. From the calculation, both soakage basins critical period is 2% AEP 12hr duration where the total attenuation volume within the pond (H) and total volume difference from Pre and Post development (C) is the least.

Table 23 and 24 shows the summary of the soakage basin calculations on each side of Wakanui Creek respectively. Please refer **Appendix F – Soakage Basin Calculations** for further calculation details.

Western Soakage Basin:
Catchment area = 6.42 ha

Pre-development Coefficient Runoff Factor = 0.300

Weighted Post-Development Coefficient Runoff Factor= 0.664

Duration (min)	A	B	C
	Total volume (Post) during the event (m^3)	Total volume (Pre) during the event (m^3)	Total volume (Post - Pre) during the event (m^3)
10	781	353	428
20	983	444	539
30	1146	518	628
60	1543	697	845
120	2105	951	1154
360	3478	1572	1906
720	4700	2124	2576
1440	6219	2810	3408
2880	8039	3633	4406

Duration (min)	D	E	F	G	H
	Allotment Tanks Total Storage (m^3)	Total Pond Storage (m^3)	Volume soaked away during the event (m^3) Infiltration = 140mm/hr	Soakage volume storage, depth = 0.6m (m^3)	Total Attenuation (m^3) (D+E+F+G)
10	330	977	4	171	1482
20	330	977	14	171	1492
30	330	977	25	171	1503
60	330	977	64	171	1542
120	330	977	150	171	1628
360	330	977	522	171	2000
720	330	977	1100	171	2578
1440	330	977	2278	171	3756
2880	330	977	4666	171	6144

Duration (min)	H	C	Criteria
	Total Attenuation (m^3) (D+E+F+G)	Total volume (Post - Pre) during the event (m^3)	H > C
10	1482	428	Achieved
20	1492	539	Achieved
30	1503	628	Achieved
60	1542	845	Achieved
120	1628	1154	Achieved
360	2000	1906	Achieved
720	2578	2576	Achieved
1440	3756	3408	Achieved
2880	6144	4406	Achieved

Table 23: Western Soakage Basin Pond Calculation Summary

Eastern Soakage Basin:
Catchment area = 9.255 ha

Pre-development Coefficient Runoff Factor = 0.300

Weighted Post-development Coefficient Runoff Factor = 0.662

Duration (min)	A	B	C
	Total volume (Post) during the event (m^3)	Total volume (Pre) during the event (m^3)	Total volume (Post - Pre) during the event (m^3)
10	1123	509	614
20	1413	640	772
30	1648	747	901
60	2217	1005	1212
120	3026	1372	1654
360	4998	2266	2732
720	6754	3062	3692
1440	8937	4052	4886
2880	11554	5238	6316

Duration (min)	D	E	F	G	H
	Allotment Tanks Total Storage (m^3)	Total Pond Storage (m^3)	Volume soaked away during the event (m^3), Infiltration = 300mm/hr	Soakage volume storage, depth = 0.8m (m^3)	Total Attenuation (m^3) (D+E+F+G)
10	505	1512	6	114	2137
20	505	1512	20	114	2151
30	505	1512	36	114	2167
60	505	1512	92	114	2223
120	505	1512	216	114	2346
360	505	1512	747	114	2877
720	505	1512	1543	114	3704
1440	505	1512	3257	114	5388
2880	505	1512	6669	114	8800

Duration (min)	H	C	Criteria
	Total Attenuation (m^3) (D+E+F+G)	Total volume (Post - Pre) during the event (m^3)	H > C
10	2137	614	Achieved
20	2151	772	Achieved
30	2167	901	Achieved
60	2223	1212	Achieved
120	2346	1654	Achieved
360	2877	2732	Achieved
720	3704	3692	Achieved
1440	5388	4886	Achieved
2880	8800	6316	Achieved

Table 24: Eastern Soakage Basin Pond Calculation Summary

5.4.2 SECONDARY RETICULATION SYSTEM

For events greater than the stormwater reticulation design event, excess surface runoff within the site will be conveyed within the road carriageway via road carriageway and swales to the soakage basin. Within this period, the soakage basin will be full and any excess stormwater will overflow to Wakanui Creek. The secondary flow path is shown in dark and light blue arrows as shown in Figure 25.

Figure 25: Stormwater Secondary Flow Path

While no flood risk was identified from the available territorial authority sources, it is noted that potentially significant flooding may occur in the event of an upstream river breach of the Ashburton River. It is recommended that finished floor level requirements are confirmed with ECan and ADC at the subdivision stage.

5.4.3 STORMWATER QUALITY

The soakage basin will be designed to capture the first flush volume and treat on average at least 80% of annual run-off from impervious areas of the site. 25mm rain depth was used to calculate the first flush volume for each soakage basin.

First Flush Volume in Western Soakage Basin = 597m^3
First Flush Volume in Eastern Soakage Basin = 852m^3

The surface runoff will be conveyed via kerb and channel to collector sumps within the road network. The sump with a drowned outlet and sediment trap will provide pre-treatment for larger size, heavier gross pollutant and hydrocarbons prior to discharging into the network and the soakage basins.

The soakage basins will provide the first flush treatment with the following pollutant removal efficiency (%) from WWDG document shown in Table 26.

	Pollutant Removal Efficiency (%)					
	Total Suspended Solids (TSS)	**Phosphorus**	**Nitrogen**	**BOD**	**Trace Metals**	**Bacteria**
Soakage Basin	60-100	40-80	40-80	20-60	40-100	60-100

Table 26: WWDG Chapter 6 - Pollutant Removal Efficiency (%)

Using NIWA Urban Runoff Quality Information System (URQIS) to provide the predicted contaminants for the site. The proposed soakage basin for treatment to the site is sufficient to meet the Land and Water Regional Plan (LWRP) Schedule 5 Limits for 95% Level of Protection to species and the Groundwater Limits shown in Table 27.

Contaminants	**URQIS Pre-Treatment Mean concentration**	**Pollutant Removal Efficiency (Average %)**	**Predicted average concentration after treatment**	**LWRP Schedule 5 Limits (95% protection)**	**LWRP Groundwater Limits**
TSS	120 mg/L	80	24 mg/L	50 mg/L	
Dissolved Zinc	0.11 mg/L	70	0.033 mg/L	8.0 mg/L	
Dissolved Copper	0.0082 mg/L	70	0.00246 mg/L	1.4 mg/L	1 mg/L
Dissolve Lead	0.00035 mg/L	70	0.000105 mg/L	3.4 mg/L	0.005 mg/L
Dissolved Reactive Phosphorus (DRP)	0.032 mg/L	60	0.0128 mg/L	0.016 mg/L	
Dissolved Inorganic Nitrogen (DIN)	0.54 mg/L	60	0.216 mg/L	1.5 mg/L	
Total Nitrogen (TN)	2mg/L	60	0.8 mg/L		5.63 mg/L
E-coli	1200 cfu/100mL	80	240 cfu/100mL	550 cfu/100mL	< 1 cfu/100mL

Table 27: Pre- and Post-Treatment contaminants concentration

5.5 GROUNDWATER E-COLI ASSESSMENT

To assess the potential effects of the proposed discharge of treated stormwater to land, the potential concentration of microbes in the shallow groundwater system have been assessed below.

Pathogens in the treated stormwater water will dieback as it filters through the soakage pits and the underlying vadose (or unsaturated) zone, and then as it travels through the shallow groundwater system. Aquifer removal rates and the methodology outlined in Pang 2009[1] were used to estimate the separation distance required to ensure that downgradient groundwater has a virus concentration of < 1 per L, i.e. downgradient groundwater will comply with the drinking water standards. The analysis is

([1]) Pang 2009, entitled 'Microbial removal rates in subsurface media estimated from published studies of field experiments and large intact soil cores', (J. Environ. Qual.; 38, 15311559

summarised in Table 28 below and confirms that the discharge of treated stormwater will have a very localised effect on *E-coli* concentrations and is not expected to affect any downgradient wells.

Table 28: Stormwater discharge to ground – *E-coli* assessment

Parameter	**Values**
Method used	Pang 2009 L = n / lamda Where: L= horizontal setback distance (m) n= reduction required (log_{10}) to get to drinking water standard lamda = removal rate (log_{10}/m
n= reduction required (log_{10})	Two values assessed Log_{10} (240) = 2.38 expected discharge *E-coli* concentration (post treatment) Log_{10} (1200) = 3.08 expected stormwater *E-coli* concentration (pre-treatment)
Lamda = removal rate (log_{10}/m)	Three values assessed all from Pang 2009 and for gravels with clean water (not wastewater) discharges 0.0292 log_{10}/m = geomean 0.0205 log_{10}/m = minimum 0.0380 log_{10}/m = maximum

Results					**Comment**
		Separation distance required (m)			
		Removal Rate log_{10}/m			
Parameter	Value	geomean 0.0292	minimum 0.0205	maximum 0.0380	
Reduction required n (Log_{10})	2.38 (discharge post treatment)	**82**	**116**	**63**	Closest bore BY21/0456 100m downgradient. The bore is likely used as stock water purposes. Closest drinking water protection bore K37/1703 300m and are well outside required separation distance.
	3.08 (stormwater pre treatment)	**106**	**150**	**81**	

6.0 COMMON SERVICES TRENCHING

Services including water, power and telecommunications will be installed within a common services trench to be generally located within the berm area of the road. Telecommunication and Power reticulation design will be undertaken by the network authority. All works carried out will meet the requirements of the network operators.

7.0 POWER AND TELECOM

Chris Cunneen Underground Manager of EA Networks has confirmed capacity to service the site. EA Networks will do the concept design for the power and telecom in conjunction with development scheme plan layout.

Final details and design will be provided through the engineering approval process.

8.0 STREET LIGHTING

Lighting will be designed to provide a minimum of P3 luminance on the roads and pedestrian areas. The lighting will be designed in accordance with AS/NZS 1158, Category P3 (NZ), V4.

9.0 ROADING AND FOOTPATH

It is proposed to have three main road connections connected to the site, two at Farm Road and one at Racecourse Road. There will be the western and eastern loop road interconnecting with the main road within the site. The transport infrastructure within the site is anticipated to be ‘Live and Play, Suburban area’ in accordance to NZS 4404:2010 Land use and area type matrix.

The conceptual road layout is inter-connected within the site and three connections to the wider public transport network. The main road and the loop road within the site will have reduced speed to discourage through traffic and to create highly useable public space which can be enjoyed by all members of the community.

The carriageway pavement, footpath, vehicle access, kerb and channel will be design in accordance to NZS 4404:2010, Austroads Guide to Road Design, ADC District Plan requirements and standards.

Please refer to **Appendix C – Concept Scheme and Design Plans** for the typical road carriageway design and layout.

Typical cross section of the main road reserve shown in Figure 29.

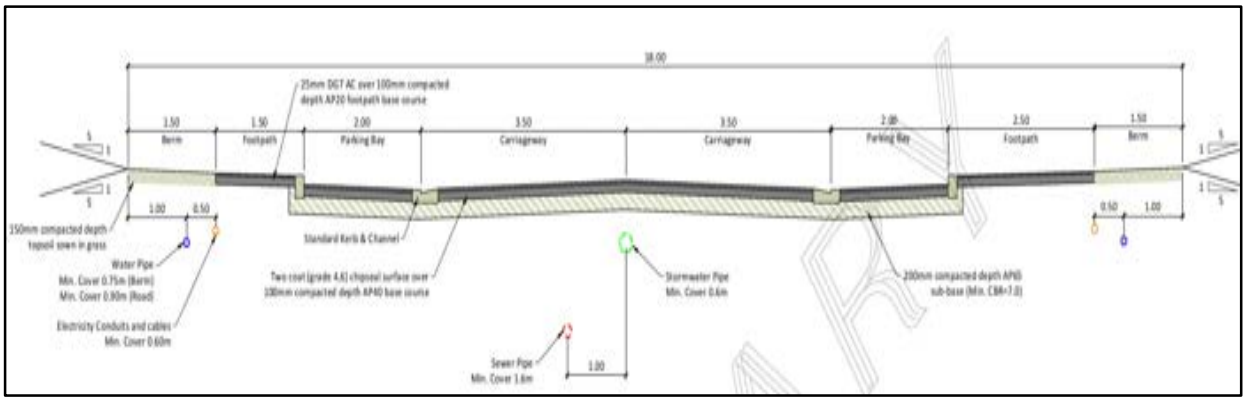

Figure 29: Typical main road reserve cross-section

The conceptual design for the main road reserve is 18m width for two-way traffic flow, parking bays, kerb and channel, grass berm and footpath at both sides.

One side of the footpath within the main road reserve is designed to have a 2.5m width shared footpath that provide sufficient space for both pedestrian and cyclist to use to be able to have better connectivity and access to Wakanui Stream and Argyle Park.

Typical cross section of the western and eastern loop road reserve shown in Figure 30.

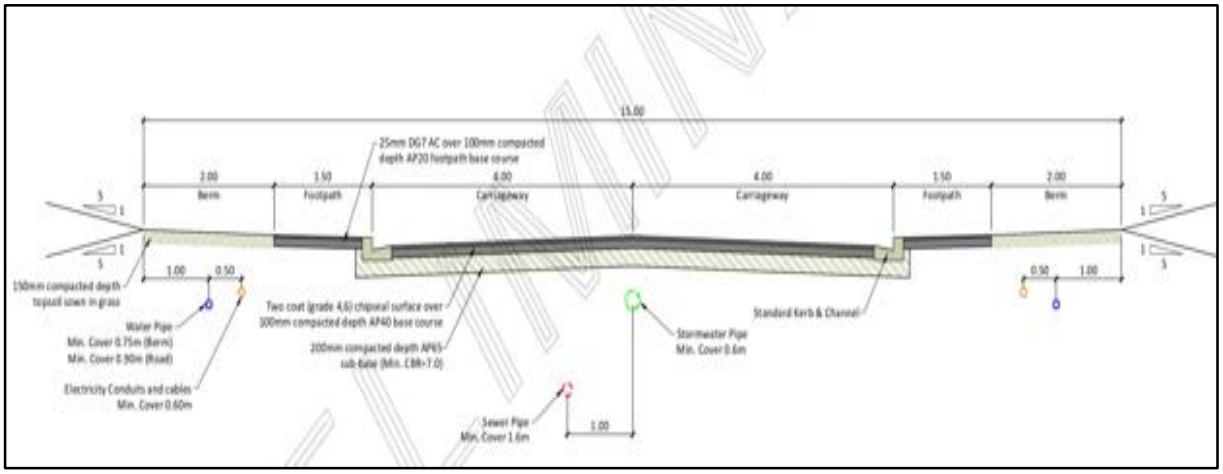

Figure 30: Typical western and eastern road reserve cross-section

The conceptual design for the western and eastern road reserve is 15m width for two-way traffic flow, kerb and channel, grass berm and footpath at both sides.

9.1 NETWORK CONNECTIVITY

The proposed the main road within the site is designed to have two road linkages to Farm Road and one road linkage to Racecourse Road to have a total of three alternative routes for all types of users. The road layout design is to achieve short travel distance less than 400m from a lot to a connector/collector or arterial road as per NZS 4404:2010 for a suburban area.

The conceptual road and footpath design layout has adopted New Zealand Urban Design Protocol utilizing Wakanui Stream, Argyle Park and the nearby modern residential environment and surroundings to improve access, promote neighborhood, well-being and attractive places.

9.2 TARGET OPERATING SPEED AND VISIBILITY

Based on NZS 4404:2010, the target operating speed for a “Live and Play” suburban area with the proposed road reserve width is as shown in Table 31.

Road reserve category	Road Reserve width (m)	Target Operating Speed (km/h)
Main Road	18	40
Western Loop Road	15	40
Eastern Loop Road	15	40

Table 31: Target Operating Speed for each road category to the site

All intersections will have 6m curve radii return on both side of the road that will provide more than 40m stopping sight distances for motorist within the site. For the main road that connects to Farm Road and Racecourse Road, there is more than 70m stopping sight distance as per Austroads Guide to Road Design.

10.0 SAFETY IN DESIGN

Health and safety is of paramount importance throughout the design and construction phase of any construction project. The following sections briefly discuss the proposed methodologies for each aspect of construction and the alternatives considered, along with the health and safety considerations given toward future operations and maintenance.

10.1 EARTHWORKS AND TRENCHING

Finished ground levels will be designed in such a way so as to minimise the earthworks required and trench depth within the site.

If unsuitable materials are encountered and deep excavation or trenching is required to allow removal and remediation of the land, suitable benching of the excavation and securing of the area will be utilised in an effort to minimize the risk to staff and the public. Both this methodology and/or trench shielding will

be employed wherever deep excavation, trenching (greater than 1.5 m depth) or poor ground condition is encountered.

Stock piles of top soil and silts will be located as per the Erosion and Sediment Control Plan. The banks will be sufficiently stabilised with vegetation or other methods, this will also further minimise the risk of bank collapse. The stability of the stockpiles will be ensured by achieving appropriate bank slopes and lightly compacting with the excavator bucket.

10.2 PRESSURE NETWORK

Upon completion of pipe laying, pressure testing of pipes will be undertaken. Due to the significant pressures subjected throughout the test, this exercise has the potential to be hazardous if fittings are not correctly secured. This risk can only be minimised by ensuring a suitably trained, council-approved contractor undertakes the testing. This also applies to chlorination testing; however, this can be isolated by ensuring the new network is kept separate from the live water network.

Council procedures will also be followed for livening of the new network to ensure the health risks to public are minimised.

10.3 SERVICES

Overhead and underground services, namely live telecommunications and power, pose a significant risk of injury. This will be minimised by the contractor employing the following methodology:

1. The contractor must obtain as-built plans from all relevant service providers. Always retain a copy of the plan on site.
2. The contractor must have a suitably trained cable/service locator mark out all existing services.
3. Follow service provider guidelines for excavation.
4. Always have a spotter present when working in the vicinity of existing services.

10.4 MAINTAINANCE CONSIDERATION

Health and safety during the operational phase of the stormwater and sanitary wastewater has also been addressed via the use of large access manholes and low battered grades for height changes. This will allow for easy maintenance of systems and will limit any unnecessary risks required to undergo maintenance. Entry in to any chambers will require appropriately qualified and experienced staff for confined spaces access.

Stormwater swale and soakage basins have been designed with batters grades low enough to provide easy access around, into and out of the basins, as well as to allow for easy, and safe maintenance.

Sump locations and access points will allow for easy and safe maintenance via the usage of vacuum trucks/systems, however a Traffic Management Plan should be implemented for this work, as well as sweeping of kerbs. Any materials, fluids and/or debris removed from the sumps should be disposed of to an appropriate facility.

It is proposed step rungs to all manholes structures to provide easy maintenance access and recovery.

When dealing with any of the wastewater systems it should be noted that sewage is a biohazard and correct handling procedures will be needed. Safety equipment should be used at all times and any sewage removed from site needs to be disposed of to the appropriate facility. Appropriately qualified and experienced staff must undertake this work.

10.5 CONSTRUCTION

During construction Site Specific Safety Plan (SSSP) must be prepared by the Contractor and provided to the Engineer and local authority prior to any works commencing on site. The SSSP will be treated as a live document and updated regularly by the main contractor when new hazards are identified.

The SSSP will assist in the recording of hazard identification and management; investigation into incidents, including near misses; training and inducting new personnel and visitors to site; explaining the procedures for what to do in the event of an emergency; and clarification of the responsibilities of each party with regards to health and safety on the construction site.

10.6 DECOMMISSIONING

The decommissioning of any stormwater or sanitary wastewater systems would involve; removal of manhole lids, breakdown of manhole walls to 600 mm below ground level and filling of manholes with pit-run material. Similarly, the decommissioning of any other service or structure would require the demolition of the concrete walls, pipes and/or sumps to 600 mm below ground level and filling with pit run material. This process will result in a low health and safety risk; however, contractors will need to develop site specific safety plans for the planned activities.

11.0 FUTURE CAPACITY

The proposed infrastructure has surplus capacity for servicing future intensification or development within the site without needing to upgrade the services as demonstrated in the model, calculation and options within this report.

APPENDIX A – PRELIMINARY SITE INVESTIGATION (PSI)

DAVIS OGILVIE
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Authorised By:	**Gareth Oddy** Technical Director – Environmental Science CEnvP SC, BSc, MSc, IP402/405	**Signature:** 

This Preliminary Site Investigation has been prepared at the specific instruction of Coniston Park Ltd. It addresses potential land contamination conditions underlying the property at Lot 4 DP 320165 & Lot 8 DP 311232, Farm Road, Ashburton.

Davis Ogilvie did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited investigation of the site and have not been taken into account in the report.

Davis Ogilvie's opinions are based upon information that existed at the time of the production of this document. Assessments made in this report are based on the conditions found onsite and published sources detailing the recommended investigation methodologies described. No warranty is included—either expressed or implied—that the actual conditions will conform to the assessments contained in this report.

Davis Ogilvie has provided an opinion based on observations, site investigations, and analysis methodologies current at the time of reporting. The report cannot be used by any third party without the written approval of Davis Ogilvie. The report cannot be used if there are changes in the referenced guidelines, analysis methodologies, laws, or regulations.

Only Coniston Park Ltd. and the Local and Regional Territorial Authorities are entitled to rely upon this engineering report. Davis Ogilvie & Partners Ltd. accepts no liability to anyone other than Coniston Park Ltd. in any way in relation to this report and the content of it and any direct or indirect effect this engineering report may have. Davis Ogilvie & Partners Ltd. does not contemplate anyone else relying on this report or that it will be used for any other purpose.

Should anyone wish to discuss the content of this report with Davis Ogilvie & Partners Ltd, they are welcome to contact us on (03) 366 1653 or at Level 1, 24 Moorhouse Ave, Addington, Christchurch.

Sovereign Palms Ltd. engaged Davis Ogilvie to complete a Preliminary Site Investigation (PSI) at Lot 4 DP 320165 & Lot 8 DP 311232, Farm Road, Ashburton. We understand Coniston Park Ltd. are proposing to develop the site with a residential subdivision.

1.1 Objectives of the Assessment

The objective of this PSI was to evaluate the following:

- Whether there has been (or is more likely than not to have been) a potentially contaminating land use at the site and specifically within the proposed footprint of the new stormwater management area.
- The nature and source of probable contaminants.
- The possible locations of contamination.
- Known or potential exposure pathways by which identified receptors could be exposed to the contaminants, under current or known proposed future land use.
- Known or potential human and ecological receptors that could be exposed to contaminants.
- Potential consequences for the project.

1.2 Approach

The preliminary site investigation was completed in accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG). The PSI includes four main stages, record review, site reconnaissance, interviews with site occupants and this report summarising the information collected and assessment of potential land contamination. The following scope of work was completed:

- Review of available site records from Lot 4 DP 320165 & Lot 8 DP 311232, including property records from Environment Canterbury (ECan) and Ashburton District Council (ADC), namely, the Listed Land Use Report (LLUR) property statement, historical aerial photographs, and property file.
- Attend the site to conduct a site walk over, complete an evaluation of the land, and built assets in order to evaluate the potential for releases of hazardous substances to land.
- Interviews with site owners will be completed to understand site processes and evaluate past uses and land conditions.
- Preparation of a PSI report, including a summary of the site setting, site history, the nature and source of probable contaminants, known or potential exposure pathways and known or potential receptors. The report will be produced in accordance with the requirements of the NES CS Regulations and as per the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No.1.

2.1 Managing Contaminants in Soil to Protect Human Health (NES CS)

The NES CS for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations under the Resource Management Act (1991) came into effect on 1 January 2012. The NES CS regulates activities undertaken on contaminated land and provides nationally consistent human health risk-based standards for management of such activities. The NES CS does not include criteria for environmental risk assessment instead this relies upon the Resource Management Act (1991) and rules within Regional Plans.

The NES CS applies to 'pieces of land' on which any activity in the HAIL is 'more likely than not' to have occurred and where soil disturbance activities exceed the permitted thresholds. According to the NES regulations (8.3), disturbing the soil of the piece of land is a permitted activity while the following requirements are met:

(a) controls to minimise the exposure of humans to mobilised contaminants must—
- *(i) be in place when the activity begins:*
- *(ii) be effective while the activity is done:*
- *(iii) be effective until the soil is reinstated to an erosion-resistant state:*

(b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:

(c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2:

(d) soil must not be taken away in the course of the activity, except that —
- *(i) for the purpose of laboratory analysis, any amount of soil may be taken away as samples:*
- *(ii) for all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year:*

(e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

(f) the duration of the activity must be no longer than 2 months:

(g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

The NES CS process assessed the likelihood of contaminated soil existing at the site by way of a preliminary site investigation. If a HAIL activity is identified as having 'more likely than not' occurred, then the NES CS will be considered to apply to the site should a change in land use, subdivision and disturbing or removing the soil be required.

If these thresholds, among others, are exceeded then resource consent will be required. A resource consent application should include a Detailed Site Investigation (DSI) undertaken to establish the level of land contamination and status of the consent required (controlled versus restricted discretionary). Should the DSI indicate that soil concentrations are at / or below background values for that site then NES would be considered to no longer apply, and resource consent would not be required.

2.2 ECan Regional Plan

Regional Councils are required to manage the effects of contaminated land discharges to land, water and air. ECan has several rules relating to the assessment, management and use of sites containing contaminants in the land within their Land, and Water Regional Plan (LWRP). Additional resource consents may be required should a DSI identify that contaminants are being discharge to the environment outside of thresholds set within the LWRP.

[redacted]

The approximately 8.32 ha site with legal identifiers Lot 4 DP 320165 & Lot 8 DP 311232 are located on predominantly flat rural land in the northern area of the Ashburton township. The latest available ECan aerial photograph of the site and vicinity is provided in Figure 1 while a summary of the site details is provided in Table 1.

The site is located 750 m east from the northern branch of the Ashburton River (Hakatere), at its nearest point and is surrounded by rural-residential properties to the north, east, and south. Wakanui Creek flows southeast through the centre of the site. A developed residential subdivision is located immediately beyond the south-western site boundary.

Figure 1: Site Layout, Lot 4 DP 320165 & Lot 8 DP 311232, are indicated by the red outline (Latest aerial imagery obtained from Canterbury Maps).

Table 1: Site Details	
Item	**Description**
Address	Farm Road, Ashburton, Canterbury
Legal Description	Lot 4 DP 320165 held under title 79791 Lot 8 DP 311232 held under title 44314
Property Owner	Golden Mile Trading (Lot 4) Carl Grove Developments Limited (Lot 8)
Site Area	8.2002 ha (Lot 4) 8.12 ha (Lot 8) Total = 16.3202 ha
Territorial Authority	Ashburton District Council
Site Zoning	Residential D  **Figure 2.**

The site setting is summarised in Table 2.

Table 2: Site Setting	
Item	**Description**
Topography	The land is predominantly flat across the site. According to published elevation data on Google Earth and Canterbury Maps the site is located at an elevation of 111 to 113 m above mean sea level across the site.
Local Setting	The site is located at the north-western side of Farm Road in a rural area approximately 3.3 km north of central Ashburton. Rural-residential properties neighbour the site to the north, east and south. The site is located approximately 3.3 km north of central Ashburton on the north-western side of Farm Road. The property is in a rural area with neighbouring rural-residential properties to the north, east and south. Residential properties are located immediately south-west.
Nearest Surface Water & Use	The Wakanui Creek flows southeast through the centre of the site. The watercourse appears on the ECan River Network[1] and is classed as a 'spring fed plains watercourse'. The channel exits the southeast of the site.

3.1 Geology and Hydrogeology

The documented geology and hydrogeology of the site and surrounding area is summarised in Table 3.

Table 3: Geology and Hydrogeology	
Item	**Description**
Geology	The geological map of the area is shown in Figure 3. The published geology from GNS[2] of the site has been identified as "Modern river floodplain/low-level degradation terrace. Unweathered, variably sorted gravel/sand/silt/clay. (Q1a)". Borelogs for ECan wells K37/2568 and K37/2576, are located on neighbouring properties close to the western edge of the site. K37/2568 shows 'earth' to 1.0 m, underlain by clay to 3.0 m, followed by sandy and clayey gravel to at least 23.5 m. K37/2576 shows 'soil' to 0.5 m underlain by gravel to at least 48 m with a unit of clay from 17.0 to 18.5 m. The logs are consistent with the published geology.
Hydrogeology	According to Canterbury Maps a groundwater well, K37/0391 has been installed on the eastern side of the site according to the ECan database of wells. The well was drilled to a depth of 9.75 m in 1974 and showed an initial water level of 2.11 m below ground level, a high groundwater level of 1.56 and a low of 2.83 m below ground level. There is no well log. Piezometric contours accessed via canterbury maps[3] indicate that groundwater flow in the area is generally to the southeast. ECan wells on the neighbour's property: K37/2568 and K37/2576, show initial groundwater levels of 5.4 and 2.96 m below ground level.

[1] https://opendata.canterburymaps.govt.nz/datasets/ecan::ecan-river-network/about
[2] Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Geology data ©GNS Science 2014
[3] https://opendata.canterburymaps.govt.nz/datasets/ecan::ecan-river-network/about Piezometric Contours layer, accessed 19 April 2023

	Water level in Wakanui Creek appeared to be at a depth of approximately 0.5 m during the site visit (13 March 2023). The depth of the creek is approximately 1.5 m.
Groundwater Abstractions	There are no groundwater takes associated with the site. 24 off-site registered active consents to take groundwater within a 500 m radius of the site were identified surrounding the site. Listed as below.

Consent No	Consent Type	Type	Activity
CRC050225.1	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC042199	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC172260	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC022166	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC012325	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC012059	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC000257	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC940073B.2	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC171568	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC022166.1	Water Permit (s14)	Water Take/Use	Take Groundwater
SCY690097	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC170743	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC915045	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC042199.1	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC940254	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC082743	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC131340	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC012059	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC190971	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC021605	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC050225	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC930263	Water Permit (s14)	Water Take/Use	Take Groundwater
SCY690096	Water Permit (s14)	Water Take/Use	Take Groundwater
CRC156062	Water Permit (s14)	Water Take/Use	Take Groundwater

Consents

There are no documented active discharge consents on-site and four active discharge consents off-site within a 500 m radius of the site.

The discharge consents are listed below and involve the discharge of a contaminant into land to water and discharge contaminant onto land and into water. Neither discharge consent is considered likely to impact on the site soils with respect to the accumulation of contaminants within shallow soil.

Consent No	Consent Type	Type	Activity
CRC164505	Discharge Permit (s15)	Human Effluent	Discharge Contaminant into Land to Water
CRC064133	Discharge Permit (s15)	Human Effluent	Discharge Contaminant into Land to Water
CRC202144	Discharge Permit (s15)	Human Effluent	Discharge Contaminant into Land to Water
CRC103259	Discharge Permit (s15)	Stormwater Residential	Discharge Contaminant into Land to Water

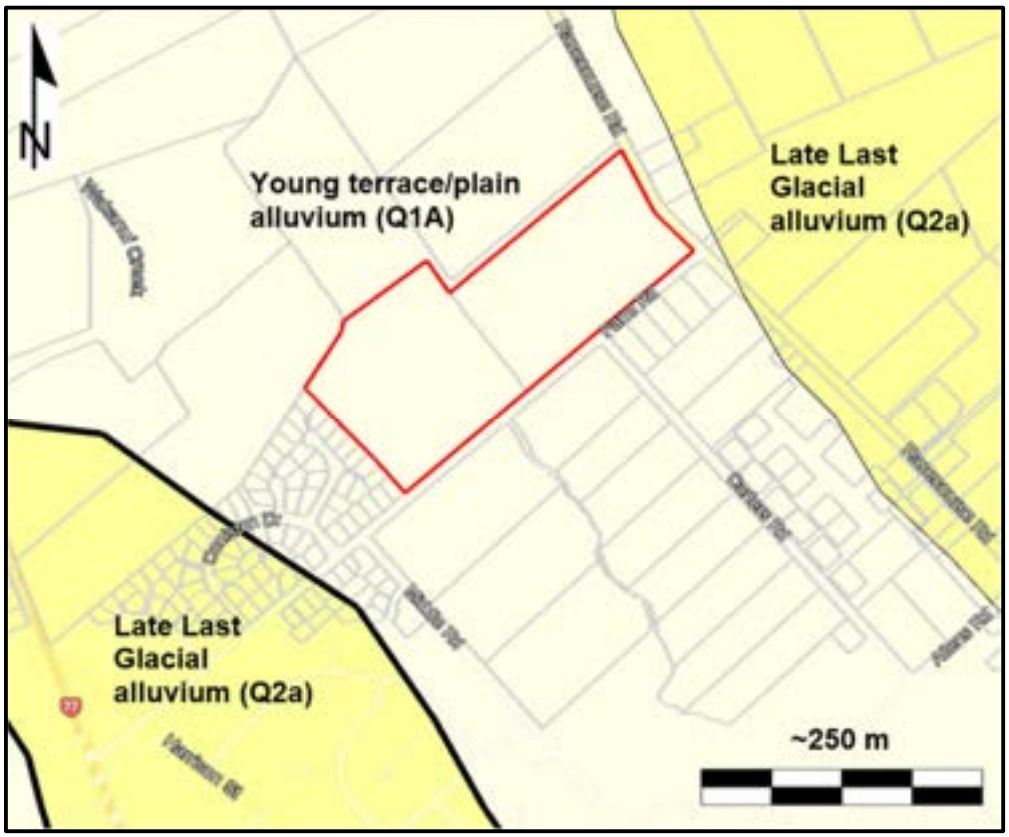


Figure 3: Geological Map of surrounding Area. The site boundary is shown by the red outline.

The location of the resource consents adjacent to the site is shown below, in Figure 4.

Figure 4: Nearby Consents listed in Table 3, obtained from Canterbury Maps, February 2023.

3.2 Ground Water and Surface Water Sensitivity

Groundwater is anticipated to be located relatively shallow beneath the site. A groundwater bore search indicated that there are 24 registered active and consented groundwater take within 500 m of the site.

An assessment to establish whether the shallow groundwater aquifer below the site is a 'sensitive aquifer' as defined by the Ministry for Environment (MfE) Guidelines, (2011) has been undertaken (refer to Table 4 below). It is noted that an aquifer is sensitive when either all the first three criteria set out below are met or the fourth criterion is met in accordance with Module 5.2.3 of the MfE Guidelines.

Table 4: Groundwater and Surface Water Sensitivity	
Criteria	**Assessment**
The aquifer is not artesian or confined; and	**No**. The aquifer beneath the site is anticipated to be semi-confined or unconfined.
The aquifer is expected to be less than 10 m below the potential suspected source of impact; and	**Yes**. Groundwater is expected to be at a depth of approximately 1.5 to 3 m below EGL based on nearby groundwaters wells discussed in Table 3.
The aquifer is of quality appropriate for use, can yield water at a useful rate and is in an area where abstraction and use of groundwater may be reasonably foreseen; or	**Yes**. The upper groundwater bearing strata is considered likely to be of suitable quality and be available at sufficient yield rates based on soil types.
The source is less than 100 m from a sensitive surface water body (i.e., a surface water body where limited dilution is available to mitigate the impact of contaminated groundwater discharging into the surface water body).	**Yes**. Surface water receptors on site include the Wakanui Creek.
Sensitivity Assessment	Based on the above, the shallow aquifer is considered to be sensitive.

Groundwater is considered to be sensitive in accordance with the MfE sensitive aquifer assessment. Section 15 of the Resource Management Act prohibits the discharge of contaminants to groundwater unless specifically allowed for in a regional plan rule.

3.3 Proposed Development

Development for 147 low density residential properties with associated stormwater ponds and infrastructure are proposed for the site. The lots will be served by a new internal road network off the existing Farm Road in the south. An initial scheme plan is shown in Figure 5 and **Appendix A**.

Figure 5: Excerpt plan for the proposed Coniston Park subdivision.

The history of the site was established via the review of several sources of information. Sources included a review of the ADC property file, records of title, review of available historical aerial photographs from Canterbury Maps, Google Earth and Retrolens, a review of consents and groundwater information presented on Canterbury Maps online GIS database. Each source and the relevant information gained is discussed below.

4.1 ECan Listed Land Use Register

Canterbury Regional Council (CRC) maintains a Listed Land Use Register (LLUR) of past and current land uses within the Canterbury region. The LLUR documents sites that have or have had a hazardous activity or land use conducted according to the MfE Hazardous Activities and Industries List (HAIL). Sites that are recorded as currently or previously having had an activity on the HAIL trigger the requirement for a contaminated land investigation prior to development. The LLUR has been populated by ECan primarily from a review of historical aerial photographs and is considered by ECan to not be complete. The CRC LLUR property statement was requested by Davis Ogilvie on 19/4/2023 for the site and is resented in **Appendix B**.

According to the LLUR property statement there are no sites associated with the area of enquiry however there are two HAIL sites within 50 m of the site; the Farm Road Market Garden to the south and Racecourse Road Landfill to the east of the site. Both HAIL sites, according to ECan LLUR statement have not been investigated and are over 20 m away from the sites on the opposite side of their respective roads.

The market garden is reported to have been present between 1980 – 2010 is considered unlikely to have affected the soil quality on site with the deposition of pesticide spray residues. This conclusion is reached given the distance to the site, the prevailing wind direction being from the northeast in Ashburton and the presence of other residential properties along Middle Road in the 1980s which would have raised concerns about significant spray drift nuisance if it occurred.

Limited details are publicly available on the Racecourse Road Landfill. From our review of the historical aerial photographs, it appears that some aggregate extraction occurred, and backfilling of the site commenced in pre 1955 with limited filling post 1985. The site does not appear to have been completely filled as Lidar imagery and contours presented on ECan's Canterbury Maps indicate a large depression covers the eastern half of the site. The type of waste disposal, if any, is not known however based on the small scale of potential landfilling (6,600 m^2) and amount of time elapsed since this occurred, it is considered that the generation of landfill gases such as methane and carbon dioxide is unlikely to be still occurring to any degree that would present a risk to proposed residential receptors to the southwest. Property files for PT RES 1405 BLK IX and RES 4624, the location of the landfill, were requested from ADC on 20 April 2023[4], however Davis Ogilvie was informed that no information is held by ADC regarding these properties.

4.2 Previous Environmental Reports

Following a review of the LLUR, no previous environmental investigations are known to have been completed at the site or submitted to ECan.

4.3 Records of Title

Historic Records of Title were obtained from LINZ for the site and are presented in **Appendix C**. The record indicates the original certificates of title were issued in 1882, with title changes in 1999, 2005, 2011 and 2021.

4.4 Interview

Stuart Tarbotton, one of the current owners of the site, was contacted on 4 April 2023 to discuss the known history of the site. Stuart has owned the property for approximately 1 – 2 years. According to Stuart the site has been used for cropping and grazing and no development is known to have taken place. No building remnants or indications of farm dumps have been observed.

4.5 Historical Aerial Photograph Review

Aerial photographs obtained from the CRC online Geographical Information System (GIS) and Retrolens dating from 1940 to 2022 have been reviewed. The relevant visible features are summarised in Table 5 while the photographs available are presented in **Appendix D**.

[4] Email between Davis Ogilvie & Partners Ltd. and Ashburton District Council, Laurelle Whitwell, (20/04/2023).

Table 5: Historical Aerial Photographs	
Date	**Description**
1940-1944	Only the southwest end of the site is included in the photography. The site appears to be part of a large paddock used for livestock grazing.
1955-1959	Full image of the site area. The site is undeveloped farmland and appears to be part of a larger property which extends to the northwest and southwest. Wakanui Creek can be seen in its present-day orientation. An approx. 50 m^2 excavation and area of wider ground disturbance can be seen on the neighbouring site to the northeast at PT RES 1405 BLK IX, on the other side of Racecourse Road.
1980-1984	No significant changes from previous image. Land still appears to be in use for livestock grazing. The excavation at PT RES 1405 BLK IX is much larger (approx. 100 m^2). A smaller excavation area and stockpiles can be seen on the same property. The excavation appears to contain water.
1984-1989	No significant changes from previous image. The land appears to be divided into six paddocks.
1995-1999	The image is distorted. No significant changes from previous image. Tracks running parallel and adjacent to Wakanui Creek are present on the southwest side of the creek. A small structure which may be a shed is located on the southern corner of the property, close to Farm Road.
2000-2004	No significant change visible from previous image. Several tracks now cut across the site at regular intervals Residential development has started at the neighbouring subdivision to the southwest.
2004-2010	No significant change visible from previous image. The neighbour's excavation / ponded area at PT RES 1405 BLK IX appears to have decreased in size indicating that the original excavation may have been partly infilled.
2010-2014	No significant change visible from previous image. Another small structure (possible a small shed) appears to be located on the north-central area of the site (northern corner of Lot 4 DP 320165). Internal farm tracks are no longer visible.
2015-2019	Both small structures are no longer on the site. A small structure is present on the east side of the northern, which is likely to be a pump station. The excavation/pond area at PT RES 1405 BLK IX has no longer contains water.
2020	No significant changes from previous image. Stock can be seen on the southern side of the site.
2021	No significant changes from previous image.

4.6 ADC Property Files

According to the ADC, the property file for the subject site area is empty and therefore has no building consent or permit list[5].

[5] Email correspondence between Davis Ogilvie and Ashburton District Council (Laurelle Whitewell), on 1/3/2023

A Davis Ogilvie Environmental Scientist attended the site on 6 March 2023 to complete a site visit, to review site layout, observe potential signs of land contamination and gather information from the site with regards to its history and site operations.

5.1 Site Observations

Observations made by the Davis Ogilvie Environmental Scientist at the site are summarised below. A selection of photographs taken during the site visit are presented in **Appendix E**.

- The site is undeveloped, relatively flat with a history of farming activity.
- A watercourse, known as Wakanui Creek crosses the centre of the site in a northwest-southeast direction. The channel is approximately 1 – 3 m wide and <1.0 m deep and was flowing at the time of this investigation. It crosses residential development, farmland, and roads in a southeast direction (parallel to Ashburton River) before reaching the coast approximately 20 km southeast of the site. Farm and roadside drains appear to have diverted the flow path towards the Ashburton River at Milton Road South.
- The site is predominantly flat and covered in various grasses within multiple fenced paddocks.
- No visible evidence of significant burn pits was noted at the site.
- No HAIL activities or evidence of previous HAIL activity were observed on site.

6 Preliminary Conceptual Site Model

A preliminary conceptual site model has been developed and consists of four primary components. For a contaminant to present a risk to human health or the environment, all four components are required to be present and connected. For the potential risk to be determined each component is required to be assessed. The four components of a conceptual site model are:

- Source of contamination;
- Pathway, by which contamination can move towards a receptor;
- Sensitive receptors which may encounter the contamination; and
- Exposure pathway, where receptors may interact with contaminants in its various states.

From our review of the available information and following our site visit, HAIL activities as defined by the Ministry for the Environment, have not been identified during the PSI as being ‘more likely than not’ to have presently or historically occurred on the piece of land (the ‘Site’).

HAIL category H (*"Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment"*) is not considered applicable to the site given the commentary provided in Section 4.1. The piezometric contours in the area also indicate that groundwater flow in the area is to the southeast and therefore any groundwater contaminants from the landfill would also be likely to flow parallel to the site boundary in the Racecourse Road direction to the southeast.

[redacted]

From our review of the available information and following our site visit, HAIL activities as defined by the Ministry for the Environment, have not been identified during the PSI as being 'more likely than not' to have presently or historically occurred on the piece of land (the 'Site'). As no HAIL activities have been identified the NES Regulations are not considered to apply to the site and proposed earthworks.

Activities on neighbouring sites are also considered unlikely to have occurred in a quantity to have affected the site to a degree that would present a significant risk to human health for proposed residential receptors or identified sensitive environmental receptors.

While every effort has been made to identify conditions that may indicate the presence of contamination, due to the preliminary and non-intrusive nature of this investigation, there is the potential for contaminated source areas to be uncovered during extensive earthworks. Therefore, should contaminated areas be identified during construction earthworks then works should cease until the area has been assessed by a suitably qualified and experienced practitioner.

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	GPM

NORTH

Key

- Proposed Allotment
- Proposed Local Purpose Reserve
- Indicative Stormwater Basin Area
- Proposed Row & Pedestrian Link
- Existing Easements
- Indicative Wakanui Creek Top of Bank
- Existing ground major contour at 0.5m
- Existing ground minor contour at 0.1m
- Proposed Stormwater Flow Direction
- Proposed Stormwater Flow Direction (Overflow)

Owners: Golden Mile Trading Ltd & Carl Grove Developments Ltd

Applicant: Coniston Park Limited

Address: Farm Road, Ashburton

Appellation: Lot 4 DP 320165 & Lot 8 DP 311232

RT References: 79791, 44314

Total Area: 8.20 ha & 8.12 ha

Total Allotments: 166

360m^2 - 600m^2: 43 Allotments (26%)

600m^2 - 800m^2: 65 Allotments (39%)

800m^2 above: 58 Allotments (35%)

- All dimensions in metres unless shown otherwise;
- Existing boundaries adopted from LINZ online database;
- Aerial Photography: Sourced from LINZ Database https://data.linz.govt.nz/layer/106276-canterbury-02m-rural-aerial-photos-2020-2021/ under Creative Commons Attribution 4.0 International;
- Horizontal Datum: NZGD2000 NZTM;
- Vertical Datum: NZVD 2016;
- Contours at 0.1m Intervals (Major Interval 0.5m)
- This plan has been prepared for the sole purpose of supporting the Farm Road Plan Change;
- Use of this plan for other purposes or its reproduction in part or full is not permitted without the prior consent of Davis Ogilvie (Aoraki) Ltd;
- A full assessment of easements will be undertaken prior to final survey and subsequent to proposed servicing and engineering requirements being confirmed; and
- All dimensions and areas are subject to final legal survey.

Lot 1 DP 320165

Lot 3 DP 320165

Wakanui Creek Reserve details to be confirmed

Local Purpose Reserve with indicative pedestrian link

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

Lot 7 DP 62713

Local Purpose Reserve with indicative pedestrian link and Stormwater Swale

Lot 4 DP 320165

Lot 8 DP 311232

WAKANUI CREEK

RACECOURSE ROAD

Lot 6 DP 67784

Existing easement and stormwater swale subject to further discussion with client, ADC and engineering design

Local Purpose Reserve with indicative stormwater basin

Indicative pedestrian link alongside Wakanui Creek

FARM ROAD

Existing roadside drain

Local Purpose Reserve with indicative stormwater basin and pedestrian link

Lot 201 to vest with Ashburton District Council as Road

CARTERS ROAD

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road Ashburton 1072\06 CADD\Dwg\30625-Subdivision Layout Plan Option D.dwg

DAVIS OGILVIE

Davis Ogilvie (Aoraki) & Partners Ltd
Engineers - Surveyors - Planners
14 The Terrace, Timaru 7940
P.O. Box 359 Timaru, NZ
Ph. 03 688 8350 / 0800 888 350
Also - Nelson, Christchurch, Greymouth

CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

CONCEPT PLANNING

SUBDIVISION LAYOUT PLAN - OPTION D

Design	Drawn	QA check	dwg	Issue
MCB	MCB	GPM	PL01	A
Scale @ A1	Date	File		
1:1000	05-23	30625		

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry from our Listed Land Use Register (LLUR). The LLUR holds information about sites that have been used or are currently used for activities which have the potential to cause contamination.

The LLUR statement shows the land parcel(s) you enquired about and provides information regarding any potential LLUR sites within a specified radius.

Please note that if a property is not currently registered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR database is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; additional relevant information may be held in other files (for example consent and enforcement files).

Please contact Environment Canterbury if you wish to discuss the contents of this property statement.

Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit ecan.govt.nz/HAIL for more information or
contact Customer Services at ecan.govt.nz/contact/ and quote ENQ342829

Date generated: 19 April 2023
Land parcels: Lot 8 DP 311232
Lot 4 DP 320165

The information presented in this map is specific to the area within a 50m radius of property you have selected. Information on properties outside the serach radius may not be shown on this map, even if the property is visible.

Sites at a glance

Sites within enquiry area

Site number	Name	Location	HAIL activity(s)	Category

Please note that the above table represents a summary of sites and HAILs intersecting the area of enquiry only.

Nearby sites

Site number	Name	Location	HAIL activity(s)	Category
279487	Farm Road Market Garden	Farm Road, Ashburton	A10 - Persistent pesticide bulk storage or use;	Not Investigated
279525	Racecourse Road	Part RES 1405 and RES 4624	G3 - Landfill sites;	Not Investigated

Please note that the above table represents a summary of sites and HAILs intersecting the area of enquiry within a 50m buffer.

More detail about the sites

Site 279487: Farm Road Market Garden (Within 50m of enquiry area.)

Category: Not Investigated
Definition: Verified HAIL has not been investigated.

Location: Farm Road, Ashburton
Legal description(s): Lot 190 DP 235

HAIL activity(s):

Period from	Period to	HAIL activity
1980	2010	Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

Notes:

2 Feb 2021 Market gardening (persistent pesticides) is noted in aerial photographs between 1980 and 2010

2 Feb 2021 This record was created as part of the Ashburton District 2020 HAIL identification project.

Investigations:

There are no investigations associated with this site.

Site 279525: Racecourse Road (Within 50m of enquiry area.)

Category: Not Investigated
Definition: Verified HAIL has not been investigated.

Location: Part RES 1405 and RES 4624
Legal description(s): Part RES 1405,RES 4624

HAIL activity(s):

Period from	Period to	HAIL activity
1940	Present	Landfill sites

Notes:

14 Apr 2021 This record was created as part of the Ashburton District Council 2020 HAIL identification project.

Investigations:

There are no investigations associated with this site.

Nearby investigations of interest

There are no investigations associated with the area of enquiry.

Disclaimer

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987.

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Listed Land Use Register

What you need to know

Everything is connected

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012.

For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)[1]. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

[1] The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

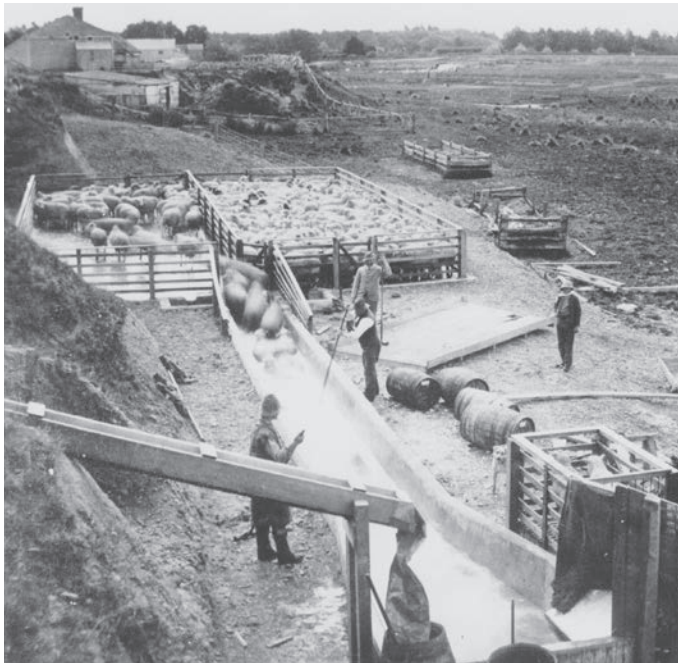
The LLUR is available online at www.llur.ecan.govt.nz. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit www.ecan.govt.nz/HAIL.

IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:
Calling from Christchurch: (03) 353 9007
Calling from any other area: 0800 EC INFO (32 4636)

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Everything is connected

Promoting quality of life through balanced resource management.

www.ecan.govt.nz E13/101

Listed Land Use Register

Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

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Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

E13/102

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General of Land

Identifier **44314**

Land Registration District **Canterbury**

Date Issued 10 September 2002

Prior References

CB37B/954 CB37B/957 CB37B/958

Estate Fee Simple

Area 8.1200 hectares more or less

Legal Description Lot 8 Deposited Plan 311232

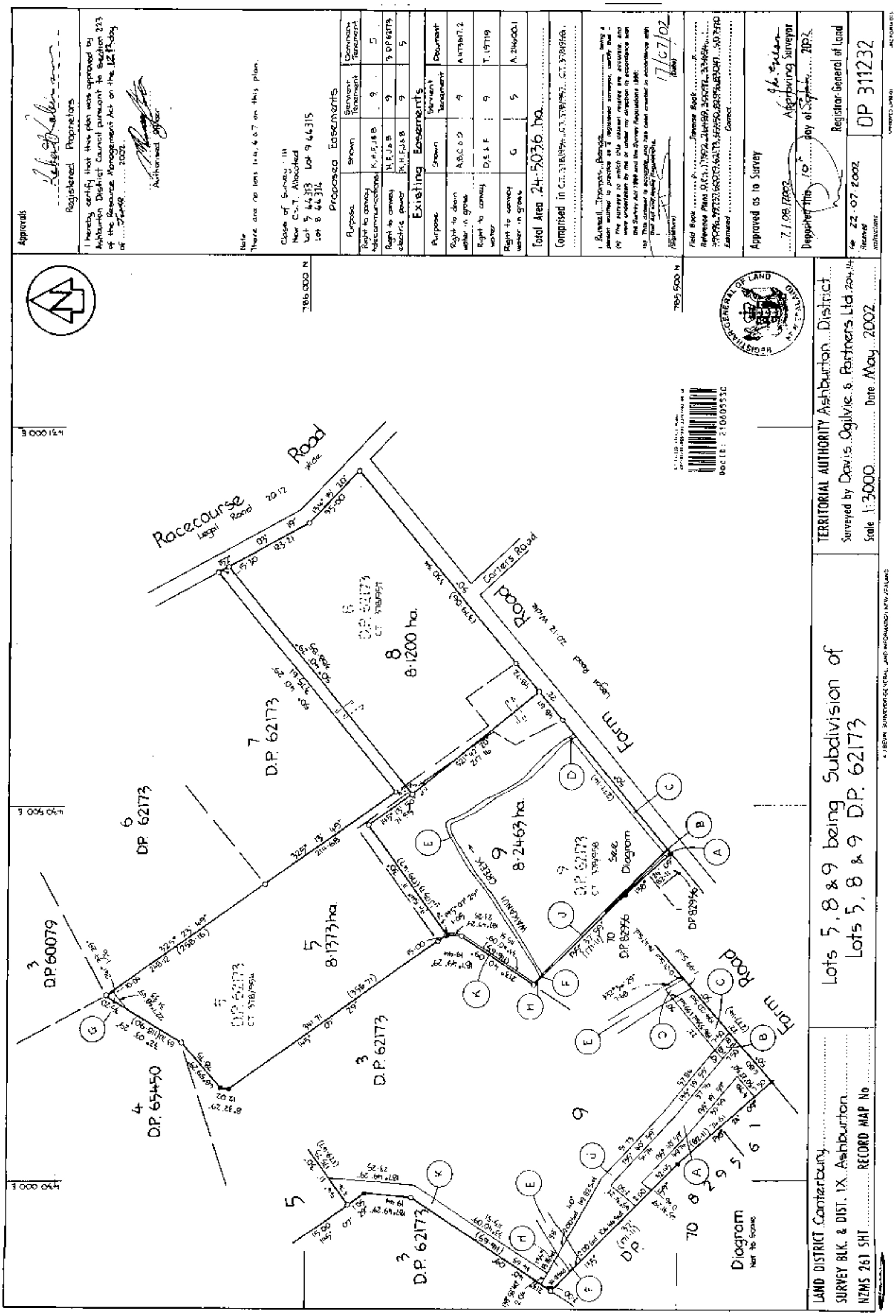
Registered Owners

Carl Grove Developments Limited

Interests

Land Covenant in Transfer A428146.8 - 6.10.1999 at 12.00 pm (affects part formerly Lots 8 and 9 DP 62173)

Land Covenant in Transfer A428146.9 - 6.10.1999 at 12.00 pm (affects part formerly Lot 5 DP 62173)


Approvals
Registered Proprietors
Proposed Easements
Existing Easements
Total Area 24.5036 ha.
Approved as to Survey
Registrar-General of Land
DP 311232
TERRITORIAL AUTHORITY Ashburton District
Surveyed by Davis, Ogilvie & Partners Ltd.
Scale 1:3000
Date May 2002
LAND DISTRICT Canterbury
SURVEY BLK. & DIST. IX Ashburton
NZMS 261 SHT
RECORD MAP No
Lots 5, 8 & 9 being Subdivision of Lots 5, 8 & 9 D.P. 62173
Racecourse Road
Farm Road
Carters Road
WAKANUI CREEK
8·1200 ha.
8·2463 ha.
8·1373 ha.
D.P. 62173
D.P. 60079
D.P. 65450
D.P. 82956
Diagram
Not to Scale

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Historical Search Copy

R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **44314**

Land Registration District **Canterbury**

Date Issued 10 September 2002

Prior References

CB37B/954 CB37B/957 CB37B/958

Estate Fee Simple

Area 8.1200 hectares more or less

Legal Description Lot 8 Deposited Plan 311232

Original Registered Owners

Robert Robinson as to a 1/2 share

Robert Robinson and Nicholas George Clark as to a 1/2 share

Interests

Land Covenant in Transfer A428146.8 - 6.10.1999 at 12.00 pm (affects part formerly Lots 8 and 9 DP 62173)

Land Covenant in Transfer A428146.9 - 6.10.1999 at 12.00 pm (affects part formerly Lot 5 DP 62173)

8873701.1 Transfer to Robert Robinson, Stephen Peter Rennie, David Peter Fisher and David McLaren Ferguson - 26.9.2011 at 12:59 pm

11654579.1 Transmission to Stephen Peter Rennie, David Peter Fisher and David McLaren Ferguson as survivor(s) - 14.4.2021 at 12:17 pm

12098544.1 Transfer to David McLaren Ferguson, David Peter Fisher and Stephen Peter Rennie (1/2 share) and David McLaren Ferguson, David Peter Fisher and Stephen Peter Rennie (1/2 share) - 7.5.2021 at 2:29 pm

12098544.2 Transfer to Carl Grove Developments Limited - 7.5.2021 at 2:29 pm

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General of Land

Identifier **79791**

Land Registration District **Canterbury**

Date Issued 21 April 2005

Prior References
44315

Estate Fee Simple

Area 8.2002 hectares more or less

Legal Description Lot 4 Deposited Plan 320165

Registered Owners
Golden Mile Trading Limited

Interests

Subject to a right to convey water over part herein marked S,T,V on DP 320165 contained in Transfer 19719 - 18.12.1882 at 2.45 pm

Land Covenant in Transfer A428146.8 - 6.10.1999 at 12.00 pm (affects part formerly Lot 9 DP 62173)

Land Covenant in Transfer A428146.9 - 6.10.1999 at 12.00 pm (affects part formerly Lot 5 DP 62173)

Subject to a right to drain water in gross over part marked A,B,R,S on DP 320165 in favour of Ashburton District Council created by Transfer A473617.2 - 11.9.2000 at 2:10 pm

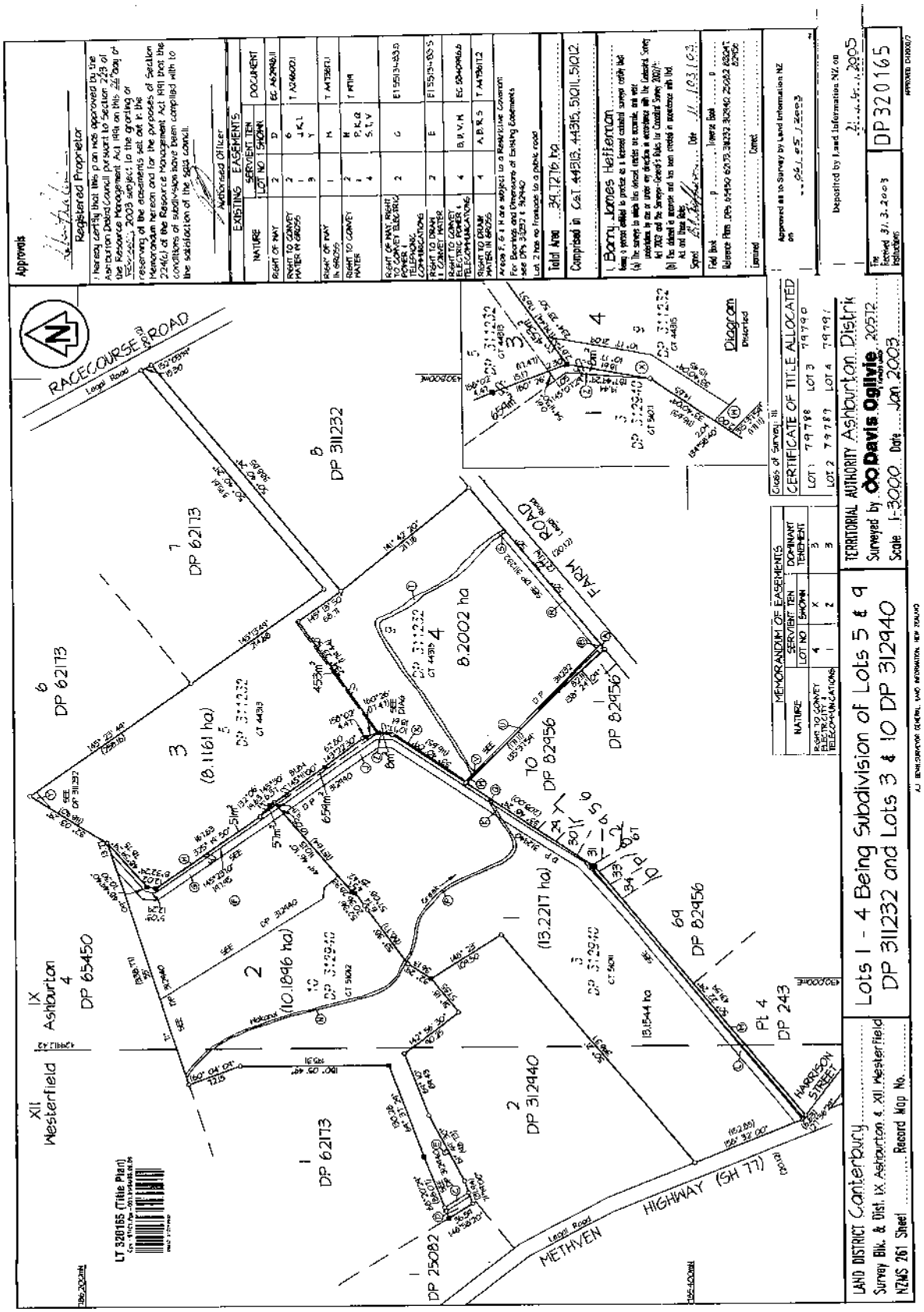
Subject to a right to convey electric power and telephonic communications over part marked B,U,V,W on DP 320165 created by Easement Instrument 5340996.6 - 10.9.2002 at 2:44 pm

Subject to a right to drain water over part marked G, H on DP 337801 created by Easement Instrument 6140238.5 - 7.9.2004 at 9:00 am

The easements created by Easement Instrument 6140238.5 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to convey electricity and telecommunications over part marked X on DP 320165 created by Easement Instrument 6392086.8 - 21.4.2005 at 9:00 am

The easements created by Easement Instrument 6392086.8 are subject to Section 243 (a) Resource Management Act 1991


Approvals
Registered Proprietor
EXISTING EASEMENTS
MEMORANDUM OF EASEMENTS
CERTIFICATE OF TITLE ALLOCATED
LOT 1 79798 LOT 3 79799
LOT 2 79789 LOT 4 79797
TERRITORIAL AUTHORITY Ashburton District
Surveyed by Davis Ogilvie 20572
Scale 1:3000 Date Jan 2003
Deposited by Land Information NZ on
DP 320165
LAND DISTRICT Canterbury
Survey Dist. & Dist. IX Ashburton & XII Westerfield
NZMS 261 Sheet Record Map No.
Lots 1 - 4 Being Subdivision of Lots 5 & 9
DP 311232 and Lots 3 & 10 DP 312940
RACECOURSE ROAD
FARM ROAD
HIGHWAY (SH 77)
METHVEN
HARRISON STREET
Diagram
Barry James Heffernan
LT 320165 (Title Plan)

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Historical Search Copy

R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **79791**

Land Registration District **Canterbury**

Date Issued 21 April 2005

Prior References
44315

Estate Fee Simple

Area 8.2002 hectares more or less

Legal Description Lot 4 Deposited Plan 320165

Original Registered Owners

Robert Robinson as to a 1/2 share

Robert Robinson and Nicholas George Clark as to a 1/2 share

Interests

Land Covenant in Transfer A428146.9 - 6.10.1999 at 12.00 pm (affects part formerly Lot 5 DP 62173)

Land Covenant in Transfer A428146.8 - 6.10.1999 at 12.00 pm (affects part formerly Lot 9 DP 62173)

Subject to a right to convey water over part herein marked S,T,V on DP 320165 contained in Transfer 19719 - 18.12.1882 at 2.45 pm

Subject to a right to drain water in gross over part marked A,B,R,S on DP 320165 in favour of Ashburton District Council created by Transfer A473617.2 - 11.9.2000 at 2:10 pm

Subject to a right to convey electric power and telephonic communications over part marked B,U,V,W on DP 320165 created by Easement Instrument 5340996.6 - 10.9.2002 at 2:44 pm

Subject to a right to drain water over part marked G, H on DP 337801 created by Easement Instrument 6140238.5 - 7.9.2004 at 9:00 am

The easements created by Easement Instrument 6140238.5 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to convey electricity and telecommunications over part marked X on DP 320165 created by Easement Instrument 6392086.8 - 21.4.2005 at 9:00 am

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8873701.1 Transfer to Robert Robinson, Stephen Peter Rennie, David Peter Fisher and David McLaren Ferguson - 26.9.2011 at 12:59 pm

11654579.1 Transmission to Stephen Peter Rennie, David Peter Fisher and David McLaren Ferguson as survivor(s) - 14.4.2021 at 12:17 pm

12098433.1 Transfer to Stephen Peter Rennie, David Peter Fisher and David McLaren Ferguson (1/2 share) and Stephen Peter Rennie, David Peter Fisher and David McLaren Ferguson (1/2 share) - 7.5.2021 at 1:17 pm

12098433.2 Transfer to Golden Mile Trading Limited - 7.5.2021 at 1:17 pm

Photograph 1:	*Retrolens 1940-44*

Photograph 2:	*Retrolens 1955-59*

Photograph 3:	*Retrolens 1980-84*

Photograph 4:	*Retrolens 1985-89*

Photograph 5:	*Retrolens 1995-99*

Photograph 6:	*Canterbury Maps 2000 - 2004*

Photograph 7:	*Canterbury Maps 2004 - 2010*

Photograph 8:	*Google Earth 2010*

Photograph 9:	*Canterbury Maps 2010 - 2014*

Photograph 10:	*Google Earth 2015*

Photograph 11:	*Canterbury Maps 2015 - 2019*

Photograph 12:	*Google Earth 2020*

Photograph 13:	*Google Earth 2021*

Photograph 1:	General site conditions looking at the centre of the site to the northeast. Wakanui Creek can be seen by the line of green vegetation. Bails of hay are in the top right hand corner.

Photograph 2:	Aerial photo showing the northeast boundary of the site, which is relatively flat alluvial ground. Wakanui Creek flows through the site following the tree line (oak trees) to the north and flows in a general southeast direction and then loops to the front of the photo that you can see between the willows. There is an unnamed drainage channel that follows the poplar trees and heads north.

Photograph 3:	Aerial photo (31/01/2023) showing Wakanui Creek.

Photograph 4:	Aerial photo of the site from the southeast corner looking northeast. Farm road can be seen on the right. Wakanui Creek crosses the road just ahead of that car in the distance and pops out the other side.

Photograph 5:	Aerial photo of the northwest boundary paddocks, looking north. The northernmost paddock is used for brassica crops. The tree lined driveway is the neighbours. Racecourse road is at the top right corner.

APPENDIX B – GEOTECHNICAL REPORT (43340) – FARM ROAD, ASHBURTON

DAVIS OGILVIE

ENGINEERS / SURVEYORS / PLANNERS

0800 999 333
hello@do.nz

Level 1, 24 Moorhouse Avenue, Addington
PO Box 589, Christchurch 8140
www.do.nz

Davis Ogilvie & Partners Ltd

Title:	Geotechnical Report: Coniston Park, Farm Road, Allenton, Ashburton
Client:	Coniston Park Limited (Ltd)
File Location:	\\dop5\jobdata\projects\43s\43340 - Coniston Park\Geotech\003 Report\230302.43340.KL. Coniston Park Subdivision Report.docx
Version:	2
Date:	21 July 2023
Project No:	43340

Prepared By:	**Kelly Lyons** Graduate Engineering Geologist BSc	**Signature:** 
Reviewed By:	**Hamish Cattell** Engineering Geologist PhD, BSc (Hons) MEngNZ	**Signature:** 
Authorised By:	**Ben Parry** Principal Engineering Geologist PG Dip, BSc (Tech) CMEngNZ (PEngGeol)	**Signature:** 

This report has been prepared at the specific instructions of Coniston Park Ltd. and concerns the proposed Coniston Park subdivision in Ashburton. The site is legally described as Lot 4 DP 320165 and Lot 8 DP 311232. This report provides a geotechnical assessment of the land underlying the site and a review of geotechnical information.

Davis Ogilvie did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited investigation of the site. Variations in conditions may occur between test locations, and there may be conditions onsite which have not been revealed by the investigation, which have not been taken into account in the report.

Davis Ogilvie's opinions are based upon information that existed at the time of the production of the document. Assessments made in this report are based on the conditions found onsite and published sources detailing the recommended investigation methodologies described. No warranty is included; either expressed or implied that the actual conditions will conform to the assessments contained in this report.

Information herein was created from maps and / or data from the New Zealand Geotechnical Database (https://www.nzgd.org.nz) which were prepared and / or compiled for the Earthquake Commission (EQC) to assist in assessing insurance claims made under the Earthquake Commission Act 1993. The source maps and data were not intended for any other purpose. EQC and its engineers, Tonkin & Taylor, have no liability for any use of the maps and data or for the consequences of any person relying on them in any way.

Only Coniston Park Ltd. and the Local and Regional Territorial Authorities are entitled to rely upon this engineering report. Davis Ogilvie & Partners Ltd. accepts no liability to anyone other than Coniston Park Ltd. any way in relation to this report and the content of it and any direct or indirect effect this engineering report may have. Davis Ogilvie & Partners Ltd. does not contemplate anyone else relying on this report or that it will be used for any other purpose.

Should anyone wish to discuss the content of this report with Davis Ogilvie & Partners Ltd, they are welcome to contact us on (03) 366 1653 or at Level 1/24 Moorhouse Avenue, Addington, Christchurch.

EXECUTIVE SUMMARY

Davis Ogilvie & Partners Ltd. was engaged by Coniston Park Ltd. to undertake a geotechnical investigation of the site at Farm Road, Ashburton (Lot 4 and Deposited Plan (DP) 320165 and Lot 8 DP 311232). The purpose of the geotechnical investigation was to assess the underlying ground conditions, assess any geotechnical constraints, and provide preliminary geotechnical design criteria for the proposed District Plan change and subdivision of approximately 141 residential lots.

Davis Ogilvie completed 11 Test Pits and 2 Hand Augers with associated Dynamic Cone Penetrometers. Results from the investigation revealed a consistent soil profile of 0.3 – 0.4 m topsoil overlying stiff to hard silt, followed dense to very dense sandy gravel. Nearby deep testing indicated the gravel is likely to extend beyond 40 m deep. Groundwater was encountered during the test pit investigations between 2.7 – 5.0 m below EGL and was recorded to rise up to 1.0 m above the initial level of the water strike.

A geotechnical ultimate bearing capacity of 300 kPa was generally achieved below the surficial topsoil unit, typically 0.3 – 0.4 m below EGL. Further geotechnical testing may be required during subdivision development, and geotechnical recommendations for residential development shall be provided in a geotechnical completion report compiled following earthworks.

All earthworks on site shall be subject to supervision and certification by a suitably qualified Geo-professional. The site-won silt soils and deeper gravel soils are considered suitable for reuse as engineered fill, subject to laboratory testing approval. All fills must be placed in accordance with NZS 4431:2022.

Careful consideration must be given to the design of stormwater management systems. The investigation revealed variable groundwater conditions and artesian groundwater, and testing was completed in the drier months of the year. Further groundwater monitoring is recommended. For preliminary pavement design a subgrade CBR of 4 may be adopted. Careful management of the near-surface silty subgrade during earthworks, especially during periods of rain.

While no flood risk was identified from the available territorial authority sources, it is noted that potentially significant flooding may occur in the event of an upstream river breach of the Ashburton River. Environment Canterbury (ECan) and Ashburton District Council should be contacted to confirm any minimum finished floor levels for the development. It is recommended that a Registered Professional Surveyor is engaged to confirm ground levels onsite.

Overall, the site is considered suitable for residential development under Section 106 of the Resource Management Act (1991) provided the recommendations in this report are followed. A Statement of Professional Opinion on the Suitability of Land for Subdivision is enclosed.

A□□□□□□ **A** – Coniston Park Development Scheme Plan

A□□□□□□ □ – Site and Test Location Plan (DWG G01A)

A□□□□□□ □ – Test Pit, Hand Auger and DCP Logs

A□□□□□□ □ – Laboratory Reports

A□□□□□□ □ – Statement of Suitability for Subdivision

Davis Ogilvie & Partners Ltd. (DO) has been engaged by Coniston Park Ltd. to carry out a geotechnical investigation at the proposed Coniston Park subdivision at Farm Road, Allenton, Ashburton, legally known as Lot 4 and Deposited Plan (DP) 320165 and Lot 8 DP 311232. The purpose of the investigation was to assess the underlying ground conditions and any geotechnical constraints in relation to a proposed District Plan change for a proposed residential subdivision at the site. Preliminary geotechnical design criteria are also provided to assist with preliminary subdivision design.

It is understood that Davis Ogilvie Aoraki are undertaking Civil Engineering design for the proposed development which will be reported separately but should be reviewed in conjunction with this report.

1.1 Site Description

The site is located in Allenton, Ashburton, approximately 2.6 km northwest of State Highway 1, 1.7 km northeast of the Ashburton River and 0.7 km southeast of the Ashburton River North Branch (Figure 1). The land parcels (Lot 4 & Lot 8) occupy a total area of 16.32 ha and are hereon known as “the site”.

The currently grassed farmland site is bounded by Farm Road to the southeast and Racecourse Road to the northeast, residential lots to the southwest and similar rural–residential farmland to the northwest. The site is undeveloped, relatively flat with a history of farming land use (Figure 2A & 2B).

Near the centre of the northwest boundary, a watercourse, known as Wakanui Creek, enters the site at an acute angle and crosses in a northwest-southeast direction where it is lined by large mature trees (Figure 2A). The channel is approximately 3 – 6 m wide and incised 0.5 – 1.0 m deep and was flowing (southeast) at the time of this investigation (Figure 2C). The watercourse is classified on the Environment Canterbury (ECan) River Network[1] as a *“spring-fed plains watercourse”*; however, based on aerial imagery[2] it appears to now be mainly fed from the Ashburton River North Branch via a small channel, some 1.4 km northwest of the site, and from modified active water races. The channel exits at the southeast of the site where it crosses developed and undeveloped land in a southeast direction (parallel to Ashburton River) before reaching the coast approximately 20.0 km southeast of the site.

[1] https://opendata.canterburymaps.govt.nz/datasets/ecan::ecan-river-network/about
[2] Canterbury Maps Viewer available at https://mapviewer.canterburymaps.govt.nz/

Near the westernmost end of the site (Lot 4), parallel to the northwest boundary, is a dry water race confined by stop banks and crossed by bridges (Figure 2D). The water race source runs through farmland in the northwest before passing the site and heading southwest to the Ashburton River North Branch. A roadside swale also exists between, and parallel to, the southeast boundary and Farm Road (Figure 2B).

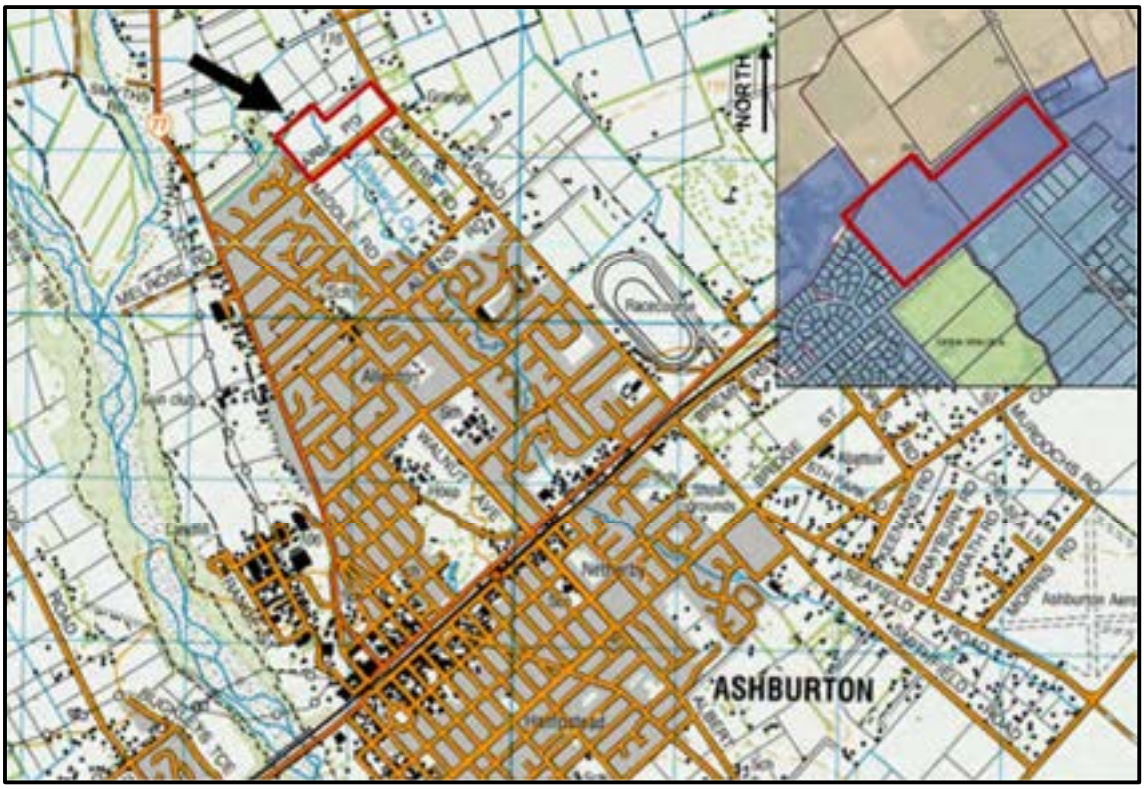

Figure 1: Location of the site shown in red. Figure cropped from Topo50 Maps[3].
***Insert* shows Ashburton District Council District Plan zone 'Residential D' (purple).**

[3] LINZ Data Service – NZ Topo50 Maps available at https://data.linz.govt.nz/layer/50767-nz-topo50-maps/ accessed March 2023

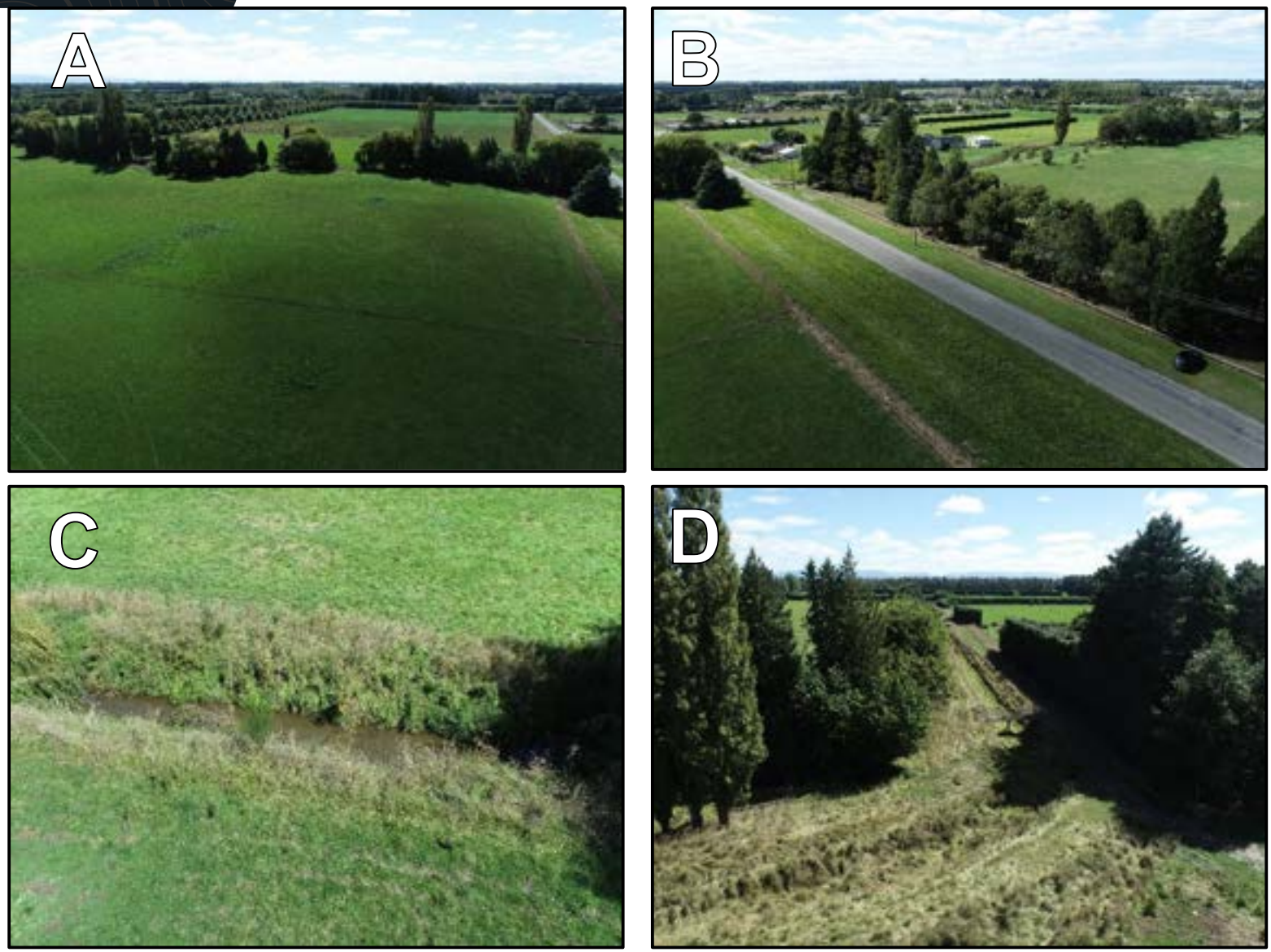

Figure 2: Photographs of the site: A) View across site looking northeast showing tree lined Wakanui Creek; B) View along Farm Road including roadside swale, looking east; C) Aerial oblique view of incised Wakanui Creek through the site; D) View of dry water race north of the site, looking northwest.

1.2 Proposed Plan Change and Development

According to the Ashburton District Council (ADC) District Plan, the site is currently zoned "Residential D" (low density, ≥ 4,000 m^2 lots). The intention is to re-zone to "Residential C" (medium – low density, ~ 500m^2 to 1,000 m^2 lots) and undertake a proposed subdivision.

The draft scheme plan for the Coniston Park subdivision by WSP shows approximately 141 proposed low– medium density residential lots (650 – 928 m^2), associated roading and a recreational reserve area surrounding Wakanui Creek. The latest draft scheme plan of the proposed development is shown in Figure 3.

Figure 3: Coniston Park development scheme plan by Davis Ogilvie showing proposed lot and road layout, subject to change.

[illegible]

A detailed review of published information regarding the site is provided in following section.

2.1 Site Geology

The published geology of the site is identified as "*grey river alluvium beneath plains or low-level terraces*" (Q1a)[4].

[4] Forsyth, P.J.; Barrell, D.J.A.; Jongens, R. (compilers) 2008. Geology of the Christchurch area. Institute of Geological and Nuclear Sciences 1:250 000 geological map 16. 1 sheet + 67 p. Lower Hutt, New Zealand. GNS Science.

Three nearby ECan groundwater well borelogs[5] along northern/northwest boundary record a consistent soil profile consisting of surficial topsoil layer over *"clay"* and *"sandy clay"*, followed by *"sandy gravel"* and *"claybound gravel."* Gravel is encountered at depths varying from 0.5 – 3.0 m below existing ground level (EGL) and extends to the base of all boreholes (23.0 – 48.5 m below EGL).

The nearest geotechnical data available on the New Zealand Geotechnical Database (NZGD) is twelve Hand Augers (HA) and Dynamic Cone Penetrometer (DCP) tests located at 17 – 21 Carters Road Allenton, approximately 760 m to the southeast of the site. The hand augers[6] were carried out by Kirk Roberts in September 2021 and describes the following typical soil profile:

- 0.0 – 0.4 m: topsoil
- 0.4 – 1.6 m: non-plastic silt
- >1.6 m: silty gravel

2.2 Hydrogeology

Onsite ECan well K37/0391 located in the northeast of the site, records an initial water level of 2.11 m, highest level of 1.56 m and lowest level of 2.83 m depth between 1974 and 1982. The median water level over the record period is 2.22 m.

The hydrology of the site can be inferred from nearby ECan wells at surrounding properties, drilled between 1990 and 2010. A selection of well data within a 1.0 km radius of the site is summarised in Table 1. Generally, the wells to the east and southwest of the site towards Racecourse Road record depth to groundwater between 2.1 – 2.5 m below ground level. Wells to the west and north of the site indicate an initial depth to groundwater between 2.1 – 5.4 m below ground level. The median depth to initial groundwater is 2.7 m.

[5] ECan Groundwater Monitoring Wells K37/2576, K37/2568, K37/0971. Drill dates 13/10/2010, 30/09/2005, 07/12/1999, available at https://mapviewer.canterburymaps.govt.nz/
[6] NZGD ID 187768, 193262,193263, 13264, 193266, 193267, 193268, 193273, 193280, 193282, 193283 accessed April 2023.

Table 1: Summary of Selected Nearby ECan Groundwater Well Data

ECan Well	Drill / read date	Well Location (to site centre, Wakanui Creek)	Depth to Gravel	Initial GWL	Min GWL	Max GWL	Borehole elevation (LVD37)*
K37/0391	~1794	On site 270 m E	No Log	2.11 m	2.83 m	1.56 m	110.24 MSL
K37/2576	2010	295 m NW	0.5 m	2.94 m	–	–	113.72 MSL
K37/2568	2005	215 m N	3.0 m	5.4 m	–	–	112.30 MSL
K37/0971	1999	360 m NE	1.2 m	2.5 m	4.0 m	4.0 m	111.83 MSL
K37/1424	~1945	600 m E	No Log	2.6 m (median)	Dry	–	110.97 MSL
K37/2444	2005	240 m W	No Log	4.0 m	–	–	118.87 MSL

* Data from ECan well database, elevation accuracy <5 m. Average elevation on site is approximately 110 MSL LVD37.

In relation to groundwater level variation over time, the document titled *Land surface recharge and groundwater dynamics – Rakaia – Ashburton Plains*[7] indicates the wells proximal to the site (L37/0403 & K37/0398) are within an area of low variation i.e., "*Group 1 (relatively stable trend).*"

2.3 Seismicity and Liquefaction Hazard

The nearest known Active Faults to the site listed in NZS 1170.5:2004 are the Alpine (115 km, northwest of the site), Kelly (120 km, north), Kakapo (130 km, north-northeast) and Hope Faults (125 km, north). Recent research has indicated that there is an increased chance of rupture on the central section of the Alpine Fault of 75% in the next 50 years and estimates a magnitude (M_w) of ≥8.0 (82% probability M_w ≥8.0)[8].

The recently active Greendale Fault (40 km, northeast) and the Port Hills Fault (85 km northeast), and several smaller active faults, were identified from the GNS fault database[9]; however, no estimated recurrence or rupture details are available.

[7] Thorley, M.J., Bidwell, V.J., Scott, D.M., (February 2010) Land-surface Recharge and Groundwater Dynamics – Rakaia-Ashburton Plains. Report No.R09/55 ISBN 978-1-86937-995-7
[8] Howarth, J.D., Barth, N.C., Fitzsimons, S.J. *et al.* Spatiotemporal clustering of great earthquakes on a transform fault controlled by geometry. *Nat. Geosci.* 14, 314–320 (2021). https://doi.org/10.1038/s41561-021-00721-4
[9] New Zealand Active Fault Database available at https://data.gns.cri.nz/af/

According to the Ashburton Liquefaction Susceptibility Map by Yetton & McCahon (2002)[10], the site is mapped as part of a wider area dominantly underlain by dense gravel alluvium older than Holocene age. The majority of the site is within a mapped zone of low [liquefaction] potential ('Zone 1') whereby there may be a *"possibility of liquefaction of local areas of liquefaction […]"* during strong earthquake shaking (Figure 4).

The northeast end of the site is within a lower risk zone (very low [liquefaction] potential ('Zone 2')) whereby there may be a *"very small risk of liquefaction of local, isolated areas"* It is noted that *"much of this zone [2] has a water table at considerable depth, and liquefaction would require a combination of perched water table as well as loose sand."*

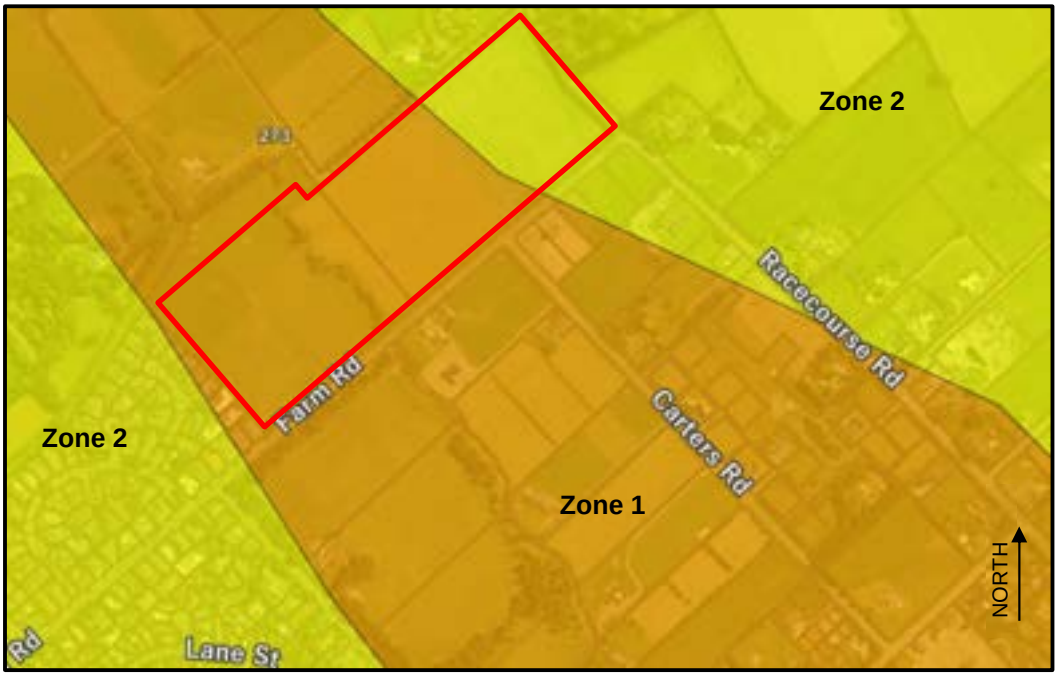

Figure 4: Image showing Liquefaction potential in Ashburton District from the 'Ashburton District Engineering Lifelines Project'. Zone 1 is shown in (orange – low risk) and Zone 2 in yellow (very low risk). The approximate site boundaries are highlighted in red.

2.4 Flood Management Finished Floor Levels

The site is not shown as being in a 'Flood Risk' area as shown on the 2010 ADC planning maps[11]. There does not appear to be any information on the flood risk posed by the Wakanui Creek.

[10] Zones have been digitised from the liquefaction potential map (Figure 7.1) in Geotech Consulting Ltd – Yetton & McCahon, 2002, Ashburton District Engineering Lifelines Project: Earthquake Hazard Assessment. Environment Canterbury report U02/55. Accessed from 'Ashburton liquefaction susceptibility (2002)' layer at https://opendata.canterburymaps.govt.nz/datasets/ecan::ashburton-liquefaction-susceptibility-2002/about
[11] ADC 'Floodable Areas' (F05); and ADC Flood Map, Map U35, dated 8/03/2010.

Modelling of 500-year Annual Recurrence Interval (ARI) flood flows for the North and South Branch Ashburton Rivers by ECan[12] has shown that the *"Ashburton urban area has no high hazard areas* [i.e., >1.0 m deep flood flows] *due to breach flows from this river."* Two main breakout events are modelled from the Ashburton River North Branch (Figure 5). The 'Jessops Bend breach' originates 2.7 km north of the site and subsequent flooding is generally immediately east of the site (estimates flood depths 0.1 – 0.4 m). The 'Rawles Crossing breach' originates 1.5 km northwest of the site and flooding generally follows the Wakanui Creek channel, flowing southeast across the western half of the site (estimates flood depths 0.1 – 0.6 m).

It is recommended that finished floor level requirements are confirmed with ECan and ADC at the subdivision stage.

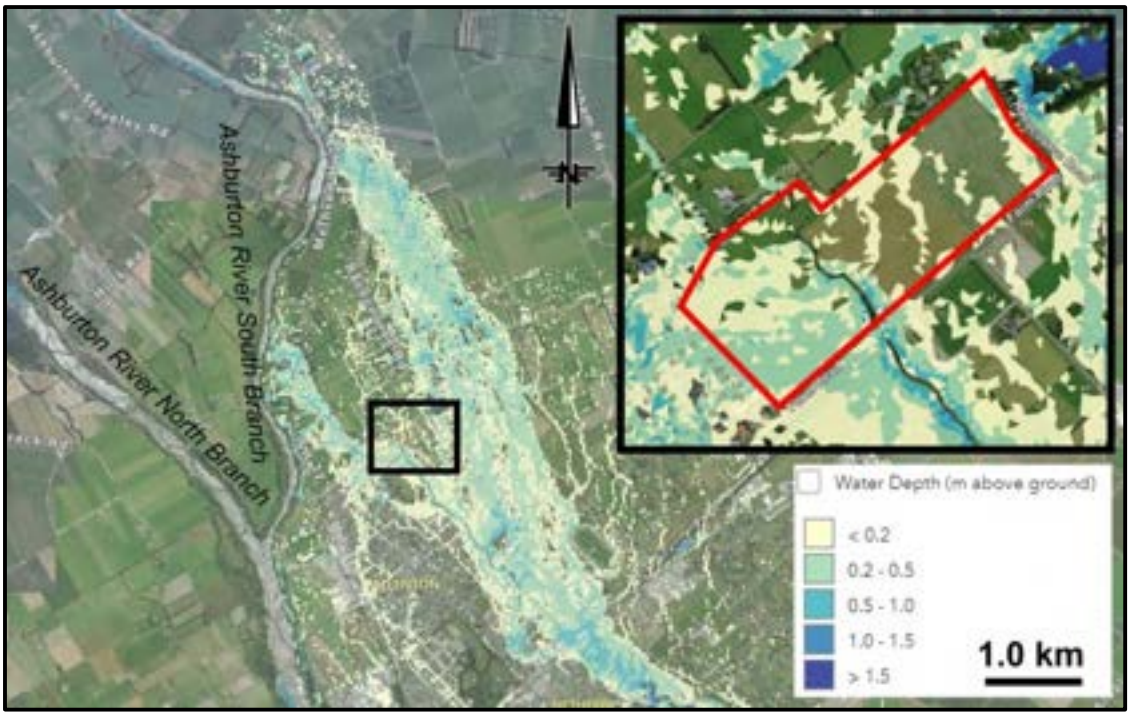

Figure 5: Image showing modelled North Branch break-out events and expected water depths from the Ashburton/Tinwald Flood Hazard Investigation (2015). *Insert* shows the site defined by red boundary.

2.5 Environment Canterbury Listed Land Use Register

The property is not included on the ECan Listed Land Use Register (LLUR). No evidence of activities consistent with the Ministry for the Environments Hazardous Activities and Industries List (HAIL) were found during that investigation. Please note, this does not confirm that the site is not contaminated, however, it does show there are no known historical listed land uses that may have caused elevated levels of potentially harmful contaminants.

[12] Ashburton and Tinwald flood investigation, Environment Canterbury Technical Report: R15/72, June 2015. Map available at https://apps.canterburymaps.govt.nz/FloodInvestigationAshburton/ Accessed March 2023.

Davis Ogilvie has also been engaged to undertake an environmental Detailed Site Investigation (DSI) report on site prior to any development. It is recommended that this report should be reviewed in due course, and any recommendations therein be undertaken.

2.6 Aerial Imagery

The earliest available aerial imagery[13] of the site from 1940 shows the site used as farmland. Racecourse and Farm Roads were built by this time and residential development is in the early stages south of Farm Road. Only one residential building (30 Methven Highway) borders the northwest boundary at this time.

The early monochromatic image clearly shows Wakanui Creek crossing the site in a consistent location, however, the upstream natural channel then extends 190 m to the north (into 273 Racecourse Road) before terminating (possible spring-fed source). The surrounding water races are constructed (and channelling filled) prior to 1950s imagery. At this time, a drainage channel was constructed from a creek–fed lake northwest of the site (at 30 Methven Highway) to Wakanui Creek, near where it enters the site (at 273 Racecourse Road), artificially connecting the creek to a 'new' water source, likely abandoning the northern channel (at 273 Racecourse Road). The constructed drainage channel includes a culvert which appears to be constructed beneath the existing water race stop banks, near the (Lot 4) northern boundary. The Wakanui Creek banks have been cleared of vegetation in the 1950s imagery, gradually regenerating over the following decades.

In the imagery from 2004 – 2010, some residential development has occurred surrounding the site. The residential buildings along the southwest boundary are largely built by this time and by 2010 a residential building is visible to the northeast.

[redacted]

Davis Ogilvie conducted geotechnical testing on the site on 13 and 14 March 2023. Testing comprised of 11 machine excavated Test Pits (TP), two Hand Augers (HA) and associated Dynamic Cone Penetrometers (DCPs) across the site. Test locations are presented in the attached site plan (DWG G01A) in **Appendix A**.

3.1 Shallow Testing

Test pits were excavated to a depth between 3.5 – 5.5 m below Existing Ground Level (EGL), which was target depth. HA and DCPs were advanced to effective refusal in gravel/hard silt at depths between 1.2 – 3.2 m below EGL.

[13] Canterbury Maps – imagery basemaps, available at https://mapviewer.canterburymaps.govt.nz/

A consistent soil profile was revealed by the investigation, consisting of up to 0.4 m of topsoil overlying silt with varying amounts of clay and sand to between 1.4 – 3.7 m. The silt was underlain by sandy gravel to a maximum of 5.5 m below EGL, the maximum depth of the investigation. An example of a typical soil profile revealed by the TPs is shown in Figure 6.

Summarised soil profiles are presented in Tables 2A and 2B and test pit logs are included in **Appendix B**.

Table 2A: Summarised Soil Profile at Selected Locations DCPs 1 – 6

Summary of Soil Type	DCP (blows / 100 mm)	Relative Density / Consistency	Depth Below EGL (m)**					
			DCP01 +TP	DCP02 +TP	DCP03 +TP	DCP04 +HA	DCP05 +TP	DCP06 +TP
TOPSOIL	1 – 4	*	0.0 – 0.4	0.0 – 0.3	0.0 – 0.4	0.0 – 0.4	0.0 – 0.3	0.0 – 0.3
SILT	2 – 18	Stiff to Hard	0.4 – 3.7	0.3 – 2.4	0.4 – 1.6	0.4 – 1.4	0.3 – 3.5	0.3 – 3.2
Sandy GRAVEL	30+	Very Dense	3.7 – 5.5+	2.4 – 2.8+	1.6 – 3.5+	1.4+	3.5 – 3.6+	3.2 – 3.3+
Groundwater depth (m below EGL)			5.0	2.8	3.1	NE	3.4	3.3

* Relative density not assigned to topsoil.

** Depths rounded to the nearest 0.1 m and may vary across the site from the test locations. Depths are not corrected for variations in topographic elevation between test locations.

NE = standing water not encountered

Groundwater readings are the initial water strike depth undertaken in the test pit excavation in March 2023.

Table 2B: Summarised Soil Profile at Selected Locations DCPs 7 – 13

Summary of Soil Type	DCP (blows / 100 mm)	Relative Density / Consistency	Depth Below EGL (m)**						
			DCP07 +TP	DCP08 +TP	DCP09 +TP	DCP10 +TP	DCP11 +HA	DCP12 +TP	DCP13 +TP
TOPSOIL	1 – 4	*	0.0 – 0.3	0.0 – 0.4	0.0 – 0.3	0.0 – 0.3	0.0 – 0.3	0.0 – 0.3	0.0 – 0.3
SILT	2 – 13	Firm to Hard	0.3 – 3.2	0.4 – 2.3	0.3 – 2.2	0.3 – 1.9	0.3 – 1.3	0.3 – 1.4	0.3 – 2.1
Sandy GRAVEL	12 – 30	Dense to Very Dense	3.2 – 4.0+	2.3 – 3.6+	2.2 – 2.8+	1.9 – 3.7+	1.3 – 1.5+	1.4 – 1.8+	2.1 – 3.2+
Groundwater depth (m below EGL)			3.8	3.3	2.8	2.7	NE	NE	3.1

* Relative density not assigned to topsoil.

** Depths rounded to the nearest 0.1 m and may vary across the site from the test locations. Depths are not corrected for variations in topographic elevation between test locations.

NE = standing water not encountered

Groundwater readings are the initial water strike depth undertaken in the test pit excavation in March 2023.

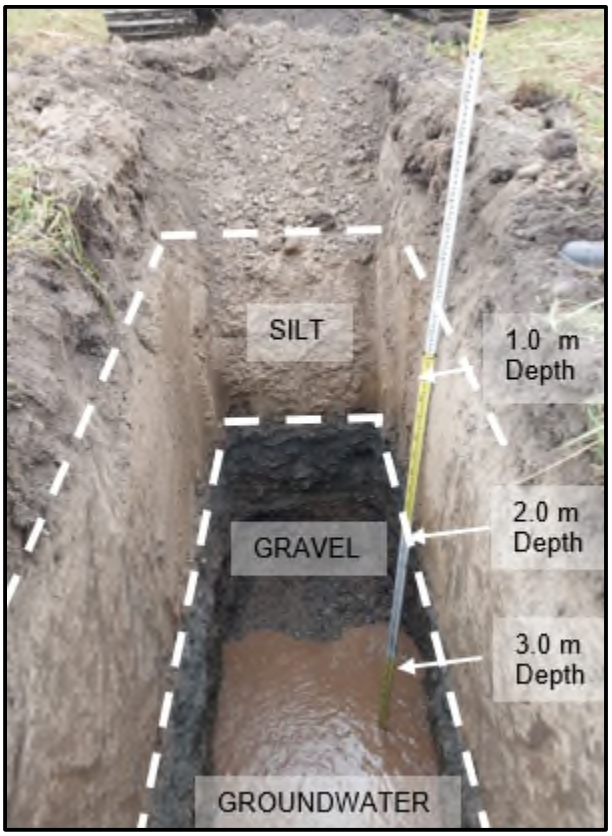

Figure 6: View of the typical subsoil profile (TP10) at Farm Road to approximately 3.7 m below existing ground level (EGL). Photo date: 13 March 2023.

The variation in depths to gravel encountered across the site (from below existing, pre-development ground level) is illustrated in Figure 7.

Figure 7: Annotated site concept plan showing summarised depths to gravel in meters below existing ground level.

3.2 Groundwater

Groundwater was encountered across the majority of the site between 2.2 – 3.8 m below EGL. TP01, located in the northwest corner of the site, first encountered groundwater at 5.0 m below EGL, which was slightly deeper than encountered elsewhere on the site. It is noted that some groundwater rise was observed across the site in the order of 0.5 – 1.0 m above the initial strike level, indicating some artesian pressure may be present. Groundwater was not encountered in the northeast (Racecourse Road) of the site in TP12 and HA4, HA11, due to the shallow termination in gravels. A summarised plan showing depth the groundwater across the site is shown in Figure 8.

Figure 8: Annotated site concept plan showing the variation in the depth to groundwater in metres below EGL in March 2023. Note, while the recordings don't take into account the relative level (RL) of the test points, the significant variation in the RL of the water level is present.

3.3 Infiltration Testing

Davis Ogilvie (Aoraki) conducted falling-head infiltration (FHI) tests at thirteen locations across the site in March 2023. Preliminary infiltration rates estimated by using the traditional Horton's equation method ranged from 50 – 1200 mm / hour. When available, the (Aoraki) infiltration report should be read in conjunction with this report. Implication of the site testing and groundwater levels are discussed in Section 6.5.

[redacted]

A laboratory testing suite was undertaken on a representative bulk sample of silt recovered from the location of TP05 at 0.5 – 0.6 m below EGL. The individual sample represents the typical shallow silt unit underlying the site. The tests results are considered suitable for preliminary infrastructure design; however, further laboratory analysis is likely required prior to and during detailed design and construction to verify the design parameters.

4.1 Particle Size Analysis

The silt sample was analyses for particle size distribution (washed grading and hydrometer method). Laboratory reports are provided in **Appendix D** and results are summarised in Table 3.

Table 3: Laboratory Results for Silt Sample

Fraction / parameter	Sample
	TP05, 0.5 – 0.6 m
Clay (<0.002 mm)	20%
Silt (<0.06 mm)	60%
Sand (>0.06 mm)	20%
Description	SILT with some sand and clay

4.2 Maximum Dry Density

The silt sample was tested for Maximum Dry Density (MDD) using the standard compaction method in accordance with NZS 4404:1986. The silt returned a MDD of 1.77 t/m^3 at an optimum water content 18.0 %. Results are included in **Appendix D**.

4.3 California Bearing Ratio

A soaked California Bearing Ratio (CBR) test was undertaken on the remoulded silt sample in accordance with NZS 4402:1986(:6.11). The soaked sample returned a CBR of 4%. Results are included in **Appendix D**.

5 [illegible]

5.1 Design Criteria

In accordance with NZS 1170.5 a site soil class of D (deep or soft soils) is recommended for the site due to the expected significant depth to bedrock.

5.2 Liquefaction Hazard

The site has a consistent shallow profile of stiff silt over dense gravel. No discernible difference in geological conditions were observed between the areas of the site mapped by Yetton & McCahon (2002) as 'Zone 1' and 'Zone 2' however shallower groundwater was present in the Zone 1 area. Based on nearby deep testing, the gravel deposits are expected to extend to significant depth. While a shallow groundwater profile is present under the site, the presence of consistent, deep, dense gravel is expected to resist the potential for liquefaction. The presence of a stiff, non-liquefiable (i.e., non-saturated) cap is likely to further resist liquefication damage on the site surface. Conditions at the site are considered consistent with the published low to very low liquefaction potential.

Given the depth to groundwater, density of the saturated host gravels, and the consistency of the overlying silt unit, the site is unlikely to be at significant risk from liquefaction during future large seismic events. In terms of MBIE (2017)[14] liquefaction risk categories, we consider the site to have an equivalent *"low liquefaction vulnerability"* category where liquefaction damage is considered unlikely during future seismic events.

5.3 Static Geotechnical Ultimate Bearing Capacities

Based on the in-situ DCP testing a static geotechnical ultimate bearing capacity (GUBC) of 300 kPa has generally been achieved below the topsoil from 0.3 – 0.7 m below EGL. Limited thicknesses of lower strength (<300 kPa) surficial silts are present on the site.

It should be noted that although testing revealed consistent subsurface soil conditions, a low density of geotechnical testing has been undertaken. The level of testing is considered suitable for general recommendations to assist with the initial consenting phase of the development; however, during earthworks and prior to building consent, further testing, supervision, and certification will be required.

5.4 Preliminary Foundation Recommendations

Foundations designed in accordance with NZS 3604:2011 *(Timber-Framed Buildings*) are considered appropriate for proposed buildings, subject to the conditions provided in Section 9.0. For a building to comply with NZS 3604:2011, all topsoil, organic material, or any other unsuitable material, including low strength silt, and non-engineered fill, should be stripped from beneath the building footprint prior to any foundation construction onsite.

[14] MBIE (2017), Planning and engineering guidance for potentially liquefaction-prone land, published 26 September 2017.

Flood modelling is outside the scope of this report however it is recognised that the site may be at risk of inundation in the event of an Ashburton River breakout. It is recommended that a Registered Professional Surveyor confirm ground levels onsite, and ECan / ADC confirm the minimum Finished Floor Levels prior to subdivision construction.

5.5 Indicative Soil Properties

Estimated soil properties for preliminary design purposes are provided in Table 4.

Table 4: Estimated Shallow Soil Properties

Soil Description	Unit Weight[15] (γ)	Internal Angle of Friction[16] (ϕ)	Cohesion (c)[15]	Modulus of Subgrade Reaction (k_s)[17]
SILT	15 – 17 kN/m^3	26 – 28°	3 – 5 kPa	45 – 55 kPa/mm
GRAVEL	19 – 21 kN/m^3	35°	0	100 – 150 kPa/mm

5.6 Preliminary Pavement Design

Based on laboratory testing and DCP tests of the shallow subgrade soils (silt), and correlations provided in NZS 4404:2010[18], a CBR of 4 is recommended for preliminary pavement design. It must be noted that the silty subgrade soils will be sensitive to moisture variations and vehicle loading. Excessive moisture or vehicles tracking over the subgrade will have an adverse impact on the subgrade conditions and must be carefully managed during the earthworks phase.

6 [redacted]

6.1 Earthworks

Earthworks must be carried out in accordance with the NZS 4431:2022[19]. The recommendations should be incorporated into the subdivision engineering plans and into an Earthworks Specification document developed specifically for the site. Important aspects of the earthworks operation include but are not limited to the following:

- All areas on which the fill is to be placed is to be stripped of all vegetation, topsoil, soft, organic, or otherwise unsuitable soils. Topsoil onsite is approximately 0.3 – 0.4 m thick. All stripped subgrade areas are to be inspected by a suitably experienced Geo-professional prior to placing of any fill.

[15] Look, B.G. (2007) Handbook of Geotechnical Investigation and Design Tables, Taylor & Francis Group, London, UK.
[16] Bowles, J.E. (2001) Foundation Analysis and Design, McGraw-Hill International Editions – 5th Edition, Table 2-6 pp108.
[17] Figure 3.1 in NZS 4404:2010
[18] NZS 4404:2010 Land development and subdivision infrastructure.
[19] NZS 4431:2022 Engineered fill construction for lightweight structures. Published 27 May 2022.

- The engineer is to be notified of all weak soils, soft or organic material, uncontrolled or historic fill. It is noted that the test pits excavated as part of this investigation have been loosely backfilled and will require identification and full remediation during the earthworks stage.
- The subgrade surface must be adequately surveyed by the contractor (under the supervision of a Registered Professional Surveyor), and the information provided to Davis Ogilvie.
- The subgrade should be protected from water ponding and from rutting or weaving as a result of vehicle or machine loadings. Careful management of the silty subgrade will be required during earthworks, especially during periods of rain.
- Target engineered fill Maximum Dry Density (MDD) values (1 per 4,000 m^3 of fill) must be obtained prior to placement of fill and shall be retested in accordance with NZS 4431, or as directed at any stage by the Engineer. Fill shall be placed in lifts no thicker than 250 mm (un-compacted) and is to be compacted to a minimum of 95% of its MDD.
- Nuclear Density (ND) testing shall be carried out on every 250 mm lift of filling at max 20 m spacing to confirm sufficient compaction, or unless otherwise specified by the Engineer. Direct transmission mode shall be used on silt and sands fills. Backscatter mode may be adopted for testing of gravelly fills.
- The site location and subject lift of ND tests must be appropriately recorded (e.g., GPS surveyed and plotted accurately on a map), and is to be provided along with the test results to Davis Ogilvie.
- The Engineer may require and/or undertake additional DCP testing on the compacted engineered fill. Fill is to achieve the requirements of NZS 3604:2011 “Good Ground” defined as a minimum 5 blows / 100 mm. This requirement must be conformed before the placement of any subsequent lifts or topsoil.
- All filling records are to be provided to the Engineer for review and to support the fill certificate and as-built completion report. Fills not achieving the required conformance shall be reworked or replaced with conforming material.

6.2 Material Reuse

Bulk samples of the shallow silt unit have been laboratory tested to help inform recommendations for material reuse (i.e., as “site-won” fills). Particle size distribution (PSD) and maximum dry density / optimum moisture content (MDD/OMC) tests were carried out by WSP Laboratories, Christchurch. Test results are discussed in Section 4.0, and laboratory reports are attached. Additional laboratory testing may be required.

It must be noted that while placement of silt fill is considered appropriate, the material is highly sensitive to moisture variations and will be difficult to achieve the conformance requirements. It is recommended that material is only placed under favourable weather conditions with appropriate compaction machinery including padfoot rollers. Extreme care is taken to protect both the subgrade surfaces and placed silt fill. Care must also be taken to protect fill stockpiles from moisture ingress.

6.3 Cut / Fill Recommendations

Specific recommendations for earthworks shall be provided in a site-specific earthworks specification and Earthworks Management Plan (EMP). General requirements for fill placement are provided below:

- All engineered fills to be used on site are subject to further laboratory validation testing and examination by the Geo-professional during earthworks. Testing shall include but no be limited to PSD, Atterberg limits, and MDD.
- Compaction field trials / plateau tests of the selected fill material may also be undertaken to ensure adequate density of the fill material can be achieved in the field.
- Prior to approval by the Geo-professional, any imported fill must be tested to obtain, as a minimum, PSD and MDD with OMC.
- To enable fill certification at the earthworks completion stage, all fill must be placed and validated to NZS 4431:2022 and the requirements of the site-specific earthworks specification EMP developed by the appointed Geo-professional.
- The founding condition of the natural ground must be inspected and tested by a suitability qualified Geo-professional prior to filling.

6.4 Dust, Erosion and Sediment Control

The subdivision contains a waterway which crosses and exists the site to the south. Stormwater runoff must be adequately controlled both during subdivision development and in the long term to prevent localised erosion, overland flow and sedimentation. It is recommended that appropriate drainage means are incorporated in the design of the development to manage runoff.

Fine silt/clay soils can be highly dispersive in water and have the potential to create significant quantities of dust during earthworks. A stringent Dust, Erosion and Sediment Control Plan should be in place prior to earthworks commencing. It is recommended that site stripping is undertaken in small, manageable sections, and the areas covered with mulch and or topsoil and vegetation as soon as is possible to reduce the potential for erosion and dust on the site.

6.5 Stormwater and Wastewater Management

Stormwater runoff must be adequately controlled both during development and in the long term to prevent localised erosion, sedimentation, or flooding. Appropriate drainage must be incorporated in the design to manage runoff from impervious and developed surfaces.

Infiltration testing by Davis Ogilvie (Aoraki) indicate highly variable infiltration rates across the site. Preliminary results suggest ultimate infiltration rates in the order of 50 – 1200 mm / hour. It must be noted that saturated gravels were encountered in most test pits across the site and that the infiltration testing was undertaken at the end of summer (27 March). Significantly lower levels of infiltration would be expected when groundwater levels rise.

Davis Ogilvie have been involved with several subdivisions in the northern Ashburton area and have avoided simple discharge to natural ground options due to the issues related to varying groundwater levels and artesian groundwater.

Consideration must therefore be given to the potentially highly fluctuating groundwater level. To better understand the groundwater variability, it is recommended that standpipe piezometers are installed and consistently monitored using a levellogger or similar technology.

It is understood the subdivision will be connected to the existing Ashburton sewage network. With robust engineering design, and a suitable level of construction observation, the shallow soils on the site are considered competent and non-liquefiable to support a gravity-fed wastewater system.

7 [illegible]

7.1 Prior to Construction

7.1.1 Engineering Plans – Review

The full set of engineering plans are to be reviewed by or under the direction of a Chartered Professional Geotechnical Engineer. The review shall include but not be limited to the following:

- Scheme plan with proposed topography.
- Earthworks plans to show proposed cut and fill areas.

7.1.2 Earthworks Specification

In addition to the civil specification, a standalone earthworks specification should be compiled. The specification should be tailored to the site, proposed earthworks, and the Construction Management Plan. The specification shall be compiled by the Geo-professional. Additional field and laboratory testing may be required at this stage.

7.1.3 Earthworks Management Plan (EMP)

Prior to construction, the appointed Geo-professional shall develop a site / stage specific EMP which will be in addition to the Earthworks Specification.

7.1.4 Dust, Erosion and Settlement Control Plan (DESCP) (Review)

The DESCP is to be submitted by the Contractor and approved by a Geo-professional prior to any earthworks taking place on the site.

7.2 During Construction

7.2.1 Construction Monitoring

All fill shall be placed in accordance with NZS 4431:2022 and all earthworks on the site will be subject to construction monitoring. It is anticipated that a Construction Monitoring (CM) 3 level of geotechnical supervision will be appropriate for the bulk earthworks.

7.2.2 Well Decommissioning

Decommission of any existing standpipe piezometers and groundwater wells to the requirements of NZS 4411: 2001 *"Environmental Standards for drilling of soil and rock."*

7.3 Following Construction

7.3.1 As-built Surveys

Plans drawn by a Registered Professional Surveyor showing as-built surfaces and an iso-contour (cut / fill) plans and drainage plans are to be supplied to the Geo-professional.

7.3.2 Construction Monitoring Results

All construction monitoring results including all independent nuclear densometer testing, laboratory testing and any other tests undertaken or arranged by the contractor are to be supplied to the Geo-professional.

7.3.3 Geotechnical Reporting and Certification

At the completion of the earthworks an Earthworks Completion Report (ECR) shall be prepared by the Geo-professional. Subject to satisfactory completion, the report will contain the following:

- Fill certification in terms of NZS 4431:2022.
- As-built drawings for earthworks.
- Lot-specific development conditions.

[illegible]

Section 106 of the Resource Management Act (RMA) requires that the site of a subdivision be assessed for potential material damage from natural hazards. These hazards are discussed in Table 5.

Table 5: Resource Management Act Considerations

Natural Hazard	Potential Effects on Developed Site
Erosion	Erosion is not considered a significant risk to the subdivision due to its flat topography. All surface water on the site should be managed to minimise potential erosion and suitable landscaping and stormwater management systems are required ensure overland flows are controlled to prevent erosion and scouring of surface soils.
Falling Debris	Due to the flat topography of the subdivision and surrounding area it is considered there is an extremely low risk of falling debris impacting the site.
Subsidence	Seismically-induced liquefaction is unlikely to affect the site as the soils below the water table generally consist of coarse-grained materials of low liquefaction potential. With reference to MBIE (2017)[20], the site is considered to have an equivalent "low liquefaction vulnerability" category, whereby liquefaction damage is considered unlikely. Natural soils on site are considered sufficiently competent for the proposed development and are considered to present low risk in terms of static settlement / subsidence. All earthworks filling proposed to be undertaken across the site is to be carried out in accordance with NZS 4431:2022, inspected and certified by a suitably qualified Geo-professional.
Slippage	Due to the generally flat topography of the subdivision site, ground slippage is not anticipated. While no development is proposed in close proximity to the banks of the Wakanui Stream, a recommended minimum setback from the stream of 5.0 m should be adopted.
Inundation	The site is not located within an identified flood zone. Inundation of the site during floods is considered to be low risk however an Ashburton River breach scenario would result in potentially significant flooding across the site. ADC should be contacted to confirm minimum floor levels for the site. It is recommended that a Registered Professional Surveyor confirm ground levels onsite. The proposed development must by appropriately designed to manage, contain and discharge stormwater so as to manage the inundation risk to the site and also to adjacent sites. Overland flow paths must be identified and preserved as part of the subdivision design.

[20] MBIE (2017), Planning and engineering guidance for potentially liquefaction-prone land, published 26 September 2017.

Provided the recommendations presented in this report are followed, it is determined that the site is suitable under Section 106 of the RMA for the proposed subdivision into approximately 141 low – medium density residential lots. It is considered that the risk of the hazards discussed in this report can be mitigated or managed to an acceptable level. A Statement of Professional Opinion on the Suitability of Land for Subdivision is attached as **Appendix E**. The granting of subdivision consent is supported, subject to the following conditions:

1. An engineering plan review is completed by a suitably qualified Geo-professional to ensure the recommendations provided in the Davis Ogilvie geotechnical report for the subdivision have been correctly interpreted and incorporated into the subdivision design.
2. All earthworks shall be undertaken under the supervision of a suitably qualified Geo-professional with experience in land development.
3. All fill placed as part of the subdivision development or under future building footprints must be placed in accordance with NZS 4431:2022 and inspected and certified by a Chartered Professional Engineer.
4. All uncontrolled fill, infilled channels, backfilled test pits, low strength soils, organic soils or otherwise unsuitable soils within foundation excavations or beneath civil infrastructure or structural fill will require remediation by excavation and engineered filling in accordance NZS 4431:2022.
5. Any new foundations onsite must be founded below the organic topsoil, low strength soils, uncontrolled fill, or any other unsuitable material.
6. It is recommended that all future building foundation excavations are inspected/confirmed by a suitably qualified person at time of construction.
7. Minimum floor levels as per New Zealand Building Code E1 and ADC and ECan requirements.
8. Stormwater must be appropriately managed during subdivision development and longer term to limit the influence of surface water erosion on the site. Any overland flow paths must be identified and preserved as part of the subdivision design.
9. Following earthworks, a geotechnical completion report shall be compiled by a chartered geotechnical engineer or engineering geologist. The report should summarise the works completed and detail any further geotechnical recommendations including any requirements for individual lot geotechnical investigations.

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	GPM

NORTH

Key

- Proposed Allotment
- Proposed Local Purpose Reserve
- Indicative Stormwater Basin Area
- Proposed Row & Pedestrian Link
- Existing Easements
- Indicative Wakanui Creek Top of Bank
- Existing ground major contour at 0.5m
- Existing ground minor contour at 0.1m
- Proposed Stormwater Flow Direction
- Proposed Stormwater Flow Direction (Overflow)

Owners: Golden Mile Trading Ltd & Carl Grove Developments Ltd

Applicant: Coniston Park Limited

Address: Farm Road, Ashburton

Appellation: Lot 4 DP 320165 & Lot 8 DP 311232

RT References: 79791, 44314

Total Area: 8.20 ha & 8.12 ha

Total Allotments: 166

360m^2 - 600m^2: 43 Allotments (26%)

600m^2 - 800m^2: 65 Allotments (39%)

800m^2 above: 58 Allotments (35%)

- All dimensions in metres unless shown otherwise;
- Existing boundaries adopted from LINZ online database;
- Aerial Photography: Sourced from LINZ Database https://data.linz.govt.nz/layer/106276-canterbury-02m-rural-aerial-photos-2020-2021/ under Creative Commons Attribution 4.0 International;
- Horizontal Datum: NZGD2000 NZTM;
- Vertical Datum: NZVD 2016;
- Contours at 0.1m Intervals (Major Interval 0.5m)
- This plan has been prepared for the sole purpose of supporting the Farm Road Plan Change;
- Use of this plan for other purposes or its reproduction in part or full is not permitted without the prior consent of Davis Ogilvie (Aoraki) Ltd;
- A full assessment of easements will be undertaken prior to final survey and subsequent to proposed servicing and engineering requirements being confirmed; and
- All dimensions and areas are subject to final legal survey.

Lot 1 DP 320165

Lot 3 DP 320165

Wakanui Creek Reserve details to be confirmed

Local Purpose Reserve with indicative pedestrian link

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

Lot 7 DP 62713

Local Purpose Reserve with indicative pedestrian link and Stormwater Swale

Lot 4 DP 320165

Lot 8 DP 311232

WAKANUI CREEK

RACECOURSE ROAD

Lot 6 DP 67784

Existing easement and stormwater swale subject to further discussion with client, ADC and engineering design

Local Purpose Reserve with indicative stormwater basin

Indicative pedestrian link alongside Wakanui Creek

FARM ROAD

Existing roadside drain

Local Purpose Reserve with indicative stormwater basin and pedestrian link

Lot 201 to vest with Ashburton District Council as Road

CARTERS ROAD

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road Ashburton 1072\06 CADD\Dwg\30625-Subdivision Layout Plan Option D.dwg

DAVIS OGILVIE

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Also - Nelson, Christchurch, Greymouth

CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

CONCEPT PLANNING

SUBDIVISION LAYOUT PLAN - OPTION D

Design	Drawn	QA check	dwg	Issue
MCB	MCB	GPM	PL01	A
Scale @ A1	Date	File		
1:1000	05-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

NORTH

General Notes:
- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 notes.

Engineering Notes:
- All information is preliminary only and for proof of concept to support a plan change;
- Engineering in accordance with:
  - NZS 4404:2010
  - ADC Construction Standard
  - ADC District Plan
  - ADC Global Stormwater Consent
- All earthworks are to be carried out in accordance with NZS 4431:2022;
- All pipe sizes, manhole locations, hydrant locations, etc are indicative only and subject to detailed design.

Proposed Stormwater Flow Direction

Proposed Stormwater Flow Direction (Overflow)

Lot 1 DP 320165

Lot 3 DP 320165

Lot 7 DP 62713

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

Lot 4 DP 320165

Lot 8 DP 311252

Lot 6 DP 67784

Western Loop

Eastern Loop

Main Road

Main Road 2

WAKANUI CREEK

RACECOURSE ROAD

FARM ROAD

CARTERS ROAD

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

Lot 2 DP 516233

Lot 1 DP 516233

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12d$\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Road Layout Plan.dwg

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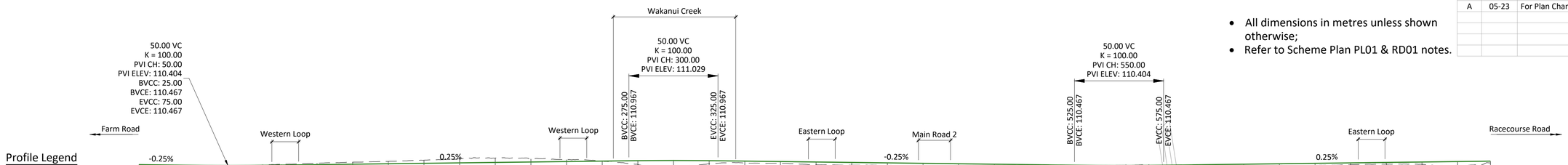
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

ROAD LAYOUT PLAN

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
1:1000	05-23	30625

dwg RD01 Issue A



Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

Existing Ground Level	110.23	110.25	110.31	110.46	110.57	110.70	110.81	110.90	111.03	111.19	111.27	111.18	111.09	110.93	110.56	109.94	110.63	110.72	110.69	110.52	110.47	110.44	110.43	110.36	110.36	110.36	110.43	110.46	110.50	110.41	110.36	110.12	110.34	110.44	110.52	110.59	110.56	110.34	110.73
Finished Ground Level	110.53	110.48	110.44	110.44	110.48	110.53	110.58	110.63	110.68	110.73	110.78	110.83	110.88	110.93	110.98	111.00	110.98	110.93	110.88	110.83	110.78	110.73	110.68	110.63	110.58	110.53	110.48	110.44	110.44	110.48	110.53	110.58	110.63	110.68	110.73	110.78	110.83	110.88	110.93
Cut (-) or Fill (+) to FL	+0.30	+0.23	+0.13	-0.02	-0.09	-0.17	-0.23	-0.27	-0.35	-0.46	-0.49	-0.35	-0.22	0.00	+0.42	+1.06	+0.35	+0.21	+0.19	+0.31	+0.31	+0.29	+0.25	+0.27	+0.22	+0.17	+0.05	-0.02	-0.06	+0.07	+0.17	+0.46	+0.29	+0.24	+0.21	+0.19	+0.27	+0.54	+0.20
Horizontal Geometry	L = 153.15								L = 76.27 R = 44.50				L = 92.62					L = 47.27 R = 59.50		L = 51.47			L = 54.85 R = 58.50		L = 282.77														
Chainage	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	360.00	380.00	400.00	420.00	440.00	460.00	480.00	500.00	520.00	540.00	560.00	580.00	600.00	620.00	640.00	660.00	680.00	700.00	720.00	740.00	758.39

Longsection: Main Road

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

Existing Ground Level	110.58	110.66	110.73	110.86	111.01	111.15	111.31	111.47	111.70	111.92	111.90	111.91	111.85	111.80	111.80	111.66	111.52	111.48	111.13	111.15	111.11
Finished Ground Level	110.48	110.63	110.77	110.91	111.05	111.19	111.33	111.48	111.62	111.76	111.82	111.79	111.69	111.58	111.48	111.37	111.27	111.16	111.06	110.95	110.89
Cut (-) or Fill (+) to FL	-0.09	-0.04	+0.04	+0.05	+0.04	+0.04	+0.02	0.00	-0.08	-0.17	-0.08	-0.12	-0.16	-0.22	-0.32	-0.29	-0.25	-0.31	-0.07	-0.20	-0.22
Horizontal Geometry	L = 40.56			L = 37.20 R = 25.00	L = 98.86					L = 34.05 R = 25.00		L = 94.67					L = 55.37 R = 27.50			L = 31.59	
Chainage	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	360.00	380.00	392.30

Longsection: Western Loop

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

Existing Ground Level	108.91	109.93	110.00	110.13	110.21	110.37	110.42
Finished Ground Level	110.26	110.80	110.83	110.78	110.73	110.68	110.66
Cut (-) or Fill (+) to FL	+1.36	+0.87	+0.83	+0.66	+0.52	+0.31	+0.25
Horizontal Geometry	L = 53.35			L = 22.01 R = 41.50	L = 32.11		
Chainage	0.00	20.00	40.00	60.00	80.00	100.00	107.48

Longsection: Main Road 2

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

Existing Ground Level	110.51	110.65	110.73	110.78	110.81	110.86	110.86	110.91	110.88	110.65	110.76	110.86	110.91	110.96	111.01	111.02	110.86	110.74	110.59	110.56
Finished Ground Level	110.82	110.87	110.92	110.93	110.88	110.83	110.78	110.73	110.71	110.73	110.78	110.83	110.88	110.93	110.94	110.92	110.87	110.82	110.77	110.76
Cut (-) or Fill (+) to FL	+0.31	+0.22	+0.20	+0.15	+0.07	-0.03	-0.08	-0.18	-0.17	+0.08	+0.03	-0.02	-0.03	-0.03	-0.06	-0.10	+0.01	+0.08	+0.17	+0.20
Horizontal Geometry	L = 29.96		L = 23.09 R = 32.50	L = 214.13											L = 43.08 R = 27.50		L = 52.71			
Chainage	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	360.00	362.96

Longsection: Eastern Loop

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\Dwg\30625-Road Layout Plan.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

ROAD LONG SECTION

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
AS SHOWN	05-23	30625

dwg	Issue
RD02	A

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

NORTH

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

Lot 1 DP 320165

Lot 3 DP 320165

Lot 4 DP 320165

Lot 7 DP 62713

Lot 8 DP 511232

Lot 6 DP 67784

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

DWG SP02

DWG SP03

DWG SP04

DWG SP05

WAKANUI CREEK

RACECOURSE ROAD

FARM ROAD

CARTERS ROAD

Existing Ø525 Concrete SW

Existing swale to be piped

Existing Roadside Drain

Existing Roadside Drain

Existing Ø450 Concrete SW

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

Lot 2 DP 516233

Lot 1 DP 516233

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Master Plan.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

THREE WATERS MASTER PLAN

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
1:1000	05-23	30625

dwg SP01 Issue A

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe (SW)
- Existing Sewer Pipe (FS)
- Existing Water Pipe (W)
- Existing Power (Underground) (E(UG))
- Existing Power (Overhead) (E(OH))
- Existing Telecom (T)

NORTH

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

WESTERN LOOP

MAIN ROAD

WAKANUI CREEK

Refer to SP04

Refer to SP03

Inlet details refer to DWG TD02

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Layout Plan.dwg

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP02	A
Scale @ A1	Date	File		
1:400	05-23	30625		

Refer to SP02

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

NORTH

WESTERN LOOP

MAIN ROAD

MAIN ROAD 2

WAKANUI CREEK

ATTENUATION POND 1

FARM ROAD

Inlet details refer to DWG TD02

Outlet details refer to DWG TD02

Refer to SP05

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP03	A
Scale @ A1	Date	File		
1:400	05-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

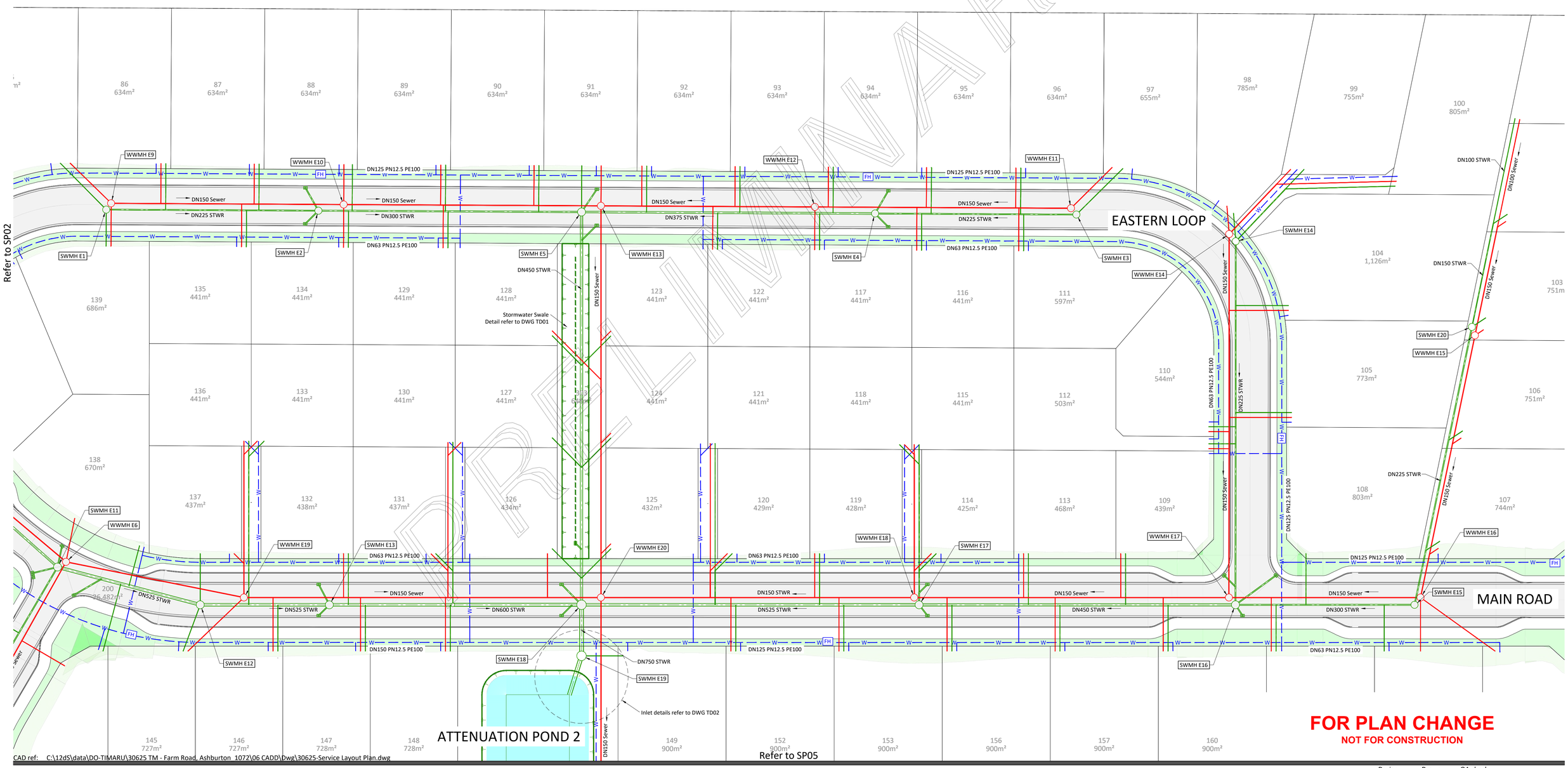
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

NORTH

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Layout Plan.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
1:400	05-23	30625

dwg SP04 Issue A

Refer to SP04

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

EASTERN LOOP

MAIN ROAD

ATTENUATION POND 2

FARM ROAD

CATERS ROAD

Refer to SP03

NORTH

SWMH E1
SWMH E2
SWMH E3
SWMH E4
SWMH E5
SWMH E11
SWMH E12
SWMH E13
SWMH E14
SWMH E15
SWMH E16
SWMH E17
SWMH E18
SWMH E19
SWMH E20
WWMH E6
WWMH E13
WWMH E14
WWMH E15
WWMH E16
WWMH E17
WWMH E18
WWMH E19
WWMH E20
WWMH E21
WWMH E22

DN225 STWR
DN300 STWR
DN375 STWR
DN225 STWR
DN63 PN12.5 PE100
DN450 STWR
DN150 Sewer
DN525 STWR
DN600 STWR
DN150 STWR
DN450 STWR
DN300 STWR
DN125 PN12.5 PE100
DN150 PN12.5 PE100
DN750 STWR
DN150 Sewer
DN63 PN12.5 PE100 Water
DN225 STWR
Existing DN200 uPVC Water

Stormwater Swale
Detail refer to DWG TD01

Inlet details refer to DWG TD02

Outlet details refer to DWG TD02

Existing road side drain to be reshaped

Existing WWMH 1.5
Existing WWMH 1.6
Existing WWMH 2.2

Lot	Area
103	751m²
105	773m²
106	751m²
107	744m²
108	803m²
109	439m²
110	544m²
111	597m²
112	503m²
113	468m²
114	425m²
115	441m²
116	441m²
117	441m²
118	441m²
120	429m²
121	441m²
122	441m²
123	441m²
124	441m²
125	432m²
126	434m²
127	441m²
128	441m²
129	441m²
130	441m²
131	437m²
132	438m²
133	441m²
134	441m²
135	441m²
136	441m²
137	437m²
138	670m²
139	686m²
141	990m²
142	991m²
143	978m²
144	691m²
145	727m²
146	727m²
147	728m²
148	728m²
149	900m²
150	1,001m²
151	1,001m²
152	900m²
153	900m²
154	1,001m²
155	1,001m²
156	900m²
157	900m²
158	1,001m²
159	1,001m²
160	900m²
200	35,482m²
302	4,049m²

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Layout Plan.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP05	A
Scale @ A1	Date	File		
1:400	05-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

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Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

Manhole Cover Level	111.75		111.40		110.96		110.82		110.46
Stormwater Pipe Invert	110.760		110.489 110.300		109.978 109.928		109.823 109.734		109.054
Manhole Depth	1.00		1.20		1.10		1.20		1.60
Stormwater Pipe Data		DN225 STWR Pipe Grade 0.50% (1:200)		DN300 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)		DN450 STWR Pipe Grade 1.40% (1:71)	
Distance		54.23	54.23	64.30	118.54	20.94	139.47	48.56	188.04

Longsection: SWMH W1 to SWMH W15

Scale: Horizontal 1:300; Vertical 1:150 @ A1

Manhole Cover Level	111.79		111.57		111.27		111.20		111.06		110.86
Stormwater Pipe Invert	110.902		110.684 110.554		110.307 110.267		110.166 110.136		110.039 110.009		109.802
Manhole Depth	0.90		1.10		1.10		1.10		1.10		1.10
Stormwater Pipe Data		DN225 STWR Pipe Grade 0.50% (1:200)		DN300 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)	
Distance		43.68	43.68	49.34	93.02	20.13	113.15	19.37	132.51	41.30	173.81

Longsection: SWMH W5 to SWMH W10

Scale: Horizontal 1:300; Vertical 1:150 @ A1

Manhole Cover Level	110.86		110.83		110.74		110.69		110.58		110.46		110.41		
Stormwater Pipe Invert	109.762		109.703 109.653		109.576 109.476		109.413 109.363		109.286 109.186		109.065 108.965		108.893 108.843		108.797
Manhole Depth	1.10		1.30		1.40		1.40		1.50		1.60		1.70		
Stormwater Pipe Data		DN450 STWR Pipe Grade 0.25% (1:400)		DN450 STWR Pipe Grade 0.25% (1:400)		DN525 STWR Pipe Grade 0.25% (1:400)		DN525 STWR Pipe Grade 0.25% (1:400)		DN600 STWR Pipe Grade 0.25% (1:400)		DN675 STWR Pipe Grade 0.25% (1:400)		DN675 STWR Pipe Grade 0.25% (1:400)	
Distance		23.75	23.75	30.82	54.57	25.22	79.79	30.89	110.68	48.48	159.16	28.65	187.81	18.50	

Longsection: SWMH W10 to Western Pond

Scale: Horizontal 1:300; Vertical 1:150 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\XRef's\X-30625-Stormwater.dwg

do DAVIS OGILVIE

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

STORMWATER LONG SECTION

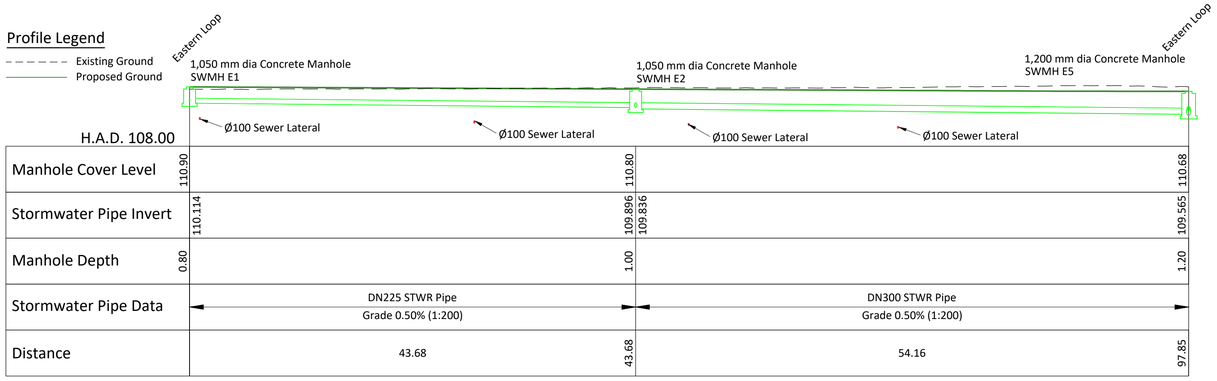
Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
AS SHOWN	05-23	30625

dwg	Issue
SW01	A

Contractor to locate all existing services & verify all dimensions before commencing work

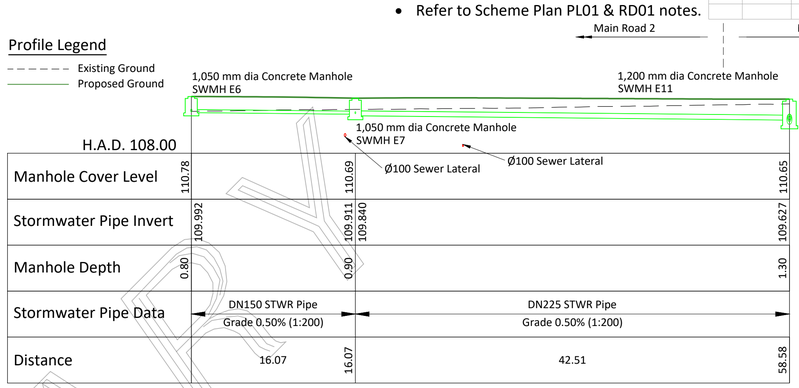
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



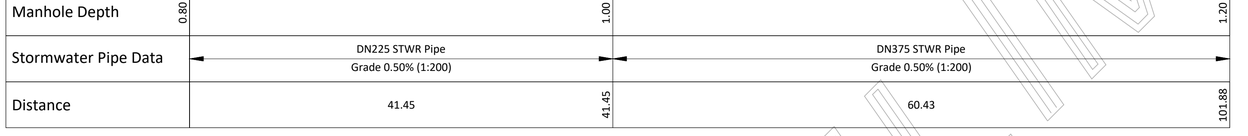
Longsection: SWMH E1 to SWMH E5

Scale: Horizontal 1:300; Vertical 1:150 @ A1



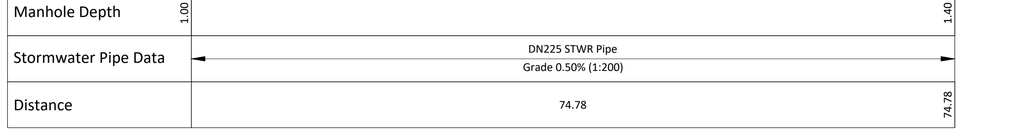
Longsection: SWMH E6 to SWMH E11

Scale: Horizontal 1:300; Vertical 1:150 @ A1



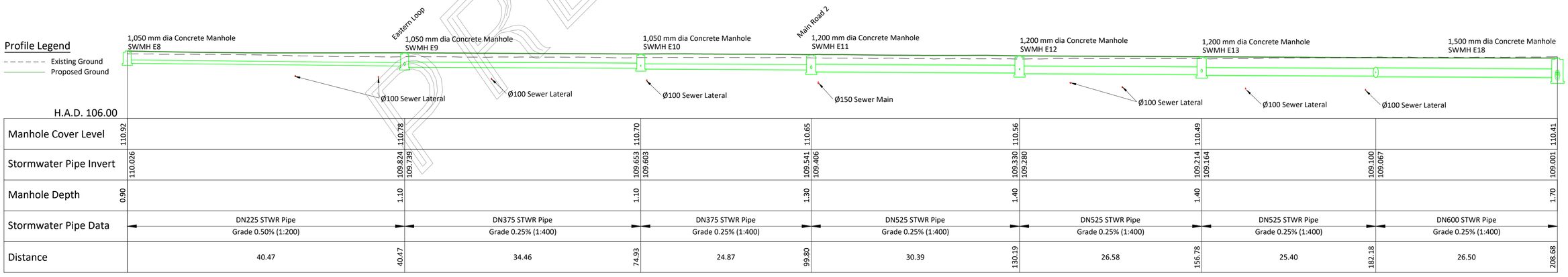
Longsection: SWMH E3 to SWMH E5

Scale: Horizontal 1:300; Vertical 1:150 @ A1



Longsection: SWMH E14 to SWMH E16

Scale: Horizontal 1:300; Vertical 1:150 @ A1



Longsection: SWMH E8 to SWMH E18

Scale: Horizontal 1:300; Vertical 1:150 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12d$\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\XRef's\X-30625-Stormwater.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

STORMWATER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SW02	A
Scale @ A1	Date	File		
AS SHOWN	05-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

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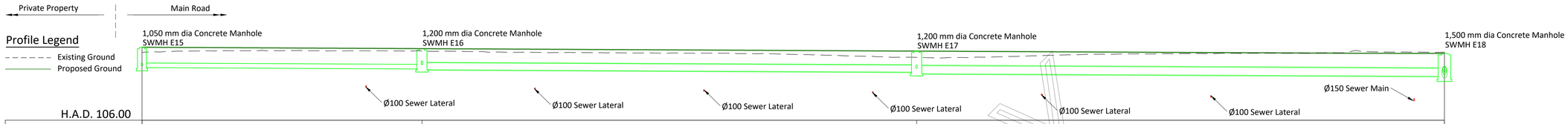
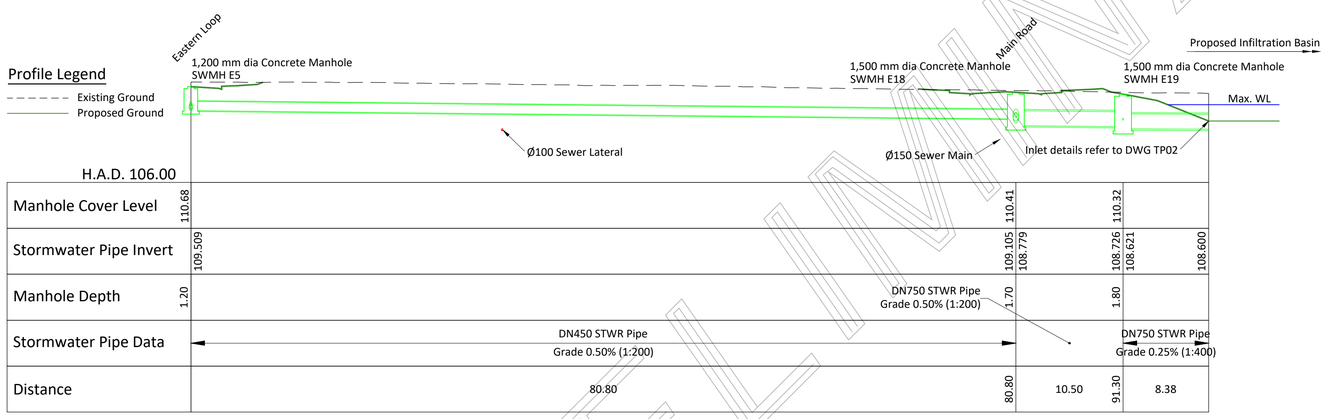


H.A.D. 106.00

Manhole Cover Level	110.81		110.72			110.56			110.41	
Stormwater Pipe Invert	109.478		109.386	109.336		109.173	109.073		108.899	
Manhole Depth	1.40		1.40			1.49			1.70	
Stormwater Pipe Data	DN300 STWR Pipe Grade 0.25% (1:400)				DN450 STWR Pipe Grade 0.25% (1:400)			DN525 STWR Pipe Grade 0.25% (1:400)		
Distance		36.87	36.87		65.13	102.00		69.50	171.50	

Longsection: SWMH E15 to SWMH E18

Scale: Horizontal 1:300; Vertical 1:150 @ A1

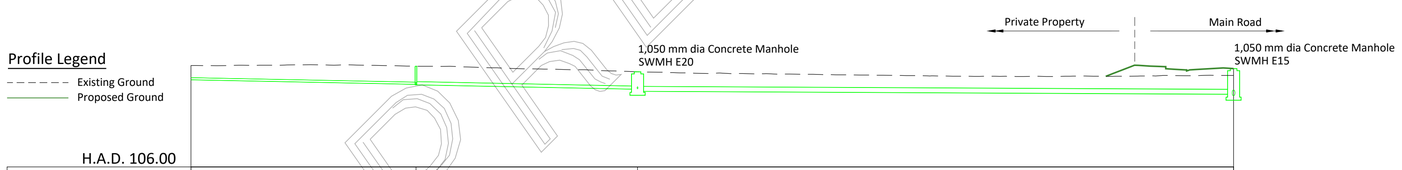


H.A.D. 106.00

Manhole Cover Level	110.68				110.41		110.32			
Stormwater Pipe Invert	109.509				109.105	108.779	108.726	108.621	108.600	
Manhole Depth	1.20				DN750 STWR Pipe Grade 0.50% (1:200) 1.70		1.80			
Stormwater Pipe Data	DN450 STWR Pipe Grade 0.50% (1:200)						DN750 STWR Pipe Grade 0.25% (1:400)			
Distance		80.80	80.80	10.50	91.30	8.38				

Longsection: SWMH E5 to Pond

Scale: Horizontal 1:300; Vertical 1:150 @ A1



H.A.D. 106.00

Manhole Cover Level				110.65					110.81	
Stormwater Pipe Invert	110.265		110.044	110.021	109.804	109.704			109.558	
Manhole Depth					1.00				1.40	
Stormwater Pipe Data	DN100 STWR Pipe Grade 1.00% (1:100)			DN150 STWR Pipe Grade 1.00% (1:100)			DN225 STWR Pipe Grade 0.25% (1:400)			
Distance		22.05	22.05	21.70	43.75	58.38			102.13	

Longsection: Lot 101 to SWMH E15

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
STORMWATER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SW03	A
Scale @ A1	Date	File		
AS SHOWN	05-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

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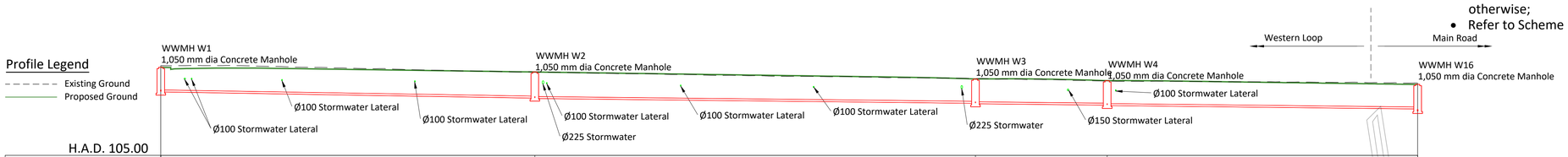
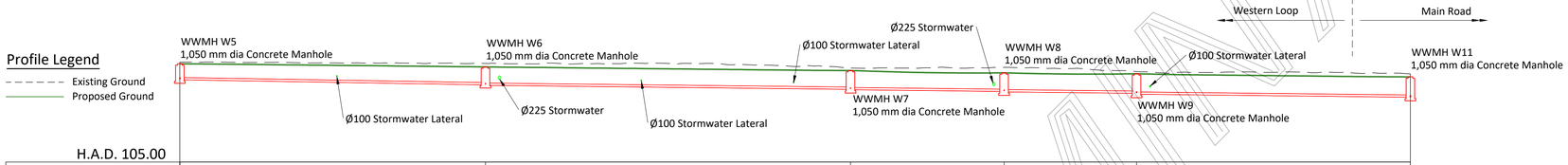


H.A.D. 105.00

Manhole Cover Level	111.81		111.44				110.90		110.77				110.48			
Sewer Pipe Invert	109.902		109.423	109.393			109.020	108.990	108.878	108.848			108.584			
Manhole Depth	2.00		2.10				2.00		2.00				2.10			
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)				DN150 Sewer Pipe Grade 0.55% (1:182)				DN150 Sewer Pipe Grade 0.55% (1:182)				DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		57.69	57.69		67.96		125.66		20.32	145.97		47.89	193.86			

Longsection: WWMH W1 to WWMH W16

Scale: Horizontal 1:400; Vertical 1:200 @ A1

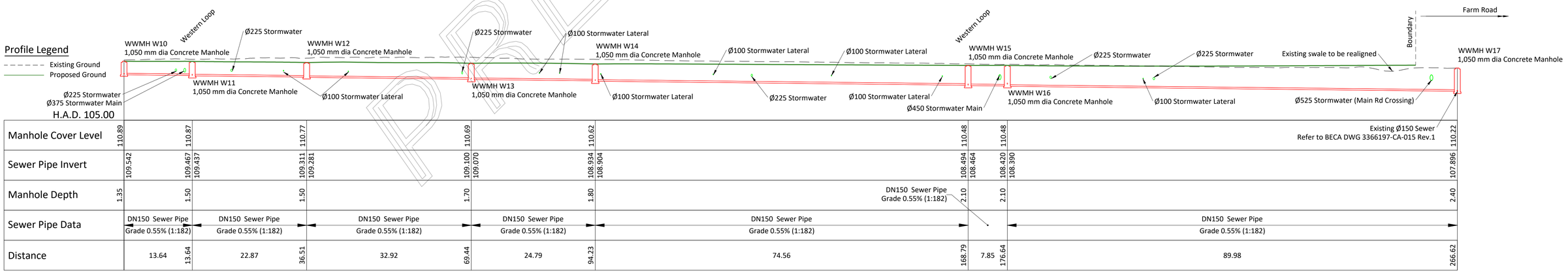


H.A.D. 105.00

Manhole Cover Level	111.77		111.55				111.30		111.14		111.08		110.87			
Sewer Pipe Invert	110.668		110.319	110.289			110.012	109.982	109.865	109.835	109.735	109.675	109.467			
Manhole Depth	1.20		1.30				1.40		1.40		1.50		1.50			
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)				DN150 Sewer Pipe Grade 0.55% (1:182)				DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		42.16	42.16		50.34		92.50		21.18	113.68	18.27	131.95	37.76	169.72		

Longsection: WWMH W5 to WWMH W11

Scale: Horizontal 1:400; Vertical 1:200 @ A1



H.A.D. 105.00

Manhole Cover Level	110.89	110.87		110.77		110.69		110.62				110.48	110.48						110.22	
Sewer Pipe Invert	109.542	109.467	109.437	109.311	109.281	109.100	109.070	108.934	108.904			108.494	108.464	108.420	108.390				107.896	
Manhole Depth	1.35	1.50		1.50		1.70		1.80				DN150 Sewer Pipe Grade 0.55% (1:182) 2.10		2.10					2.40	
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)					DN150 Sewer Pipe Grade 0.55% (1:182)							
Distance		13.64	13.64	22.87	36.51	32.92	69.44	24.79	94.23	74.56		168.79	7.85	176.64	89.98				266.62	

Longsection: WWMH W10 to WWMH W17

Scale: Horizontal 1:400; Vertical 1:200 @ A1

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\XRef's\X-30625-Sewer.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

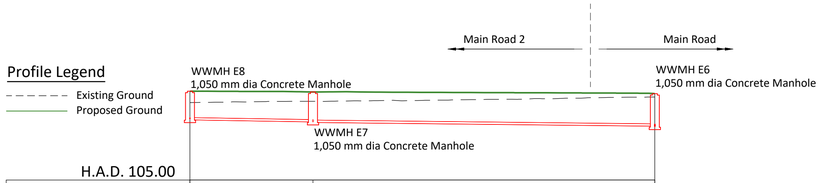
INFRASTRUCTURE SERVICING
SEWER LONG SECTION

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
AS SHOWN	05-23	30625

dwg WW01 Issue A

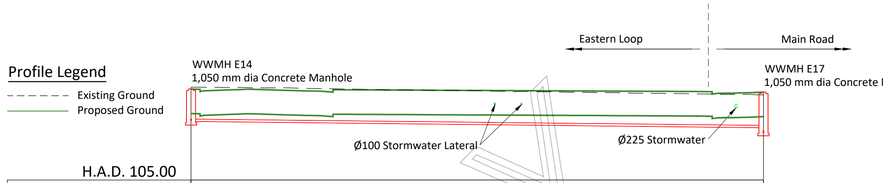
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



Manhole Cover Level	110.80		110.75		110.64	
Sewer Pipe Invert	108.925		108.791 / 108.761		108.516	
Manhole Depth	1.90		2.00		2.20	
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		16.07		16.07	44.64	60.71

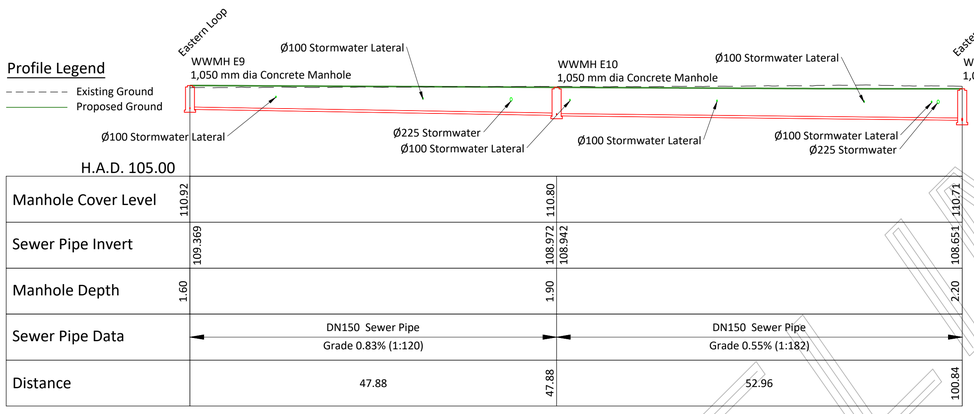
Longsection: WWMH E8 to WWMH E6



Manhole Cover Level	110.94		110.74
Sewer Pipe Invert	108.825		108.414
Manhole Depth	2.20		2.70
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.55% (1:182)		
Distance		74.76	74.76

Longsection: WWMH E14 to WWMH E17

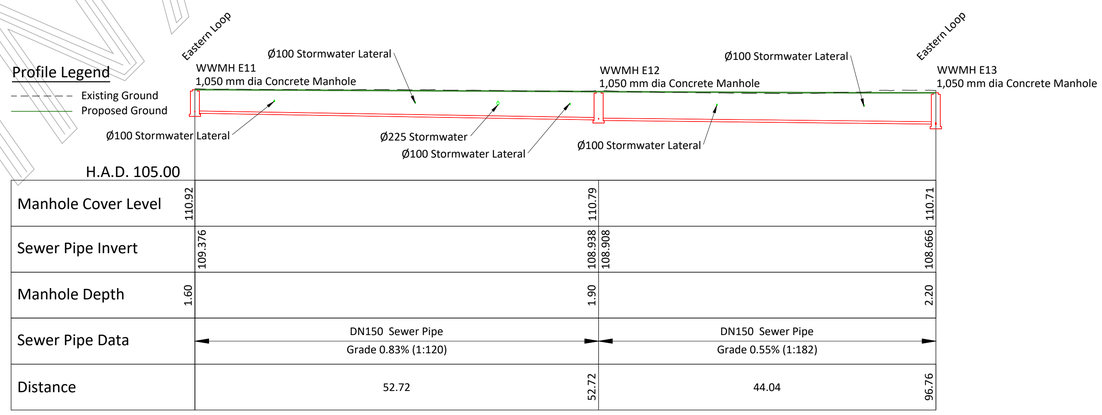
Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.92	110.80		110.71	
Sewer Pipe Invert	109.369	108.972 / 108.942		108.651	
Manhole Depth	1.60	1.90		2.20	
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)		
Distance		47.88	47.88	52.96	100.84

Longsection: WWMH E9 to WWMH 13

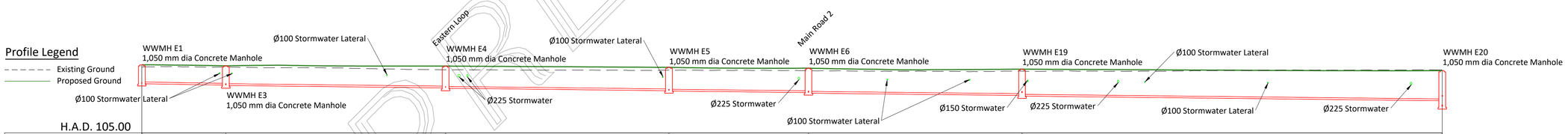
Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.92	110.79		110.71
Sewer Pipe Invert	109.376	108.938 / 108.908		108.666
Manhole Depth	1.60	1.90		2.20
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)	
Distance		52.72	52.72	44.04	96.76

Longsection: WWMH E11 to WWMH E13

Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.94	110.85		110.82		110.71		110.64	110.55	110.42
Sewer Pipe Invert	109.288	109.166 / 109.136		108.925 / 108.895		108.680 / 108.650		108.516 / 108.466	108.260 / 108.210	107.806
Manhole Depth	1.70	1.80		2.00		2.10		2.20	2.40	3.20
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)	
Distance		14.69	14.69	38.44	53.13	39.06	92.19	24.39	116.59	37.35	153.94	73.50	227.44

Longsection: WWMH E1 to WWMH E20

Scale: Horizontal 1:400; Vertical 1:200 @ A1

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

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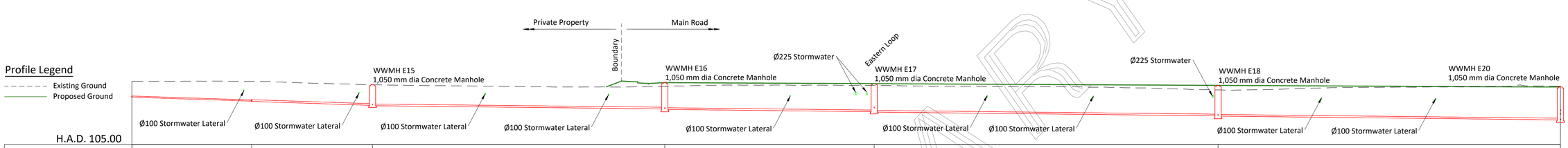
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
SEWER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	WW02	A
Scale @ A1	Date	File		
AS SHOWN	05-23	30625		



Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
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Manhole Cover Level					110.63		110.83		110.74		110.57		110.42
Sewer Pipe Invert	109.460		109.088 109.065		108.689 108.659		108.356 108.306		108.089 108.059		107.703 107.673		107.318
Manhole Depth					2.00		2.60		2.70		3.00		3.20
Sewer Pipe Data		DN100 Sewer Pipe Grade 1.65% (1:61)		DN150 Sewer Pipe Grade 1.65% (1:61)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)	
Distance		22.57	22.57	22.77	45.34	55.07	100.41	39.45	139.86	64.78	204.64	64.50	269.14

Longsection: Lot 101 to WWMH E18

Scale: Horizontal 1:400; Vertical 1:200 @ A1

Manhole Cover Level	110.71		110.42		110.13		109.91
Sewer Pipe Invert	108.601		108.157 107.288		107.000 106.970		106.685
Manhole Depth	2.20		3.20		3.20		3.40
Sewer Pipe Data		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)	
Distance		80.57	80.57	52.32	132.89	51.82	184.71

Longsection: WWMH E13 to WWMH E22

Scale: Horizontal 1:400; Vertical 1:200 @ A1

FRO PLAN CHANGE

NOT FOR CONSTRUCTION

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
SEWER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	WW03	A
Scale @ A1	Date	File		
AS SHOWN	05-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

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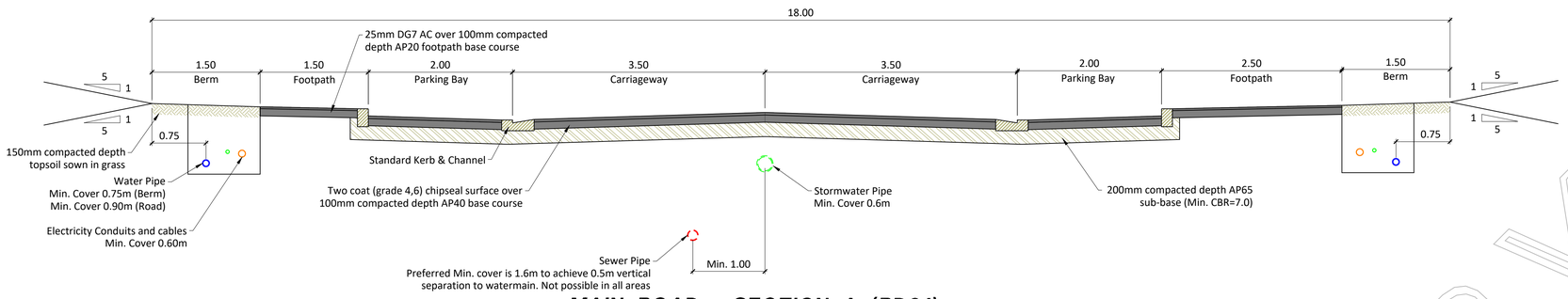
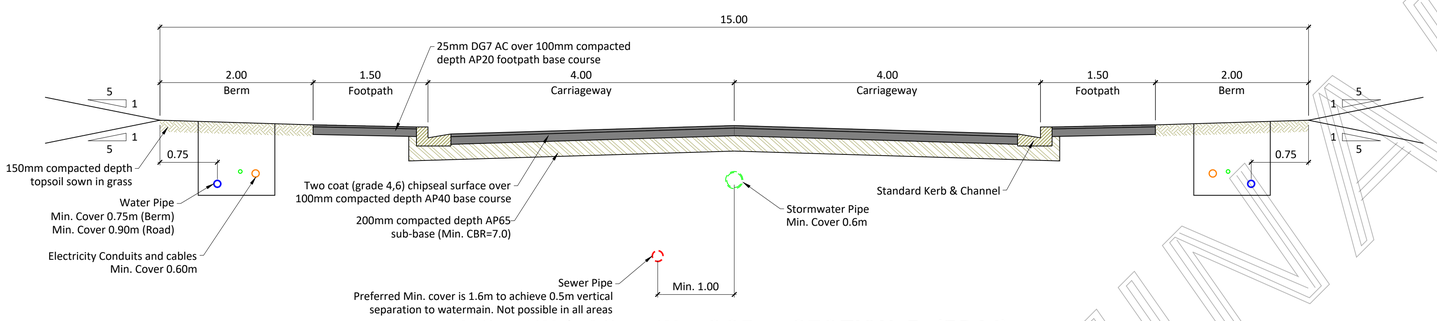


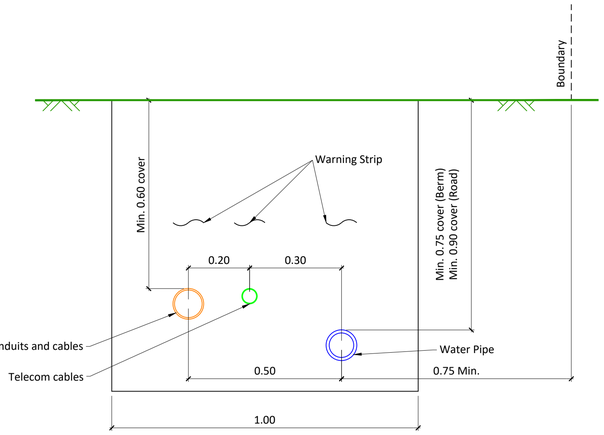
MAIN ROAD - SECTION A (RD01)

Scale 1:40



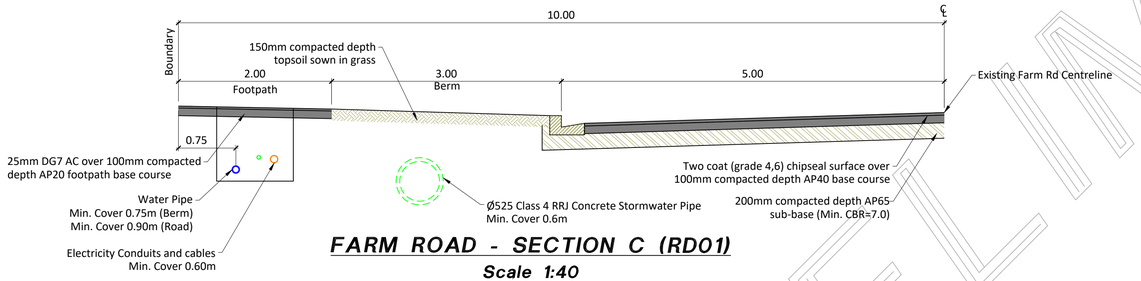
WESTERN/EASTERN LOOP - SECTION B (RD01)

Scale 1:40



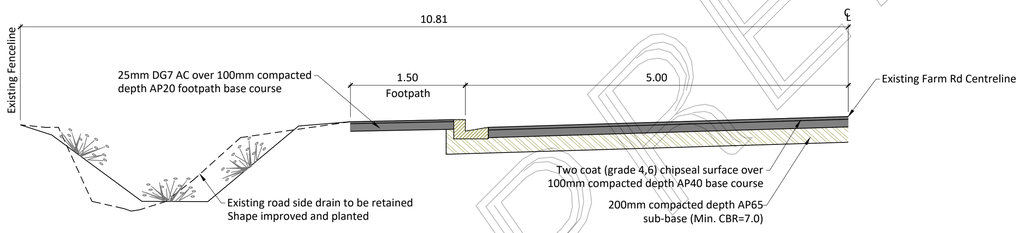
COMMON SERVICES TRENCH DETAIL

Scale 1:10



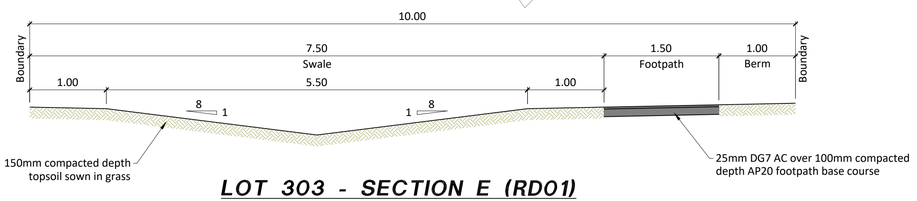
FARM ROAD - SECTION C (RD01)

Scale 1:40



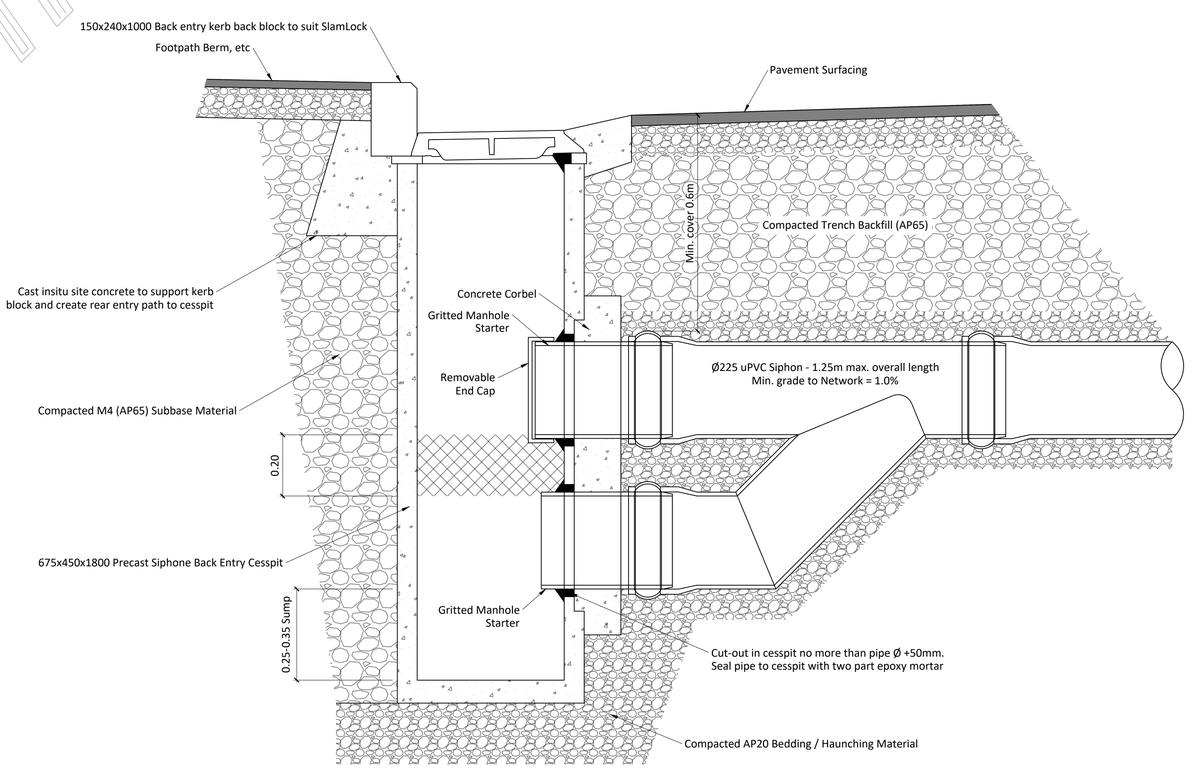
FARM ROAD - SECTION D (RD01)

Scale 1:40



LOT 303 - SECTION E (RD01)

Scale 1:40



DROWNED OUTLET SUMP DETAIL

Scale 1:10

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Road Typical Cross Section.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

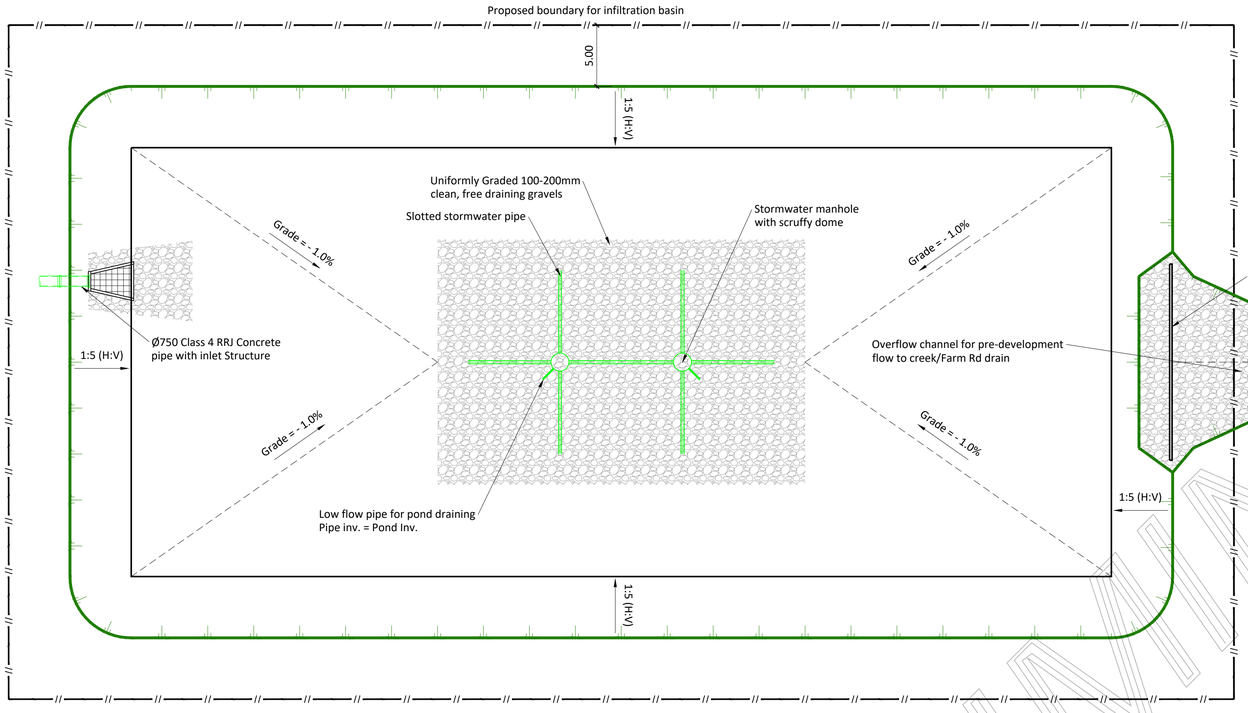
INFRASTRUCTURE SERVICING

TYPICAL ROAD CROSS SECTIONS

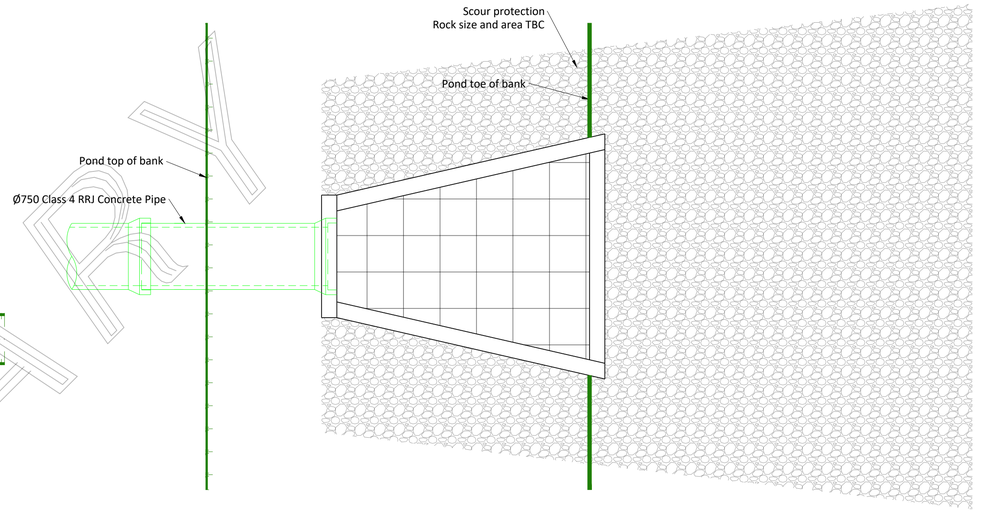
Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	TD01	A
Scale @ A1	Date	File		
1:40	05-23	30625		

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ

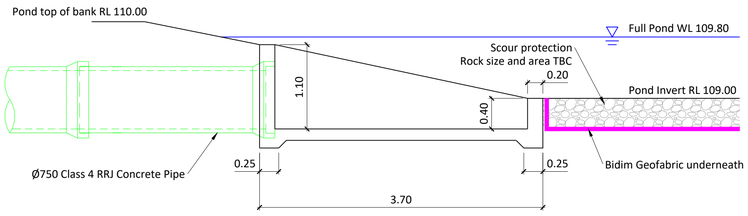
- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



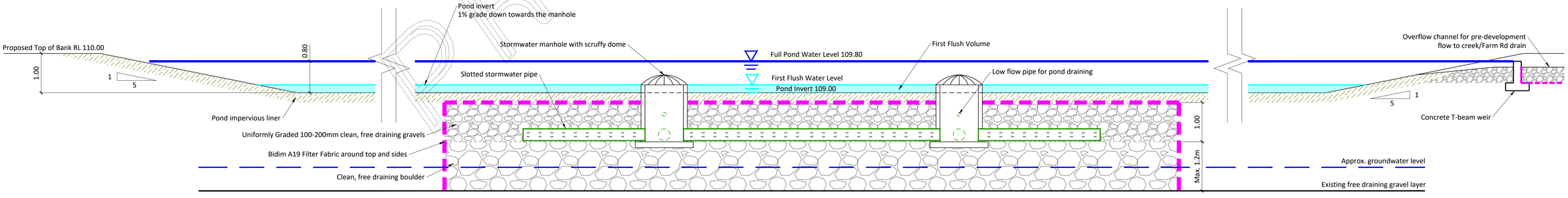
INFILTRATION BASIN TYPICAL PLAN
Scale 1:250



INLET STRUCTURE PLAN VIEW
Scale 1:40



INLET STRUCTURE SIDE ELEVATION
Scale 1:40



INFILTRATION BASIN TYPICAL CROSS SECTION
Scale 1:50

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Pond Typical Details.dwg

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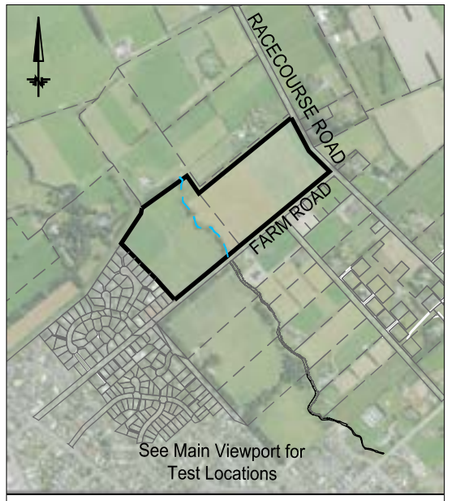
CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
INFILTRATION TYPICAL PLAN AND DETAILS

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	TP02	A
Scale @ A1	Date	File		
AS SHOWN	05-23	30625		



Scale 1 : 20,000

Key:

- : Site Boundary
- : Abuttal Boundary
- : Road Boundary
- : Dynamic Cone Penetrometer (DCP) + Hand Auger (HA)
- : Test Pit (TP)

Test locations are approximate (scaled and aligned using aerial imagery).
Shallow geotechnical testing undertaken 13/03/20233 & 14/03/2023.
Aerial image and boundaries obtained from GRIP®.
Boundaries are indicative only.

0m 50m 100m 150m 200m 250m

Scale 1:2500

CAD ref: 43340.Geotechnicalsiteplan.dwg

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Geotechnical Site Plan
Coniston Park, Farm Road, Ashburton
Lot 4 DP 320165 & Lot 8 311232

/ design	/ drawn	/ QA check	/ dwg
SW	TM	KL	G01
/ scale @A3	/ date	/ file	/ issue
1:2500	03/23	43340	A

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **HA 04**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)

Date: 14/03/23

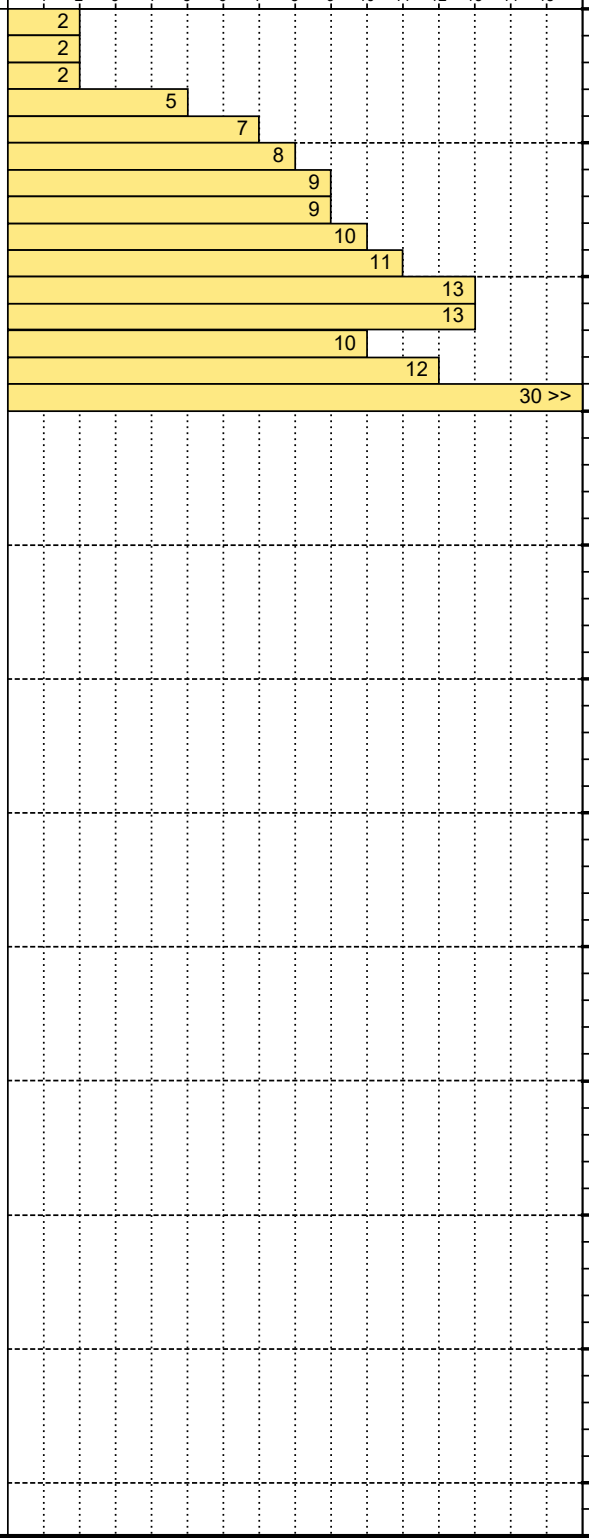
Client: Coniston Park Ltd.

Time: 1:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).

Excavation Method: Hand Auger

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.40m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	Groundwater Not Encountered
	0.40m: SV=UTP			
0.5	0.40 - 1.20m: SILT with minor clay and trace sand; greyish brown. Stiff to hard, dry, low plasticity. Sand is fine.	ML		
	0.70m: SV=140+ Colour change to yellowish brown.			
1.0				
1.5	Auger terminated at 1.20m - Refusal on hard silt.			
2.0				
2.5				
3.0				
3.5				
4.0				
4.5				
5.0				
5.5				



Logged By: KL + HC

Plotted By: TM

Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)

UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **HA 11**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)

Date: 14/03/23

Client: Coniston Park Ltd.

Time: 2:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).

Excavation Method: Hand Auger

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	Groundwater Not Encountered
0.3	0.30 - 1.20m: SILT with minor clay and trace sand; greyish brown. Stiff to hard, dry, low plasticity. Sand is fine.	ML		
	0.50m: SV=140+			
	0.65m: SV=UTP			
	0.80m: Colour change to yellowish brown. Becomes moist.			
	1.10m: Colour change to mottled orange grey.			
1.2	Auger terminated at 1.20m - Refusal on hard silt.			

DCP RESULTS

(Blows / 100mm)

Depth (m)	Blows / 100mm
0.0	1
0.1	2
0.2	4
0.3	5
0.4	9
0.5	12
0.6	12
0.7	13
0.8	12
0.9	11
1.0	10
1.1	10
1.2	14
1.3	22 >>
1.4	30 >>

Logged By: KL + HC

Plotted By: TM

Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)

UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 01**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 13/03/23

Client: Coniston Park Ltd.
Time: 9:00 am

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water	DCP RESULTS (Blows / 100mm)	DEPTH (m)
0.0	0.00 - 0.35m: SILT with minor clay and trace sand; yellowish brown. Moist. Sand is fine. (TOPSOIL)	TS	TS		1, 1, 1	0.0
0.5	0.35 - 3.30m: SILT with minor clay and trace sand; yellowish brown. Firm to stiff, dry to moist, low plasticity. Sand is fine. 0.50m: SV=173/44	ML			2, 2, 2, 4, 4, 6, 6, 6, 6, 6, 5, 5	0.5
1.0						1.0
1.5	1.50m: Colour change to mottled orange grey.				4, 5, 5, 4, 4, 4, 4, 4, 5, 5, 5	1.5
2.0						2.0
2.5	2.80m: Becomes very stiff.				6, 7, 10, 9, 9, 10	2.5
3.0						3.0
3.5	3.30 - 3.70m: Clayey SILT with some sand; bluish grey with orange mottling. Wet, moderate plasticity. Sand is fine. 3.70m: Heavy iron oxide staining.	ML				3.5
4.0	3.70 - 5.50m: Sandy fine to coarse GRAVEL with trace cobbles; grey. Saturated. Sand is fine. Gravel is subrounded to rounded.	GW		5m (13-Mar-23)		4.0
4.5						4.5
5.0						5.0
5.5	Test Pit terminated at 5.50m - Target depth achieved.					5.5

Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.
Groundwater rose to 4.2 m during test pit investigation.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 02**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 14/03/23

Client: Coniston Park Ltd.
Time: 9:00 am

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	
0.3	0.30 - 2.40m: SILT with minor clay and trace sand; yellowish brown. Stiff to very stiff, dry to moist, low plasticity. Sand is fine.	ML		
	0.40m: SV=UTP			
	0.65m: SV=UTP			
	1.00m: Colour change to mottled orange grey. Becomes wet.			
2.4	2.40 - 2.80m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Saturated. Sand is fine. Gravel is subrounded to rounded.	GW		2.8m (14-Mar-23)
2.8	Test Pit terminated at 2.80m - Target depth achieved.			

DCP RESULTS

(Blows / 100mm)

DEPTH (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	DEPTH (m)
0.0	2	2	2													0.0
0.5						6	7		10	10						0.5
1.0								9	8	9	8	7	7			1.0
1.5						6	6	5	6	4	6	6				1.5
2.0												5	8	10	30 >>	2.0
2.5																2.5
3.0																3.0
3.5																3.5
4.0																4.0
4.5																4.5
5.0																5.0
5.5																5.5

Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)

UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 03**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 13/03/23

Client: Coniston Park Ltd.
Time: 10:00 am

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.35m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS		
0.5	0.35 - 1.60m: Sandy SILT with trace clay; yellowish brown. Stiff to very stiff, dry. Sand is fine.	ML		
	0.40m: SV=UTP			
1.0	1.10m: Colour change to mottled orange grey. Increase in clay content.			
1.5				
2.0	1.60 - 3.50m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Wet. Sand is fine. Gravel is subrounded to rounded.	GW		
2.5				
3.0				3.1m (13-Mar-23)
3.5	Test Pit terminated at 3.50m - Target depth achieved.			
4.0				
4.5				
5.0				
5.5				

DCP RESULTS

(Blows / 100mm)

DEPTH (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	DEPTH (m)
0.0	1	2	3		5		7		9	10						0.0
0.5										10						0.5
1.0										10						1.0
1.5										10						1.5
2.0										10						2.0
2.5										10						2.5
3.0										10						3.0
3.5								8								3.5
4.0							7									4.0
4.5						6										4.5
5.0	30 >>															5.0
5.5																5.5

Logged By: KL + HC

Plotted By: TM

Checked By: KL

Notes: Shear vane (SV) = peak/remoulded(kPa)

UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 05**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 13/03/23
Client: Coniston Park Ltd.
Time: 11:00 am
Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water	DCP RESULTS (Blows / 100mm)	DEPTH (m)
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS		2	0.0
0.3	0.30 - 3.50m: SILT with minor clay and trace sand; yellowish brown. Stiff, dry to moist, low plasticity. Sand is fine.	ML			1	0.3
0.4	0.40m: SV=182/50				2	0.4
0.5					4	0.5
0.7	0.70m: SV=189/47				4	0.7
0.9	0.95m: SV=193/28				4	0.9
1.0	1.00m: Colour change to mottled orange grey. Increase in clay content to some.				5	1.0
1.1					5	1.1
1.2					5	1.2
1.3					5	1.3
1.4					5	1.4
1.5					5	1.5
1.6					4	1.6
1.7					3	1.7
1.8					4	1.8
1.9					3	1.9
2.0	2.00m: Stained orangey brown.				5	2.0
2.1					6	2.1
2.2	2.20m: Heavy iron oxide staining.				7	2.2
2.3					5	2.3
2.4					5	2.4
2.5					5	2.5
2.6					5	2.6
2.7	2.70m: Becomes very stiff to hard.				4	2.7
2.8					6	2.8
2.9					6	2.9
3.0					7	3.0
3.1					10	3.1
3.2					10	3.2
3.3					10	3.3
3.4				3.4m (13-Mar-23)	13	3.4
3.5	3.50 - 3.60m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Saturated. Sand is fine to coarse. Gravel is subrounded to rounded.	GW			12	3.5
3.6	Test Pit terminated at 3.60m - Target depth achieved.					3.6
4.0						4.0
4.5						4.5
5.0						5.0
5.5						5.5

Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 06**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 14/03/23
Client: Coniston Park Ltd.
Time: 10:00 am
Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water	DCP RESULTS (Blows / 100mm)	DEPTH (m)
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Dry to moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS		3	0.0
0.5	0.30 - 3.20m: SILT with minor clay and trace sand; yellowish brown. Stiff, dry to moist, low plasticity. Sand is fine.	ML			3, 2, 3, 3, 4, 4, 4, 3, 4	0.5
	0.40m: SV=155/37					
1.0	0.70m: SV=189/51				5, 5, 6, 5, 5	1.0
	0.90m: SV=140+					
1.5					7, 6, 6, 6, 5, 6	1.5
2.0	2.10m: Becomes very stiff to hard.				9, 8, 10, 10, 11, 12, 13, 13, 14, 30 >>	2.0
2.5						2.5
3.0						3.0
3.5	3.20 - 3.30m: Sandy fine to coarse GRAVEL with trace cobbles; orangey brown. Saturated. Sand is fine. Gravel is subrounded to rounded.	GW		3.3m (14-Mar-23)		3.5
4.0	Test Pit terminated at 3.30m - Target depth achieved.					4.0
4.5						4.5
5.0						5.0
5.5						5.5

Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

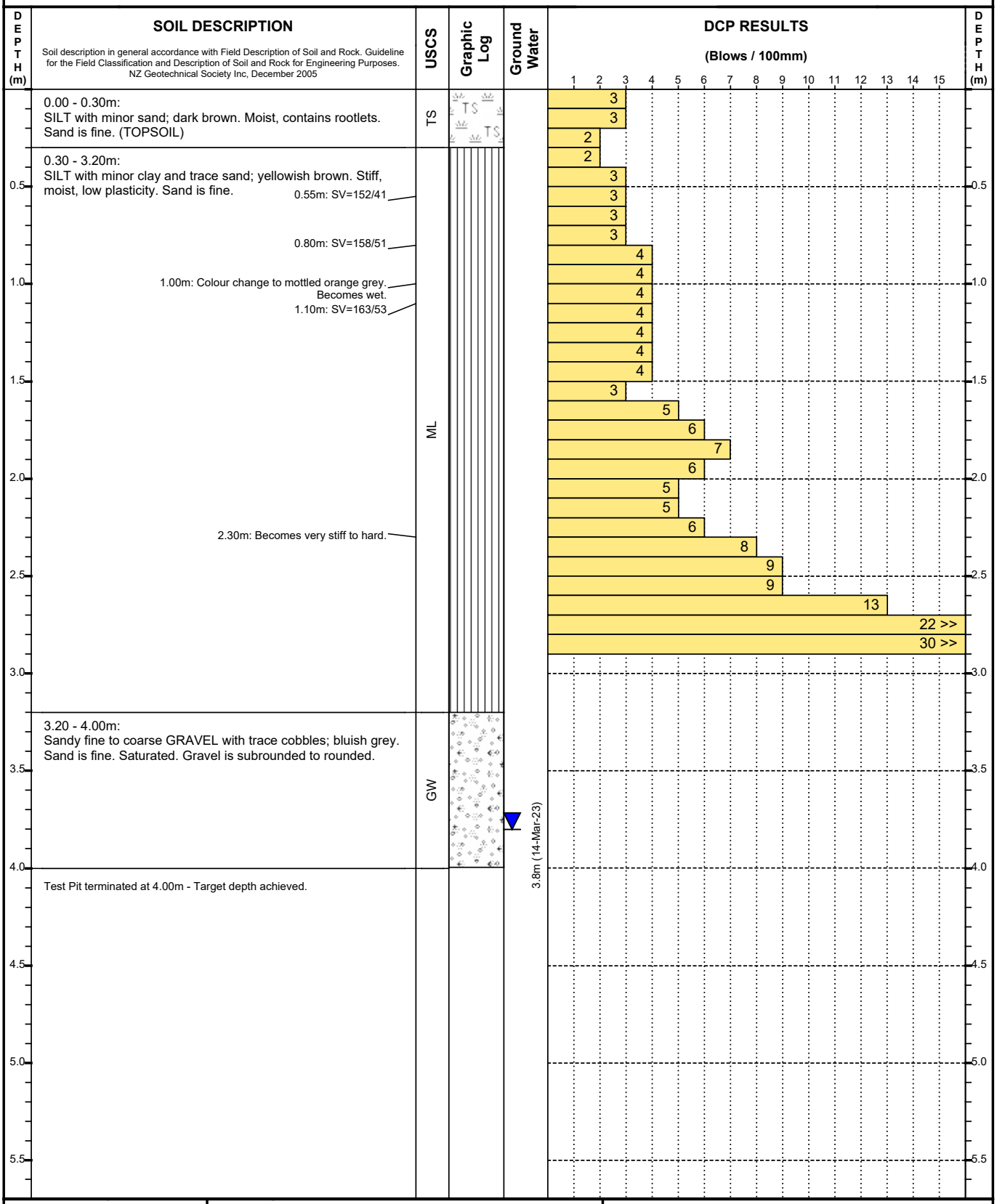
Job N° **43340**
Test N° **TP 07**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 14/03/23

Client: Coniston Park Ltd.
Time: 11:00 am

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.00	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	
0.30	0.30 - 3.20m: SILT with minor clay and trace sand; yellowish brown. Stiff, moist, low plasticity. Sand is fine.	ML		
0.55	0.55m: SV=152/41			
0.80	0.80m: SV=158/51			
1.00	1.00m: Colour change to mottled orange grey. Becomes wet.			
1.10	1.10m: SV=163/53			
2.30	2.30m: Becomes very stiff to hard.			
3.20	3.20 - 4.00m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Sand is fine. Saturated. Gravel is subrounded to rounded.	GW		3.8m (14-Mar-23)
4.00	Test Pit terminated at 4.00m - Target depth achieved.			



Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes:
Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.
Groundwater rose to 2.3 m during test pit investigation.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

DAVIS OGILVIE
Davis Ogilvie & Partners Limited
Level 1, 24 Moorhouse Avenue Addington, Christchurch 8140
Office 0800 999 333 Email hello@do.nz
www.do.nz

SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 08**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)

Date: 13/03/23

Client: Coniston Park Ltd.

Time: 12:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).

Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.35m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS		
0.4	0.40m: SV=UTP			
0.5	0.35 - 2.30m: Sandy SILT with trace clay; yellowish brown. Stiff, dry to moist. Sand is fine.	ML		
1.1	1.10m: Colour change to mottled orange grey. Increase in clay content.			
2.3	2.30 - 3.60m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Dense to very dense, wet. Sand is fine to coarse. Gravel is subrounded to rounded.	GW		3.3m (13-Mar-23)
3.0	3.00m: Heavy iron oxide staining. 3.0 - 3.6 m Colour change to orange greyish brown.			
3.6	Test Pit terminated at 3.60m - Target depth achieved.			

DCP RESULTS

(Blows / 100mm)

DEPTH (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.0				4											
0.1				4											
0.2				3											
0.3				3											
0.4				4											
0.5					5										
0.6							7								
0.7							7								
0.8						6									
0.9							7								
1.0							7								
1.1							7								
1.2						6									
1.3					5										
1.4					5										
1.5						6									
1.6						6									
1.7					5										
1.8						6									
1.9						6									
2.0					5										
2.1						6									
2.2					5										
2.3							7								
2.4												12			
2.5													13		
2.6															20 >>
2.7															28 >>
2.8															30 >>

Logged By: KL + HC

Plotted By: TM

Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)

UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 09**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 13/03/23

Client: Coniston Park Ltd.
Time: 1:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	
	0.40m: SV=UTP			
	0.30 - 2.20m: SILT with minor clay and trace sand; greyish brown. Stiff to very stiff, dry to moist, low plasticity. Sand is fine.	ML		
	0.50m: SV=UTP			
1.0	1.00m: Colour change to mottled orange grey.			
1.8	1.80m: Becomes very stiff to hard.			
2.2	2.20 - 2.80m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Very dense, wet. Sand is fine to coarse. Gravel is subrounded to rounded.	GW		2.8m (13-Mar-23)
2.8	2.80m: Heavy iron oxide band.			
	Test Pit terminated at 2.80m - Target depth achieved.			

DCP RESULTS
(Blows / 100mm)

DEPTH (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.0				4											
0.1			2												
0.2			3												
0.3					5										
0.4							7								
0.5										10					
0.6										10					
0.7											11				
0.8								8							
0.9										10					
1.0										10					
1.1										10					
1.2									9						
1.3								8							
1.4						6									
1.5						6									
1.6									9						
1.7											11				
1.8											11				
1.9															16
2.0											11				
2.1															22 >>
2.2															30 >>

Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 10**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)

Date: 13/03/23

Client: Coniston Park Ltd.

Time: 2:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).

Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	
0.5	0.30 - 1.90m: Sandy SILT with trace clay; greyish brown. Stiff to very stiff, dry. Sand is fine	ML		
	0.40m: SV=UTP			
1.0				
	1.30m: Colour change to mottled orange grey.			
1.5	1.50m: Becomes hard.			
2.0	1.90 - 3.70m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Wet. Sand is fine. Gravel is subrounded to rounded.	GW		2.7m (13-Mar-23)
2.5				
	2.70m: Iron oxide staining.			
3.0	2.90m - 3.00m: Band of iron oxide staining.			
3.5				
	Test Pit terminated at 3.70m - Target depth achieved.			
4.0				
4.5				
5.0				
5.5				

DCP RESULTS

(Blows / 100mm)

Depth (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.0		2													
0.1		2													
0.2				4											
0.3				4											
0.4				4											
0.5					5										
0.6						6									
0.7									9						
0.8									9						
0.9									9						
1.0								8							
1.1									9						
1.2									9						
1.3							7								
1.4						6									
1.5															20 >>
1.6															30 >>

Logged By: KL + HC

Plotted By: TM

Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)

UTP= Unable to penetrate.

Groundwater rose to 2.35 m after 1.5 hours.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 12**

Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 14/03/23

Client: Coniston Park Ltd.
Time: 12:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.25m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS TS	Groundwater Not Encountered
0.25	0.25 - 1.40m: SILT with minor clay and trace sand; yellowish brown. Stiff to very stiff, dry, low plasticity. Sand is fine. 0.35m: SV=UTP 0.70m: SV=UTP	ML		
1.40	1.40 - 1.80m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Dry. Sand is fine. Gravel is subrounded to rounded.	GW		
1.80	Test Pit terminated at 1.80m - Target depth achieved.			

DCP RESULTS
(Blows / 100mm)

DEPTH (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	DEPTH (m)
0.0	2															0.0
0.25	1															0.25
0.5	5															0.5
0.75	6															0.75
1.0	9															1.0
1.25	9															1.25
1.5	10															1.5
1.75	12															1.75
2.0	12															2.0
2.25	13															2.25
2.5	12															2.5
2.75	11															2.75
3.0	30 >>															3.0

Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

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SHALLOW INVESTIGATION RESULTS

Job N° **43340**
Test N° **TP 13**

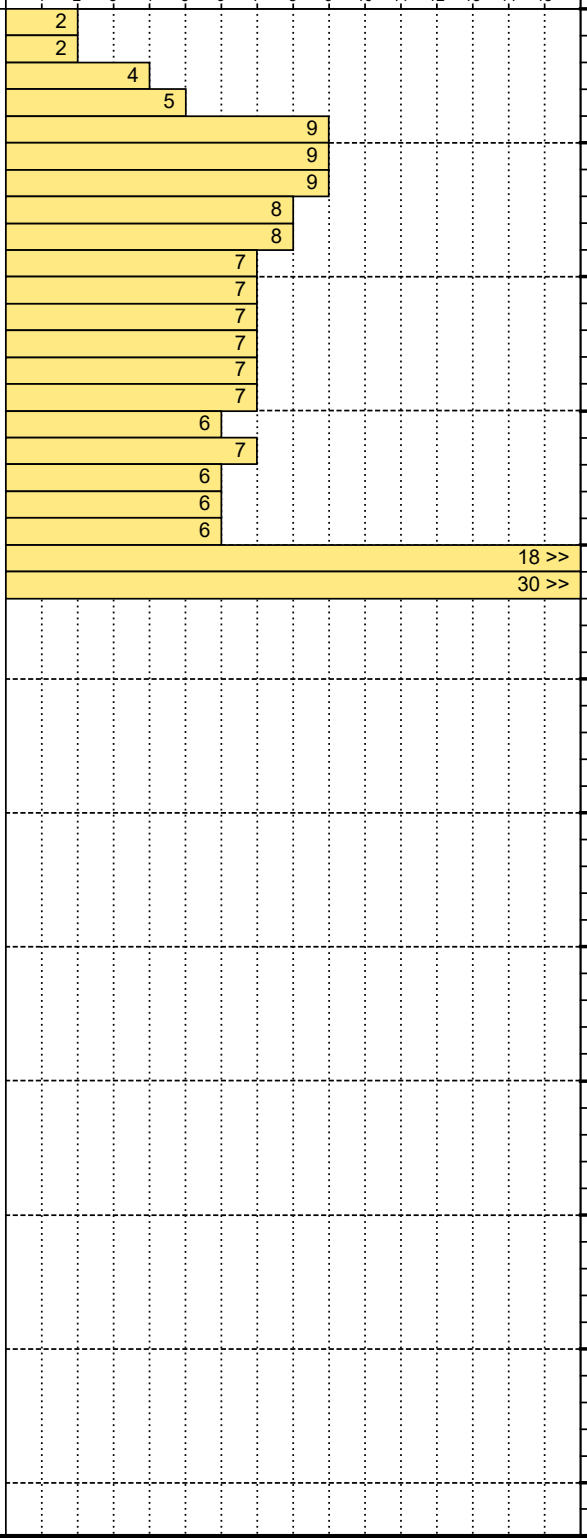
Project: Coniston Park, Farm Road, Ashburton (Lot 4 DP 320165 and Lot 8 DP 311232)
Date: 13/03/23

Client: Coniston Park Ltd.
Time: 3:00 pm

Test Location: Refer to attached Geotechnical Site Plan (G01A).
Excavation Method: 20T Excavator

DEPTH (m)	SOIL DESCRIPTION	USCS	Graphic Log	Ground Water
	Soil description in general accordance with Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. NZ Geotechnical Society Inc, December 2005			
0.0	0.00 - 0.30m: SILT with minor sand; dark brown. Moist, contains rootlets. Sand is fine. (TOPSOIL)	TS	TS	
0.3	0.30 - 2.10m: SILT with trace clay and sand; yellowish brown. Stiff to very stiff, dry to moist, low plasticity. Sand is fine.	ML		
	0.40m: SV=UTP			
	0.70m: Colour change to mottled orange grey. Increase in clay content moderate plasticity.			
2.1	2.10 - 3.20m: Sandy fine to coarse GRAVEL with trace cobbles; bluish grey. Wet. Sand is fine. Gravel is subrounded to rounded.	GW		
	2.20m: Iron oxide staining.			
	3.10m: Heavy iron oxide staining.			3.1m (13-Mar-23)
3.2	Test Pit terminated at 3.20m - Target depth achieved.			

DCP RESULTS
(Blows / 100mm)



Logged By: KL + HC
Plotted By: TM
Checked By: KL

Notes: Shear vane (SV) = peak/remoulded (kPa)
UTP= Unable to penetrate.

Dynamic Cone Penetrometer (DCP) tests and logs give an indication of the ground conditions at the location of the tests only. While they may be representative of typical conditions across the site, they do not identify variations in the ground away from the test locations. This log does not cover slope stability or suitability of the site for building.

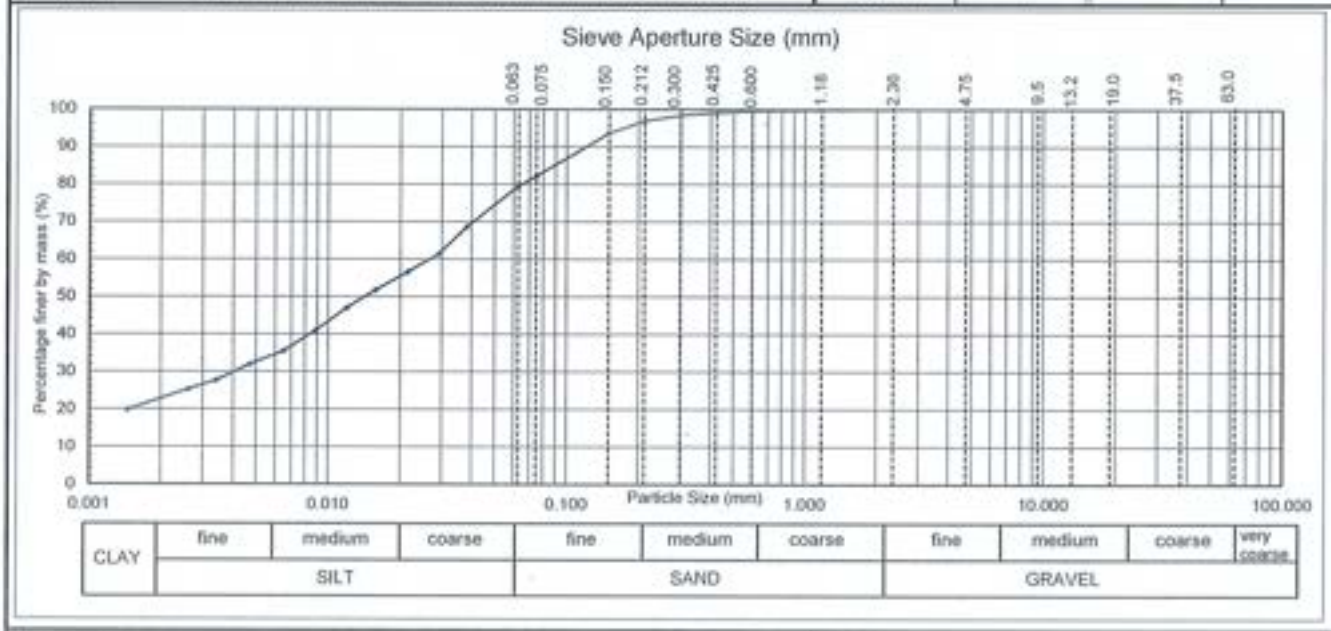
Dynamic Cone Penetrometer tests are performed in accordance with NZS 4402 Test 6.5.2 (Procedure 1 and 2)

PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)
TEST REPORT

Project :	Material Investigation
Location :	Farm Road, Ashburton
Client :	Davis Ogilvie & Partners Limited
Client/Sample Ref :	DO 43340
Contractor :	Davis Ogilvie & Partners Limited
Source:	Farm Road, Ashburton
Sampled by :	Hamish Cattell
Date received :	31 March 2023
Sampling method :	NZS 4402: 1986 (Fine)
Sample condition :	Damp as received
Sample description :	SILT with some sand and clay
Solid Particle Density (t/m^3):	2.68 Assumed
Water Content (as received):	16.6 %

Project No:	6-JDOPL16/6LC
Lab Ref No:	CH9903
Client Ref:	DO43340

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	--	0.300	98	0.0382	69	0.0065	36
37.5	--	2.36	100	0.212	97	0.0291	61	0.0047	32
19.0	--	1.18	100	0.150	94	0.0215	57	0.0034	28
13.2	--	0.600	100	0.075	82	0.0158	52	0.0026	25
9.5	--	0.425	99	0.063	80	0.0120	47	0.0014	20
Note:	"--" denotes sieve not used and/or hydrometer analysis not tested					0.0088	41		



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)	All information supplied by Client

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

Date Tested: 19 April 20232

Date Reported: 21 April 2023

IANZ Approved Signatory

Designation : *Laboratory Manager*

Date : 21 April 2023

ACCREDITED IANZ TESTING LABORATORY

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

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Christchurch, New Zealand

Telephone +64 3 343 0739
Website www.wsp.com/nz

DRY DENSITY / WATER CONTENT RELATIONSHIP
STANDARD COMPACTION

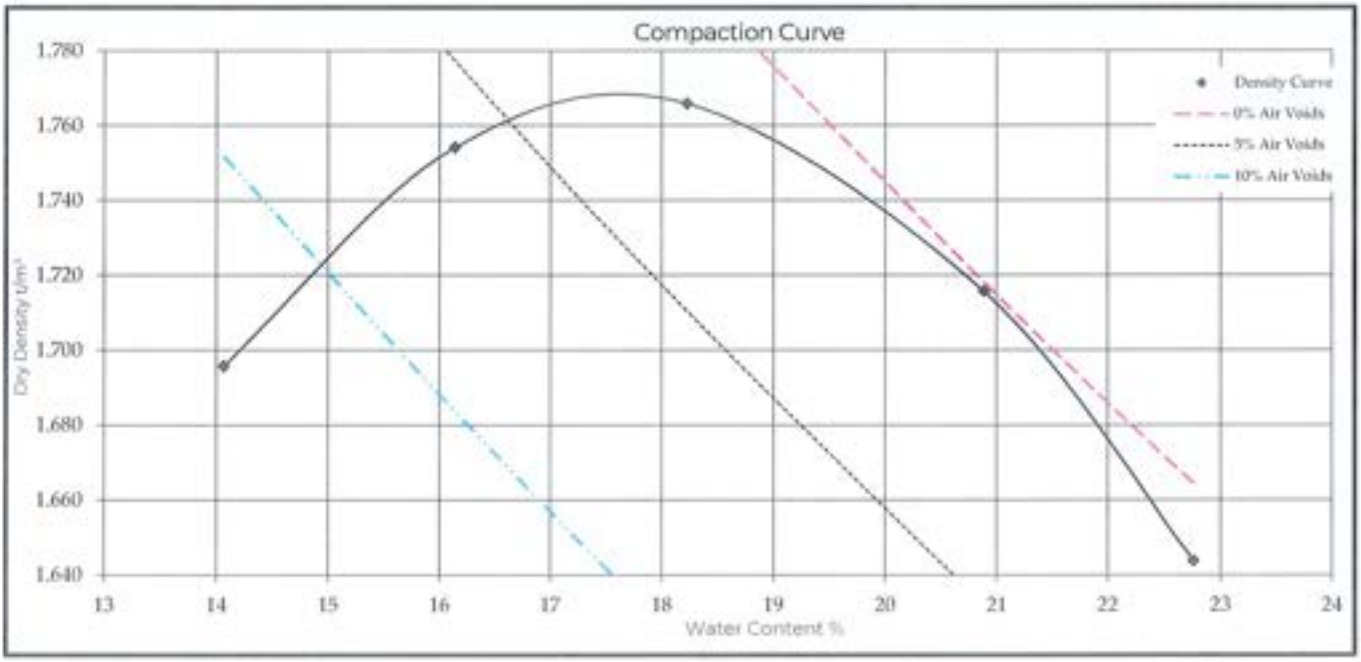
Project :	Material Investigation
Location :	Farm Road, Ashburton
Client :	Davis Ogilvie & Partners Limited
Contractor :	Davis Ogilvie & Partners Limited
Sampled by :	Hamish Cattell
Date sampled :	13 March 2023
Sampling method :	NZS 4402: 1986 (Fine)
Sample description :	SILT with some sand and clay
Sample condition :	Damp as received
Solid density :	2.68 t/m³ (Assumed)
Source :	Farm Road, Ashburton

Project No :	6-JDOPL.16/6LC
Lab Ref No :	CH9903
Client Ref No :	DO43340

Test Results

Maximum dry density	1.77	t/m³	Natural water content	16.1 %
Optimum water content	18.0	%	Fraction tested	Whole

Sample ID		-2%	NAT	+2%	+4%	+6%		
Bulk density	t/m³	1.934	2.037	2.088	2.074	2.018		
Water content	%	14.1	16.1	18.2	20.9	22.8		
Dry density	t/m³	1.696	1.754	1.766	1.716	1.644		
Sample condition		Wet Firm	Wet Firm	Wet Firm	Wet Soft	Saturated Soft		



Test Methods		Notes
Compaction	NZS 4402 : 1986 Test 4.1.1 (Standard)	All information supplied by Client

Date tested : 5 April 2023
Date reported : 21 April 2023

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IANZ Approved Signatory

Designation : *Laboratory Manager*
Date : 21 April 2023

ACCREDITED IANZ TESTING LABORATORY

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Website www.wsp.com/nz

CALIFORNIA BEARING RATIO (REMOULDED) TEST REPORT

Project :	Material Investigation
Location :	Farm Road, Ashburton
Client :	Davis Ogilvie & Partners Limited
Contractor :	Not Advised
Sampled by :	Hamish Cattell
Date sampled :	31 March 2023
Sampling method :	NZS 4402: 1986 (Fine)
Sample description :	SILT with some sand and clay
Sample condition :	Damp as received
Source:	Farm Road, Ashburton

Project No :	6-JDOPL.16/6LC
Lab Ref No :	CH9903
Client Ref No :	DO 43340

Test Results

Sample ID		1
Location		
Sample condition at compaction		Damp
Sample condition at test		Soaked
Sample description		SILT
Curing time	days	-
Soaking time	days	4
Passing 19mm	%	100
Surcharge mass	kg	4.0
Lime additive	%	-
Cement additive	%	-
Swell	%	0.6
Penetration	mm	5.0
Water content as received	%	14.5
Water content as compacted	%	15.7
Water content after testing	%	20.5
Dry density	t/m³	1.72
CBR value	%	4.0

Test Methods		Notes	
CBR	NZS : 4402 : 1986 : 6.1.1	Material Used	Whole Soil
Water Content	NZS : 4402 : 1986 : 2.1	Rate of penetration	1mm/min
Compaction	NZS : 4402 : 1986 : 4.1.1 (Standard)		
		All information supplied by Client	

Date tested : 6 April 2023
Date reported : 21 April 2023

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IANZ Approved Signatory

Designation : *Laboratory Manager*
Date : 21 April 2023

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

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Website www.wsp.com/nz

[illegible]

Issued By:	Davis Ogilvie & Partners Ltd (Geotechnical engineering firm or suitably qualified geo-professional)
To:	Coniston Park Ltd (Owner/Developer)
To be supplied to:	Ashburton District Council (Territorial authority)
In respect of:	Subdivision of Lot 4 DP 320165 and Lot 8 DP 311232. (Description of infrastructure/land development)
At:	Farm Road, Ashburton (Address)

I, Ben Parry, on behalf of Davis Ogilvie & Partners Ltd hereby confirm:

1. I am a suitably qualified and experienced geo-professional employed by Davis Ogilvie & Partners Ltd and the geotechnical firm named above was retained by the owner/developer as the geo-professional on the above proposed development.

2. The geotechnical assessment report, dated 28 April 2023, has been carried out in general accordance with the *Ministry of Business, Innovation and Employment Part D – Guidelines for the geotechnical investigation and assessment of subdivisions in the Canterbury region* and includes:
   (i) Details of and the results of the site investigation.
   (ii) An assessment of the ground bearing capacity.
   (iii) Recommendations proposing measures to avoid, remedy or mitigate any potential hazards on the land subject to the application, in accordance with the provisions of Section 106 of the Resource Management Act 1991.

3. In my professional opinion, not to be construed as a guarantee, I consider that Council is justified in granting consent incorporating the following conditions:

   - An engineering plan review is completed by a suitably qualified Geoprofessional to ensure the recommendations provided in the Davis Ogilvie geotechnical report for the subdivision have been correctly interpreted and incorporated into the subdivision design.
   - All earthworks shall be undertaken under the supervision of a suitably qualified Geoprofessional with experience in land development.
   - All fill placed as part of the subdivision development or under future building footprints must be placed in accordance with NZS 4431:2022 and inspected and certified by a Chartered Professional Engineer.

- All uncontrolled fill, infilled channels, backfilled test pits, low strength soils, organic soils or otherwise unsuitable soils within foundation excavations or beneath civil infrastructure or structural fill will require remediation by excavation and engineered filling in accordance NZS 4431:2022.
- Any new foundations onsite must be founded below the organic topsoil, low strength soils, uncontrolled fill, or any other unsuitable material.
- It is recommended that all future building foundation excavations are inspected/confirmed by a suitably qualified person at time of construction.
- Minimum floor levels as per New Zealand Building Code E1 and ADC and ECan requirements.
- Stormwater must be appropriately managed during subdivision development and longer term to limit the influence of surface water erosion on the site. Any overland flow paths must be identified and preserved as part of the subdivision design.
- Following earthworks, a geotechnical completion report shall be compiled by a chartered geotechnical engineer or engineering geologist. The report should summarise the works completed and detail any further geotechnical recommendations including any requirements for individual lot geotechnical investigations.

4. This professional opinion is furnished to the territorial authority and the owner/developer for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any building.

5. This statement shall be read in conjunction with the geotechnical report referred to in Clause 2 above and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.

6. Liability under this statement accrues to the geotechnical firm only and no liability shall accrue to the individual completing this statement.

7. The geotechnical engineering firm issuing this statement holds a current policy of professional indemnity insurance of no less than $2,000,000.00. (Minimum amount of insurance shall be commensurate with the current amounts recommended by EngNZ, ACENZ, NZTA, INGENIUM.)

Ben Parry

……

(Signature of Engineer)

For and on behalf of Davis Ogilvie & Partners Ltd.

Date: 28 April 2023

Qualifications and experience:

Principal Engineering Geologist

PG Dip, BSc (Tech), CMEngNZ (PEngGeol)

APPENDIX C – CONCEPT SCHEME AND DESIGN PLANS

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	GPM
B	11-23	Lot layout updated	GPM

NORTH

Key

- Proposed Allotment
- Proposed Local Purpose Reserve
- Indicative Stormwater Basin Area
- Proposed Row & Pedestrian Link
- Existing Easements
- Indicative Wakanui Creek Top of Bank
- Existing ground major contour at 0.5m
- Existing ground minor contour at 0.1m
- Proposed Stormwater Flow Direction
- Proposed Stormwater Flow Direction (Overflow)

Owners: Golden Mile Trading Ltd & Carl Grove Developments Ltd

Applicant: Coniston Park Limited

Address: Farm Road, Ashburton

Appellation: Lot 4 DP 320165 & Lot 8 DP 311232

RT References: 79791, 44314

Total Area: 8.20 ha & 8.12 ha

Total Allotments: 164

360m^2 - 600m^2: 33 Allotments (25%)

600m^2 - 800m^2: 74 Allotments (41%)

800m^2 above: 57 Allotments (34%)

- All dimensions in metres unless shown otherwise;
- Existing boundaries adopted from LINZ online database;
- Aerial Photography: Sourced from LINZ Database https://data.linz.govt.nz/layer/106276-canterbury-02m-rural-aerial-photos-2020-2021/ under Creative Commons Attribution 4.0 International;
- Horizontal Datum: NZGD2000 NZTM;
- Vertical Datum: NZVD 2016;
- Contours at 0.1m Intervals (Major Interval 0.5m)
- This plan has been prepared for the sole purpose of supporting the Farm Road Plan Change;
- Use of this plan for other purposes or its reproduction in part or full is not permitted without the prior consent of Davis Ogilvie (Aoraki) Ltd;
- A full assessment of easements will be undertaken prior to final survey and subsequent to proposed servicing and engineering requirements being confirmed; and
- All dimensions and areas are subject to final legal survey.

Lot 1 DP 320165

Lot 3 DP 320165

Lot 4 DP 320165

Lot 8 DP 311232

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

Lot 7 DP 62713

Lot 6 DP 67784

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

Local Purpose Reserve with indicative pedestrian link

Wakanui Creek Reserve details to be confirmed

Local Purpose Reserve with indicative pedestrian link and Stormwater Swale

Possible road or reserve subject to further discussion

WAKANUI CREEK

FARM ROAD

CARTERS ROAD

RACECOURSE ROAD

Existing easement and stormwater swale subject to further discussion with client, ADC and engineering design

Local Purpose Reserve with indicative stormwater basin

Indicative pedestrian link alongside Wakanui Creek

Existing roadside drain

Local Purpose Reserve with indicative stormwater basin and pedestrian link

Lot 201 to vest with Ashburton District Council as Road

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Subdivision Layout Plan Option D.dwg

DAVIS OGILVIE

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

CONCEPT PLANNING

SUBDIVISION LAYOUT PLAN - OPTION D

Design	Drawn	QA check	dwg	Issue
MCB	MCB	GPM	PL01	B
Scale @ A1	Date	File		
1:1000	11-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	Lot layout updated	PJ

NORTH

General Notes:
- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 notes.

Engineering Notes:
- All information is preliminary only and for proof of concept to support a plan change;
- Engineering in accordance with:
  - NZS 4404:2010
  - ADC Construction Standard
  - ADC District Plan
  - ADC Global Stormwater Consent
- All earthworks are to be carried out in accordance with NZS 4431:2022;
- All pipe sizes, manhole locations, hydrant locations, etc are indicative only and subject to detailed design.

Proposed Stormwater Flow Direction

Proposed Stormwater Flow Direction (Overflow)

Lot 1 DP 320165

Lot 3 DP 320165

Lot 7 DP 62713

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

Lot 4 DP 320165

Lot B DP 311252

Lot 6 DP 67784

Western Loop

Eastern Loop

Main Road

Main Road 2

WAKANUI CREEK

RACECOURSE ROAD

FARM ROAD

CARTERS ROAD

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

Lot 2 DP 516233

Lot 1 DP 516233

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12d$\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Road Layout Plan.dwg

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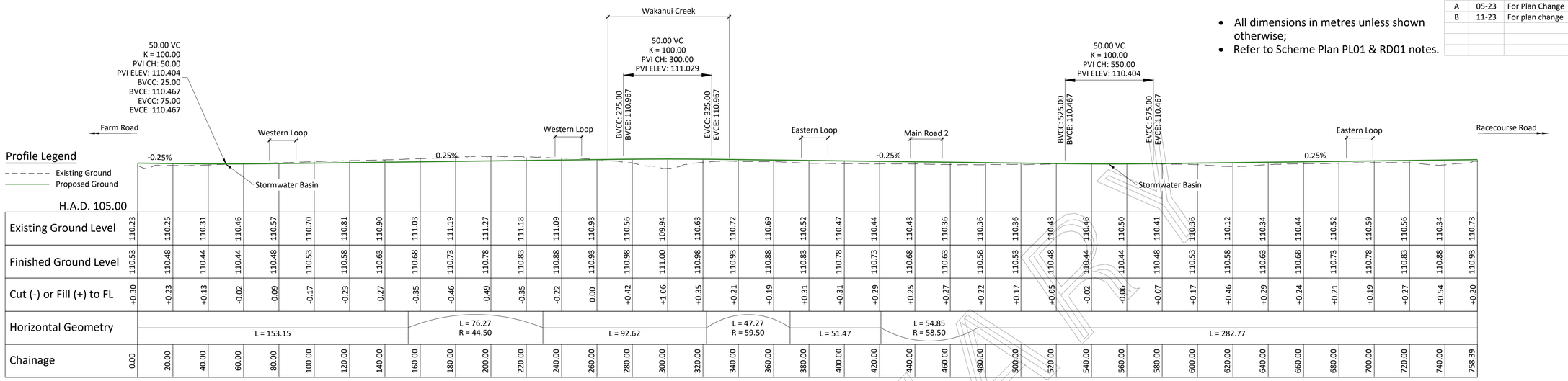
CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
ROAD LAYOUT PLAN

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
1:1000	11-23	30625

dwg RD01 Issue B



Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For plan change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

Chainage	Existing Ground Level	Finished Ground Level	Cut (-) or Fill (+) to FL
0.00	110.23	110.53	+0.30
20.00	110.25	110.48	+0.23
40.00	110.31	110.44	+0.13
60.00	110.46	110.44	-0.02
80.00	110.57	110.48	-0.09
100.00	110.70	110.53	-0.17
120.00	110.81	110.58	-0.23
140.00	110.90	110.63	-0.27
160.00	111.03	110.68	-0.35
180.00	111.19	110.73	-0.46
200.00	111.27	110.78	-0.49
220.00	111.18	110.83	-0.35
240.00	111.09	110.88	-0.22
260.00	110.93	110.93	0.00
280.00	110.56	110.98	+0.42
300.00	109.94	111.00	+1.06
320.00	110.63	110.98	+0.35
340.00	110.72	110.93	+0.21
360.00	110.69	110.88	+0.19
380.00	110.52	110.83	+0.31
400.00	110.47	110.78	+0.31
420.00	110.44	110.73	+0.29
440.00	110.43	110.68	+0.25
460.00	110.36	110.63	+0.27
480.00	110.36	110.58	+0.22
500.00	110.36	110.53	+0.17
520.00	110.43	110.48	+0.05
540.00	110.46	110.44	-0.02
560.00	110.50	110.44	-0.06
580.00	110.41	110.48	+0.07
600.00	110.36	110.53	+0.17
620.00	110.12	110.58	+0.46
640.00	110.34	110.63	+0.29
660.00	110.44	110.68	+0.24
680.00	110.52	110.73	+0.21
700.00	110.59	110.78	+0.19
720.00	110.56	110.83	+0.27
740.00	110.34	110.88	+0.54
758.39	110.73	110.93	+0.20

Horizontal Geometry: L = 153.15 | L = 76.27 R = 44.50 | L = 92.62 | L = 47.27 R = 59.50 | L = 51.47 | L = 54.85 R = 58.50 | L = 282.77

Longsection: Main Road

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

Chainage	Existing Ground Level	Finished Ground Level	Cut (-) or Fill (+) to FL
0.00	110.58	110.48	-0.09
20.00	110.66	110.63	-0.04
40.00	110.73	110.77	+0.04
60.00	110.86	110.91	+0.05
80.00	111.01	111.05	+0.04
100.00	111.15	111.19	+0.04
120.00	111.31	111.33	+0.02
140.00	111.47	111.48	0.00
160.00	111.70	111.62	-0.08
180.00	111.92	111.76	-0.17
200.00	111.90	111.82	-0.08
220.00	111.91	111.79	-0.12
240.00	111.85	111.69	-0.16
260.00	111.80	111.58	-0.22
280.00	111.80	111.48	-0.32
300.00	111.66	111.37	-0.29
320.00	111.52	111.27	-0.25
340.00	111.48	111.16	-0.31
360.00	111.13	111.06	-0.07
380.00	111.15	110.95	-0.20
392.30	111.11	110.89	-0.22

Horizontal Geometry: L = 40.56 | L = 37.20 R = 25.00 | L = 98.86 | L = 34.05 R = 25.00 | L = 94.67 | L = 55.37 R = 27.50 | L = 31.59

Longsection: Western Loop

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

Chainage	Existing Ground Level	Finished Ground Level	Cut (-) or Fill (+) to FL
0.00	108.91	110.26	+1.36
20.00	109.93	110.80	+0.87
40.00	110.00	110.83	+0.83
60.00	110.13	110.78	+0.66
80.00	110.21	110.73	+0.52
100.00	110.37	110.68	+0.31
107.48	110.42	110.66	+0.25

Horizontal Geometry: L = 53.35 | L = 22.01 R = 41.50 | L = 32.11

Longsection: Main Road 2

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

Chainage	Existing Ground Level	Finished Ground Level	Cut (-) or Fill (+) to FL
0.00	110.51	110.82	+0.31
20.00	110.65	110.87	+0.22
40.00	110.73	110.92	+0.20
60.00	110.78	110.93	+0.15
80.00	110.81	110.88	+0.07
100.00	110.86	110.83	-0.03
120.00	110.86	110.78	-0.08
140.00	110.91	110.73	-0.18
160.00	110.88	110.71	-0.17
180.00	110.65	110.73	+0.08
200.00	110.76	110.78	+0.03
220.00	110.86	110.83	-0.02
240.00	110.91	110.88	-0.03
260.00	110.96	110.93	-0.03
280.00	111.01	110.94	-0.06
300.00	111.02	110.92	-0.10
320.00	110.86	110.87	+0.01
340.00	110.74	110.82	+0.08
360.00	110.59	110.77	+0.17
362.96	110.56	110.76	+0.20

Horizontal Geometry: L = 29.96 | L = 23.09 R = 32.50 | L = 214.13 | L = 43.08 R = 27.50 | L = 52.71

Longsection: Eastern Loop

Scale: Horizontal 1:1250; Vertical 1:250 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\Dwg\30625-Road Layout Plan.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

ROAD LONG SECTION

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
AS SHOWN	11-23	30625

dwg	Issue
RD02	B

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	Lot layout updated	PJ

NORTH

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

Lot 1 DP 320165

Lot 3 DP 320165

Lot 4 DP 320165

Lot 7 DP 62713

Lot 8 DP 311232

Lot 6 DP 67784

Lot 18 DP 337801

Lot 17 DP 337801

Lot 16 DP 337801

Lot 15 DP 337801

Lot 14 DP 337801

Lot 13 DP 337801

Lot 12 DP 337801

Lot 11 DP 337801

Lot 1 DP 82956

Lot 190 DP 235

Lot 195 DP 235

Lot 5 DP 516233

Lot 4 DP 516233

Lot 3 DP 516233

Lot 2 DP 516233

Lot 1 DP 516233

DWG SP02

DWG SP03

DWG SP04

DWG SP05

Stormwater soakage pit. Size to be confirmed by during engineering detailed design

Stormwater soakage pit. Size to be confirmed by during engineering detailed design

Existing Ø525 Concrete SW

Existing swale to be piped

Existing Roadside Drain

Existing Roadside Drain

Existing Ø450 Concrete SW

WAKANUI CREEK

FARM ROAD

RACECOURSE ROAD

CARTERS ROAD

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Master Plan.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

THREE WATERS MASTER PLAN

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
1:1000	11-23	30625

dwg SP01 Issue B

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	Lot layout updated	PJ

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe (SW)
- Existing Sewer Pipe (FS)
- Existing Water Pipe (W)
- Existing Power (Underground) (E(UG))
- Existing Power (Overhead) (E(OH))
- Existing Telecom (T)

NORTH

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

WESTERN LOOP

MAIN ROAD

WAKANUI CREEK

Refer to SP04

Refer to SP03

Inlet details refer to DWG TD02

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Layout Plan.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

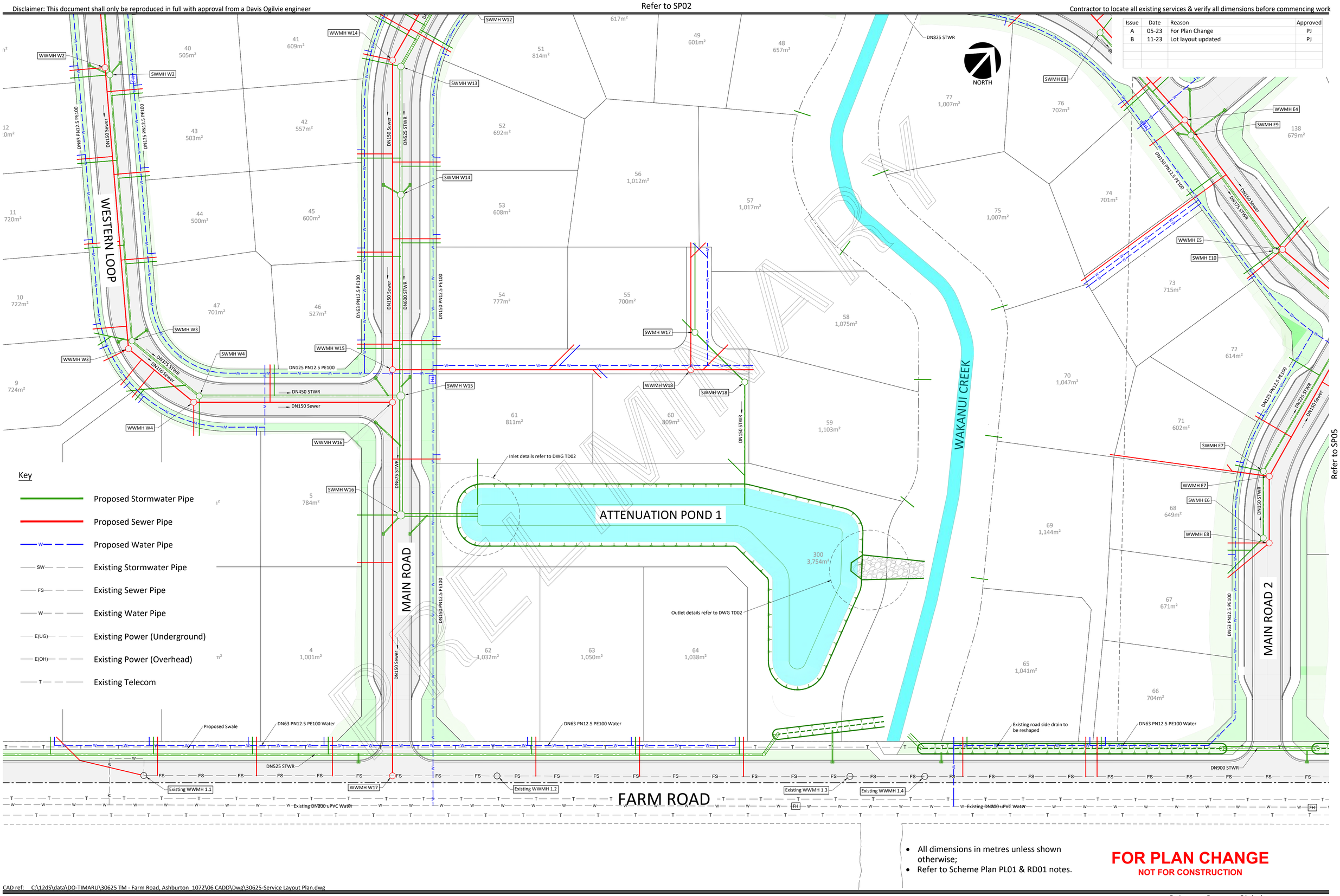
INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP02	B
Scale @ A1	Date	File		
1:400	11-23	30625		

Refer to SP02

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	Lot layout updated	PJ



Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Layout Plan.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP03	B
Scale @ A1	Date	File		
1:400	11-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	Lot layout updated	PJ

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe (SW)
- Existing Sewer Pipe (FS)
- Existing Water Pipe (W)
- Existing Power (Underground) (E(UG))
- Existing Power (Overhead) (E(OH))
- Existing Telecom (T)

NORTH

- All dimensions in metres unless shown otherwise;
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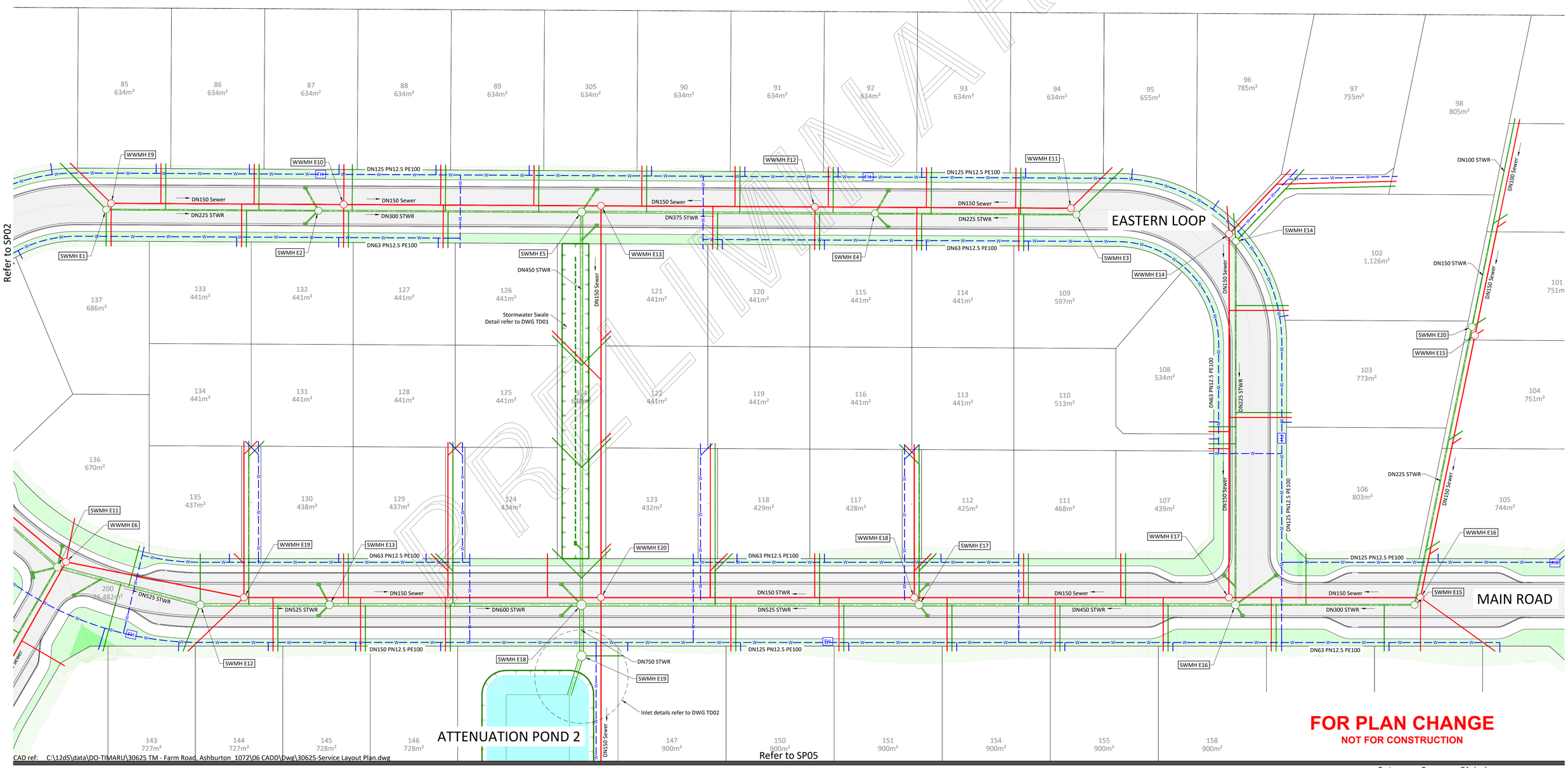

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Service Layout Plan.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP04	B
Scale @ A1	Date	File		
1:400	11-23	30625		

Refer to SP04

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	Lot layout updated	PJ

Refer to SP03

EASTERN LOOP

MAIN ROAD

ATTENUATION POND 2

FARM ROAD

CATERS ROAD

NORTH

SWMH E1
SWMH E2
SWMH E3
SWMH E4
SWMH E5
SWMH E11
SWMH E12
SWMH E13
SWMH E14
SWMH E15
SWMH E16
SWMH E17
SWMH E18
SWMH E19
SWMH E20
WWMH E6
WWMH E13
WWMH E14
WWMH E15
WWMH E16
WWMH E17
WWMH E18
WWMH E19
WWMH E20
WWMH E21
WWMH E22

DN225 STWR
DN300 STWR
DN375 STWR
DN450 STWR
DN600 STWR
DN750 STWR
DN525 STWR
DN150 STWR
DN150 Sewer
DN63 PN12.5 PE100
DN125 PN12.5 PE100
DN150 PN12.5 PE100
DN63 PN12.5 PE100 Water

Stormwater Swale
Detail refer to DWG TD01

Inlet details refer to DWG TD02

Outlet details refer to DWG TD02

Existing road side drain to be reshaped

Existing WWMH 1.5
Existing WWMH 1.6
Existing WWMH 2.2
Existing DN200 uPVC Water

137 686m²
133 441m²
132 441m²
127 441m²
126 441m²
121 441m²
120 441m²
115 441m²
114 441m²
109 597m²
101 751m²
134 441m²
131 441m²
128 441m²
125 441m²
122 441m²
119 441m²
116 441m²
113 441m²
110 513m²
108 534m²
103 773m²
104 751m²
136 670m²
135 437m²
130 438m²
129 437m²
124 434m²
123 432m²
118 429m²
117 428m²
112 425m²
111 468m²
107 439m²
106 803m²
105 744m²
200 35,482m²
142 691m²
143 727m²
144 727m²
145 728m²
146 728m²
147 900m²
150 900m²
151 900m²
154 900m²
155 900m²
158 900m²
141 978m²
140 991m²
139 990m²
303 4,049m²
148 1,001m²
149 1,001m²
152 1,001m²
153 1,001m²
156 1,001m²
157 1,001m²

Key

- Proposed Stormwater Pipe
- Proposed Sewer Pipe
- Proposed Water Pipe
- Existing Stormwater Pipe
- Existing Sewer Pipe
- Existing Water Pipe
- Existing Power (Underground)
- Existing Power (Overhead)
- Existing Telecom

- All dimensions in metres unless shown otherwise;
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FOR PLAN CHANGE
NOT FOR CONSTRUCTION

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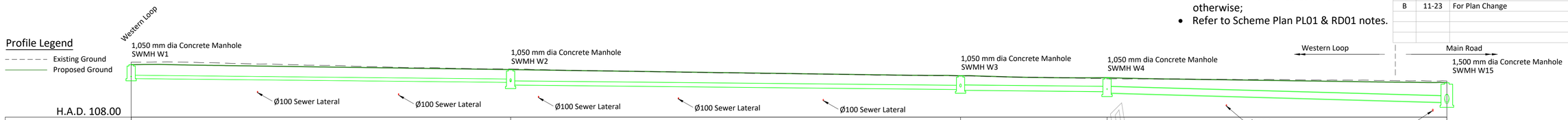
CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
THREE WATERS LAYOUT PLAN

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SP05	B
Scale @ A1	Date	File		
1:400	11-23	30625		



Contractor to locate all existing services & verify all dimensions before commencing work

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- Refer to Scheme Plan PL01 & RD01 notes.

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

Profile Legend

- - - - - Existing Ground

——— Proposed Ground

H.A.D. 108.00

Manhole Cover Level	111.75		111.40		110.96		110.82		110.46
Stormwater Pipe Invert	110.760		110.489 110.300		109.978 109.928		109.823 109.734		109.054
Manhole Depth	1.00		1.20		1.10		1.20		1.60
Stormwater Pipe Data		DN225 STWR Pipe Grade 0.50% (1:200)		DN300 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)		DN450 STWR Pipe Grade 1.40% (1:71)	
Distance		54.23	54.23	64.30	118.54	20.94	139.47	48.56	188.04

Longsection: SWMH W1 to SWMH W15

Scale: Horizontal 1:300; Vertical 1:150 @ A1

Profile Legend

- - - - - Existing Ground

——— Proposed Ground

H.A.D. 108.00

Manhole Cover Level	111.79		111.57		111.27		111.20		111.06		110.86
Stormwater Pipe Invert	110.902		110.684 110.554		110.307 110.267		110.166 110.136		110.039 110.009		109.802
Manhole Depth	0.90		1.10		1.10		1.10		1.10		1.10
Stormwater Pipe Data		DN225 STWR Pipe Grade 0.50% (1:200)		DN300 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)		DN375 STWR Pipe Grade 0.50% (1:200)	
Distance		43.68	43.68	49.34	93.02	20.13	113.15	19.37	132.51	41.30	173.81

Longsection: SWMH W5 to SWMH W10

Scale: Horizontal 1:300; Vertical 1:150 @ A1

Profile Legend

- - - - - Existing Ground

——— Proposed Ground

H.A.D. 107.00

Manhole Cover Level	110.86		110.83		110.74		110.69		110.58		110.46		110.41		
Stormwater Pipe Invert	109.762		109.703 109.653		109.576 109.476		109.413 109.363		109.286 109.186		109.065 108.965		108.893 108.843		108.797
Manhole Depth	1.10		1.30		1.40		1.40		1.50		1.60		1.70		
Stormwater Pipe Data		DN450 STWR Pipe Grade 0.25% (1:400)		DN450 STWR Pipe Grade 0.25% (1:400)		DN525 STWR Pipe Grade 0.25% (1:400)		DN525 STWR Pipe Grade 0.25% (1:400)		DN600 STWR Pipe Grade 0.25% (1:400)		DN675 STWR Pipe Grade 0.25% (1:400)		DN675 STWR Pipe Grade 0.25% (1:400)	
Distance		23.75	23.75	30.82	54.57	25.22	79.79	30.89	110.68	48.48	159.16	28.65	187.81	18.50	

Longsection: SWMH W10 to Western Pond

Scale: Horizontal 1:300; Vertical 1:150 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\XRef's\X-30625-Stormwater.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

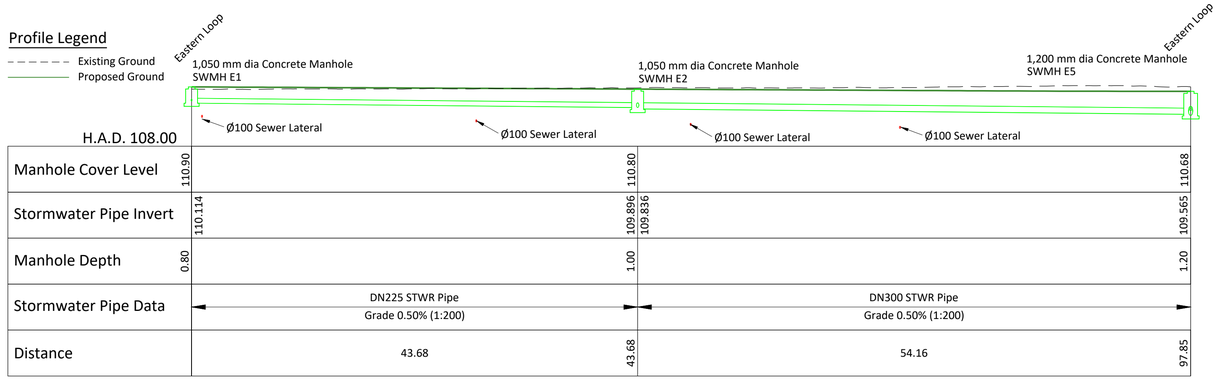
INFRASTRUCTURE SERVICING
STORMWATER LONG SECTION

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
AS SHOWN	11-23	30625

dwg	Issue
SW01	B

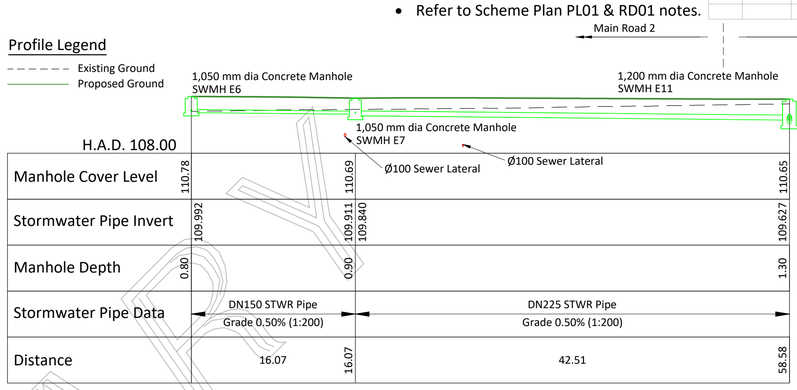
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



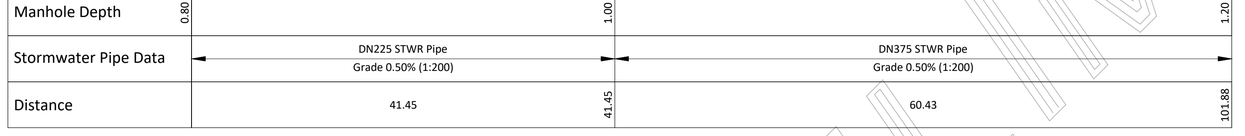
Longsection: SWMH E1 to SWMH E5

Scale: Horizontal 1:300; Vertical 1:150 @ A1



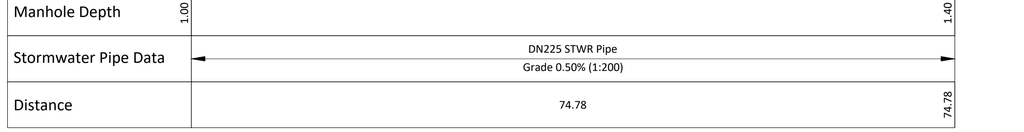
Longsection: SWMH E6 to SWMH E11

Scale: Horizontal 1:300; Vertical 1:150 @ A1



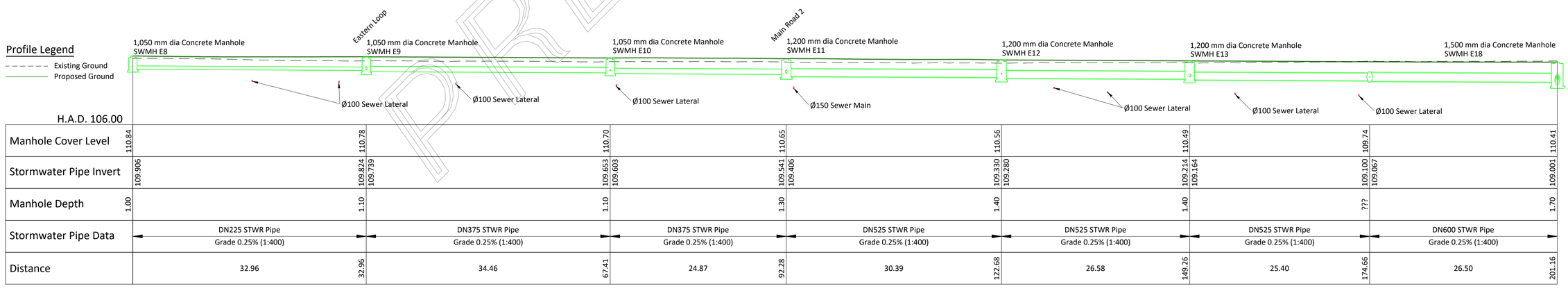
Longsection: SWMH E3 to SWMH E5

Scale: Horizontal 1:300; Vertical 1:150 @ A1



Longsection: SWMH E14 to SWMH E16

Scale: Horizontal 1:300; Vertical 1:150 @ A1



Longsection: SWMH E8 to SWMH E18

Scale: Horizontal 1:300; Vertical 1:150 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12d$\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\XRef's\X-30625-Stormwater.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

STORMWATER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SW02	B
Scale @ A1	Date	File		
AS SHOWN	11-23	30625		

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
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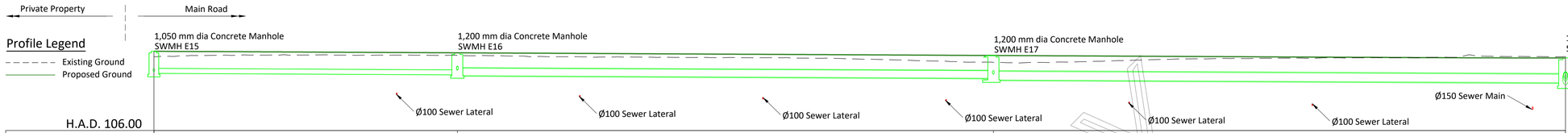
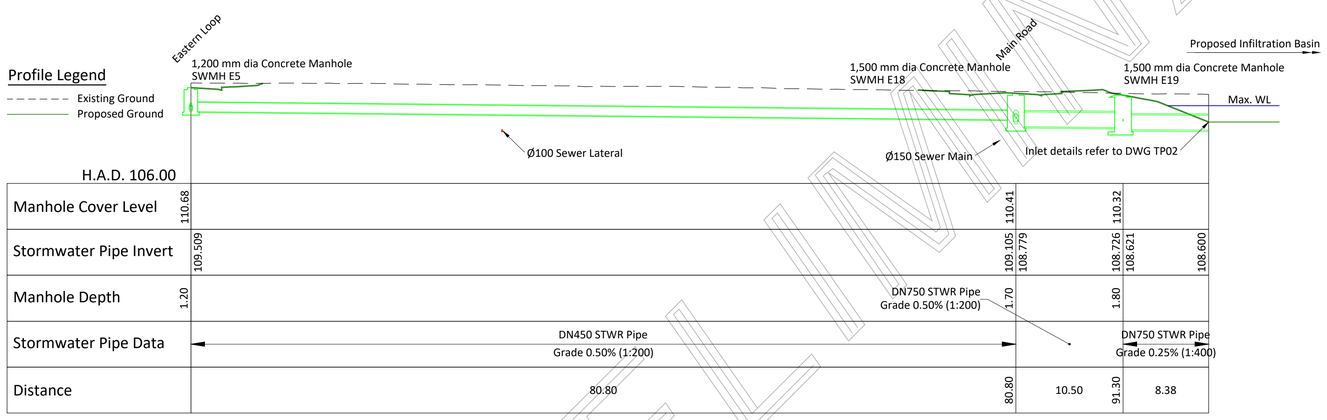


Manhole Cover Level	110.81		110.72		110.56		110.41					
Stormwater Pipe Invert	109.478		109.386	109.336	109.173	109.073	108.899					
Manhole Depth	1.40		1.40		1.49		1.70					
Stormwater Pipe Data	DN300 STWR Pipe Grade 0.25% (1:400)			DN450 STWR Pipe Grade 0.25% (1:400)			DN525 STWR Pipe Grade 0.25% (1:400)					
Distance	36.87		36.87	65.13	102.00		69.50					171.50

Longsection: SWMH E15 to SWMH E18

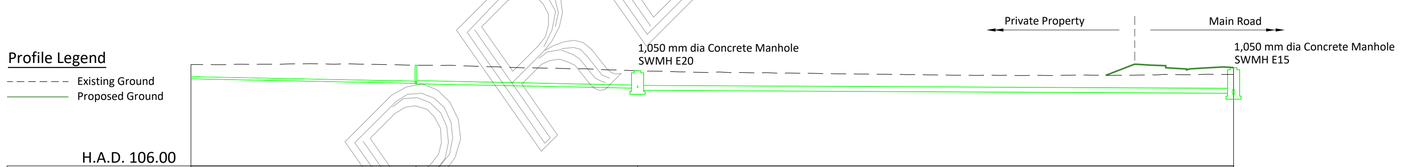
Scale: Horizontal 1:300; Vertical 1:150 @ A1



Manhole Cover Level	110.68					110.41		110.32				
Stormwater Pipe Invert	109.509					109.105	108.779	108.726	108.621	108.600		
Manhole Depth	1.20					1.70		1.80				
Stormwater Pipe Data	DN450 STWR Pipe Grade 0.50% (1:200)							DN750 STWR Pipe Grade 0.25% (1:400)				
Distance	80.80					80.80	10.50	91.30	8.38			99.68

Longsection: SWMH E5 to Pond

Scale: Horizontal 1:300; Vertical 1:150 @ A1



Manhole Cover Level					110.65					110.81		
Stormwater Pipe Invert	110.265		110.044	110.021	109.804	109.704				109.558		
Manhole Depth					1.00					1.40		
Stormwater Pipe Data	DN100 STWR Pipe Grade 1.00% (1:100)			DN150 STWR Pipe Grade 1.00% (1:100)			DN225 STWR Pipe Grade 0.25% (1:400)					
Distance	22.05		22.05	21.70	43.75		58.38			102.13		

Longsection: Lot 101 to SWMH E15

FOR PLAN CHANGE
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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
STORMWATER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	SW03	B
Scale @ A1	Date	File		
AS SHOWN	11-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
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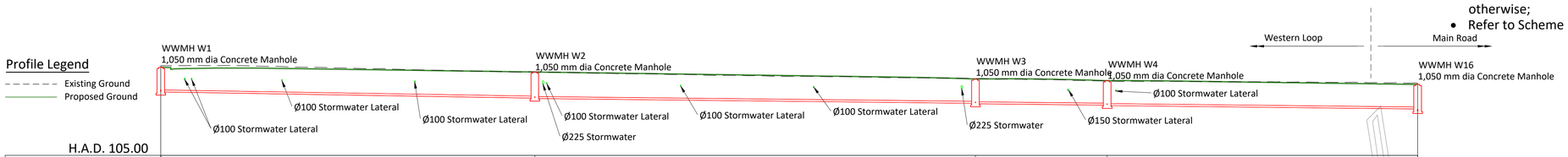
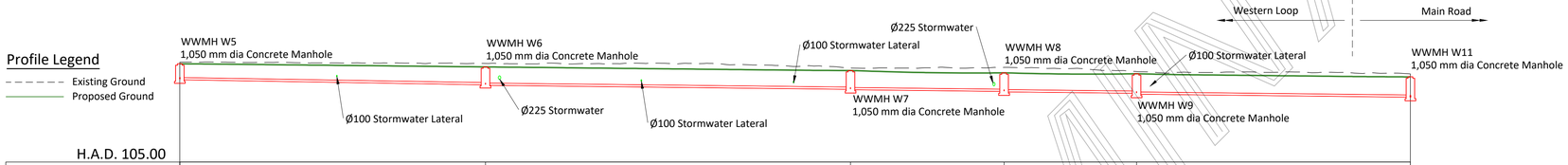


Manhole Cover Level	111.81	111.44						110.90	110.77							110.48
Sewer Pipe Invert	109.902	109.423	109.393					109.020	108.990	108.878	108.848					108.584
Manhole Depth	2.00	2.10						2.00		2.00						2.10
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)			DN150 Sewer Pipe Grade 0.55% (1:182)						DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)				
Distance	57.69	57.69		67.96			125.66	20.32	145.97	47.89						193.86

Longsection: WWMH W1 to WWMH W16

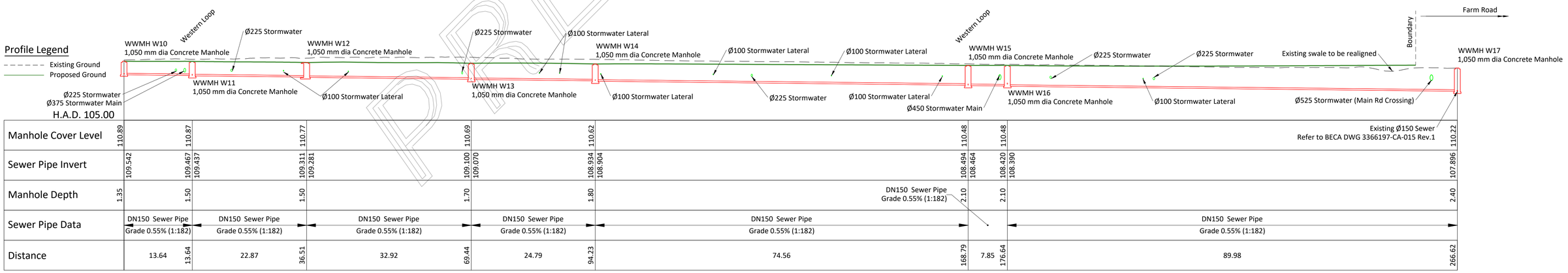
Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	111.77	111.55			111.30			111.14	111.08							110.87
Sewer Pipe Invert	110.668	110.319	110.289		110.012	109.982		109.865	109.835	109.735	109.675					109.467
Manhole Depth	1.20	1.30			1.40			1.40		1.50						1.50
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)			DN150 Sewer Pipe Grade 0.55% (1:182)				DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)				
Distance	42.16	42.16		50.34	92.50			21.18	113.68	18.27	131.95	37.76				169.72

Longsection: WWMH W5 to WWMH W11

Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.89	110.87		110.77			110.69		110.62						110.48	110.48				110.22
Sewer Pipe Invert	109.542	109.467	109.437	109.311	109.281		109.100	109.070	108.934	108.904					108.494	108.464	108.420	108.390		107.896
Manhole Depth	1.35	1.50		1.50			1.70		1.80						DN150 Sewer Pipe Grade 0.55% (1:182) 2.10		2.10			2.40
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.55% (1:182)			DN150 Sewer Pipe Grade 0.55% (1:182)			DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)								DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance	13.64	13.64		22.87	36.51		32.92	69.44	24.79	94.23			74.56		168.79	7.85	176.64		89.98	266.62

Longsection: WWMH W10 to WWMH W17

Scale: Horizontal 1:400; Vertical 1:200 @ A1

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\XRef's\X-30625-Sewer.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

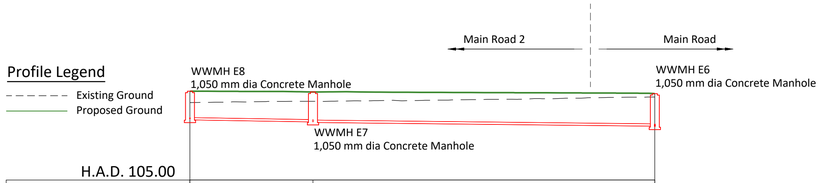
INFRASTRUCTURE SERVICING
SEWER LONG SECTION

Design	Drawn	QA check
RL	RL	PJ
Scale @ A1	Date	File
AS SHOWN	11-23	30625

dwg WW01 Issue B

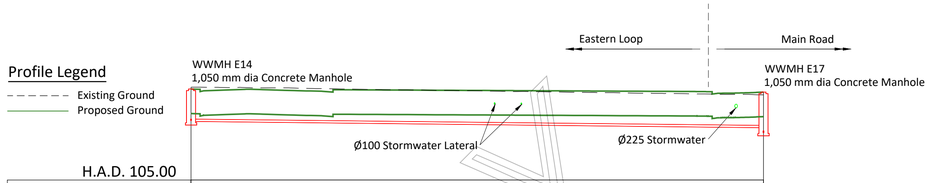
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



Manhole Cover Level	110.80		110.75		110.64	
Sewer Pipe Invert	108.925		108.791	108.761	108.516	
Manhole Depth	1.90		2.00		2.20	
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		16.07		16.07	44.64	60.71

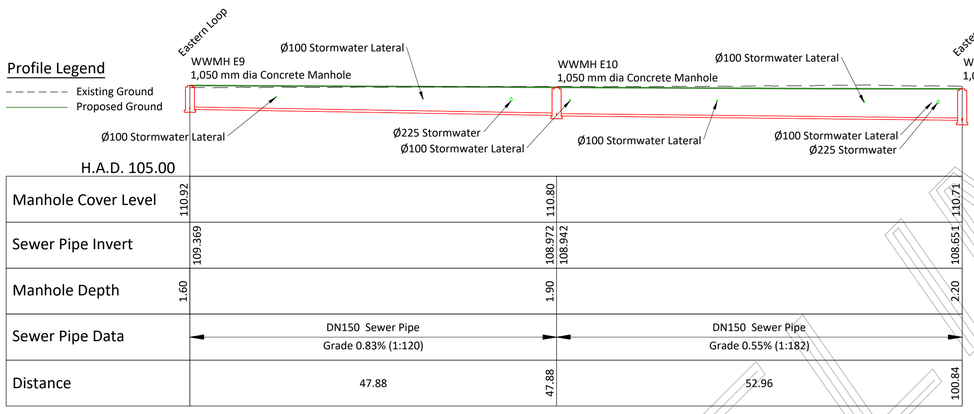
Longsection: WWMH E8 to WWMH E6



Manhole Cover Level	110.94			110.74
Sewer Pipe Invert	108.825			108.414
Manhole Depth	2.20			2.70
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		74.76		74.76

Longsection: WWMH E14 to WWMH E17

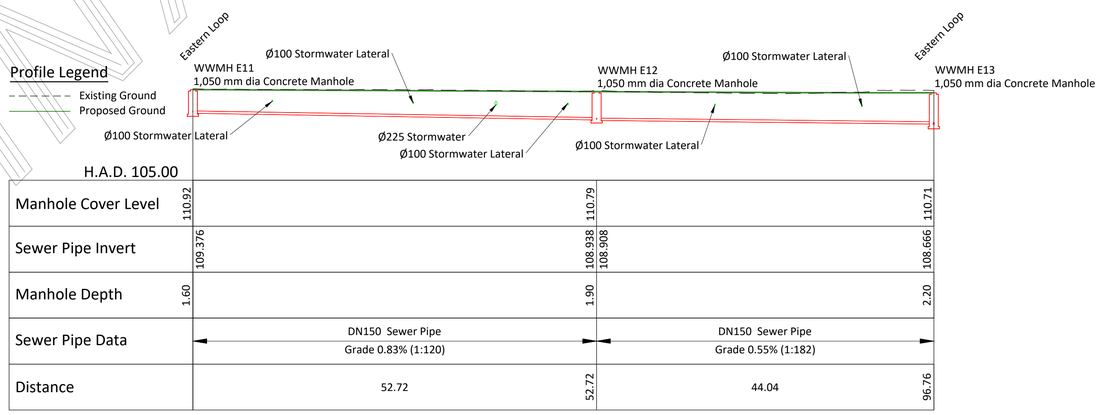
Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.92		110.80		110.71	
Sewer Pipe Invert	109.369		108.972	108.942	108.651	
Manhole Depth	1.60		1.90		2.20	
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		47.88		47.88	52.96	100.84

Longsection: WWMH E9 to WWMH 13

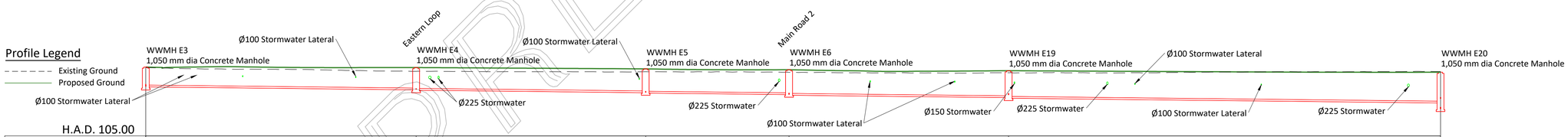
Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.92		110.79		110.71	
Sewer Pipe Invert	109.376		108.938	108.908	108.666	
Manhole Depth	1.60		1.90		2.20	
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.83% (1:120)		DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance		52.72		52.72	44.04	96.76

Longsection: WWMH E11 to WWMH E13

Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.87		110.82		110.71		110.64		110.55	110.42
Sewer Pipe Invert	109.178		108.925	108.895	108.680	108.650	108.516	108.466	108.260	108.210	107.806
Manhole Depth	1.80		2.00		2.10		2.20		2.40	3.20
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)	
Distance		45.99		45.99	39.06	85.06	24.39	109.45	37.35	146.80	73.50	220.30

Longsection: WWMH E1 to WWMH E20

Scale: Horizontal 1:400; Vertical 1:200 @ A1

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING

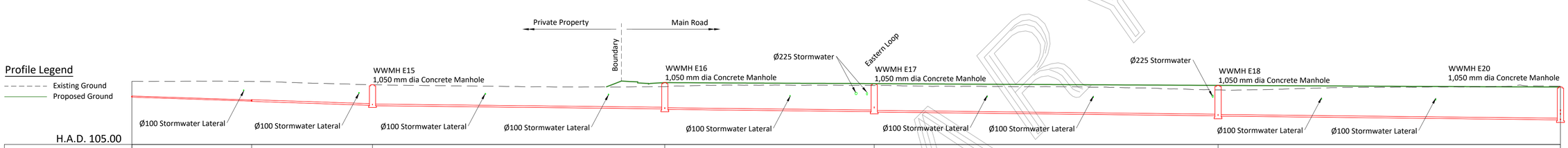
SEWER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	WW02	B
Scale @ A1	Date	File		
AS SHOWN	11-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

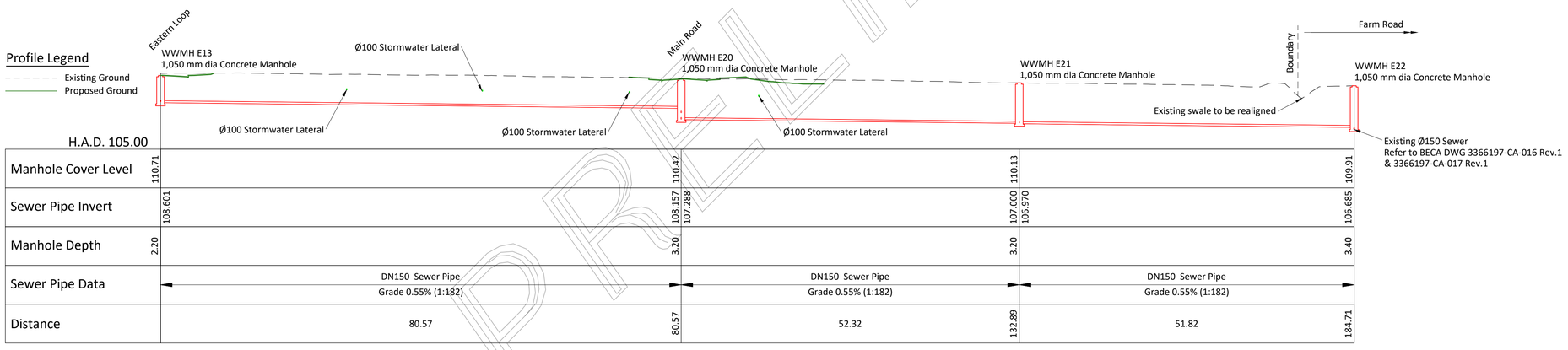
- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



Manhole Cover Level			110.63		110.83		110.74		110.57		110.42		
Sewer Pipe Invert	109.460	109.088	109.065	108.689	108.659	108.356	108.306	108.089	108.059	107.703	107.673	107.318	
Manhole Depth			2.00		2.60		2.70		3.00		3.20		
Sewer Pipe Data	DN100 Sewer Pipe Grade 1.65% (1:61)		DN150 Sewer Pipe Grade 1.65% (1:61)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)		
Distance	22.57	22.57	22.77	45.34	55.07	100.41	39.45	139.86	64.78	204.64	64.50	269.14	

Longsection: Lot 101 to WWMH E18

Scale: Horizontal 1:400; Vertical 1:200 @ A1



Manhole Cover Level	110.71		110.42		110.13		109.91		
Sewer Pipe Invert	108.601		108.157	107.288	107.000	106.970	106.685		
Manhole Depth	2.20		3.20		3.20		3.40		
Sewer Pipe Data	DN150 Sewer Pipe Grade 0.55% (1:182)			DN150 Sewer Pipe Grade 0.55% (1:182)		DN150 Sewer Pipe Grade 0.55% (1:182)			
Distance	80.57		80.57	52.32	132.89	51.82	184.71		

Longsection: WWMH E13 to WWMH E22

Scale: Horizontal 1:400; Vertical 1:200 @ A1

FRO PLAN CHANGE
NOT FOR CONSTRUCTION

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

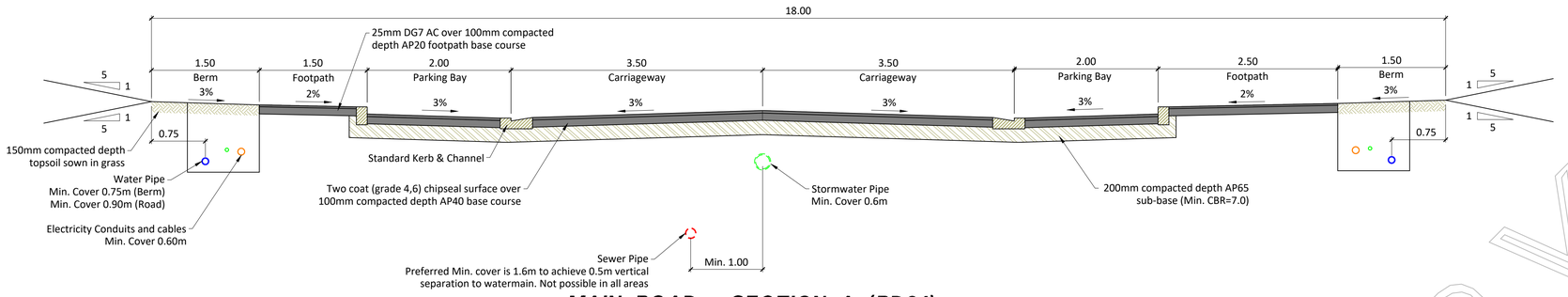
INFRASCTRUCTURE SERVICING
SEWER LONG SECTION

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	WW03	B
Scale @ A1	Date	File		
AS SHOWN	11-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

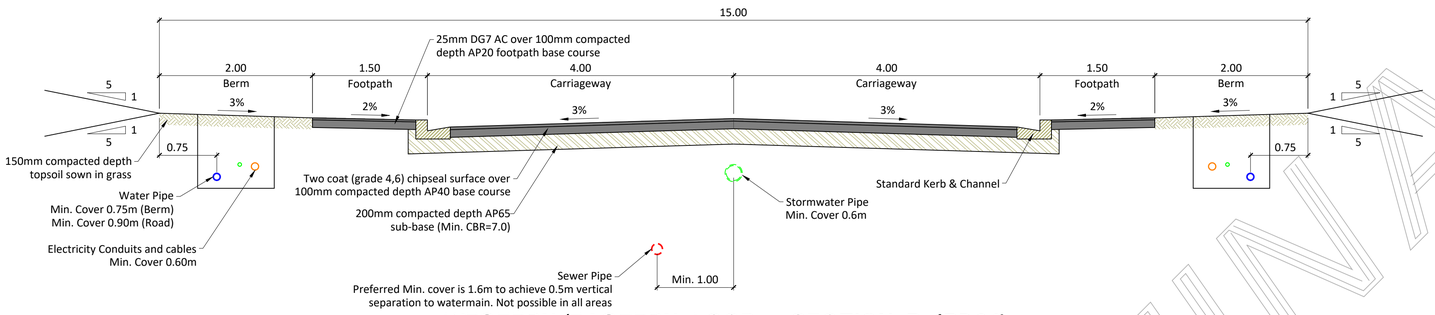
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



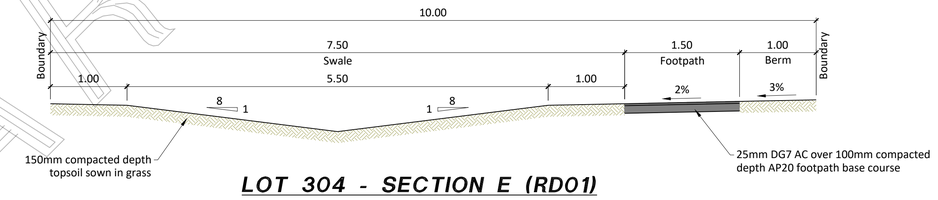
MAIN ROAD - SECTION A (RD01)

Scale 1:40



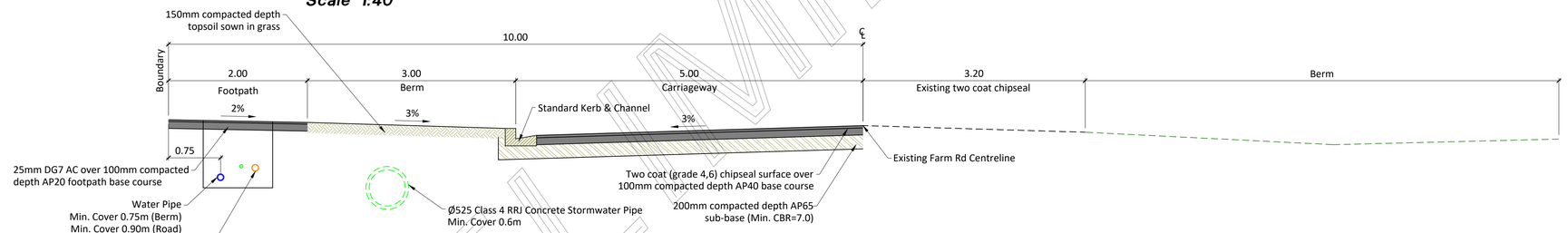
WESTERN/EASTERN LOOP - SECTION B (RD01)

Scale 1:40



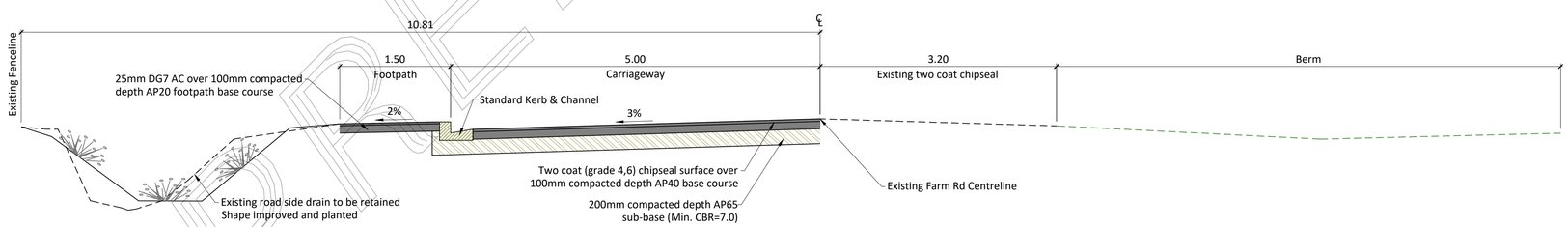
LOT 304 - SECTION E (RD01)

Scale 1:40



FARM ROAD - SECTION C (RD01)

Scale 1:40



FARM ROAD - SECTION D (RD01)

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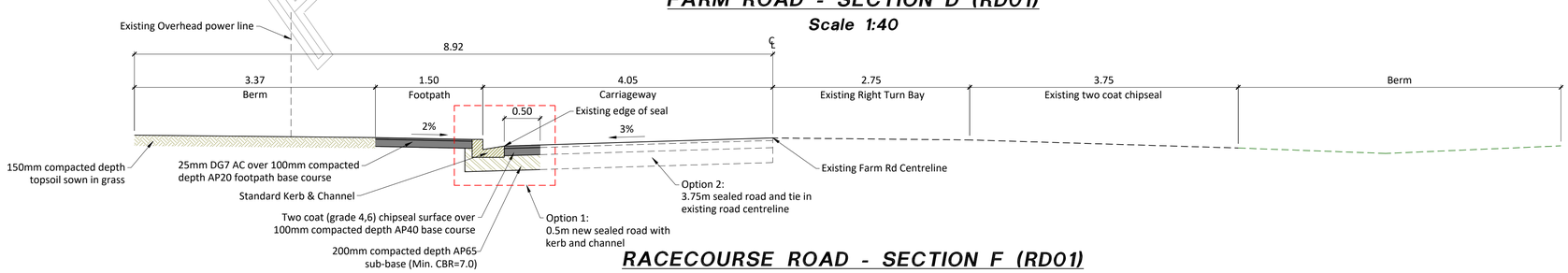

RACECOURSE ROAD - SECTION F (RD01)

Scale 1:40

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Road Typical Cross Section.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

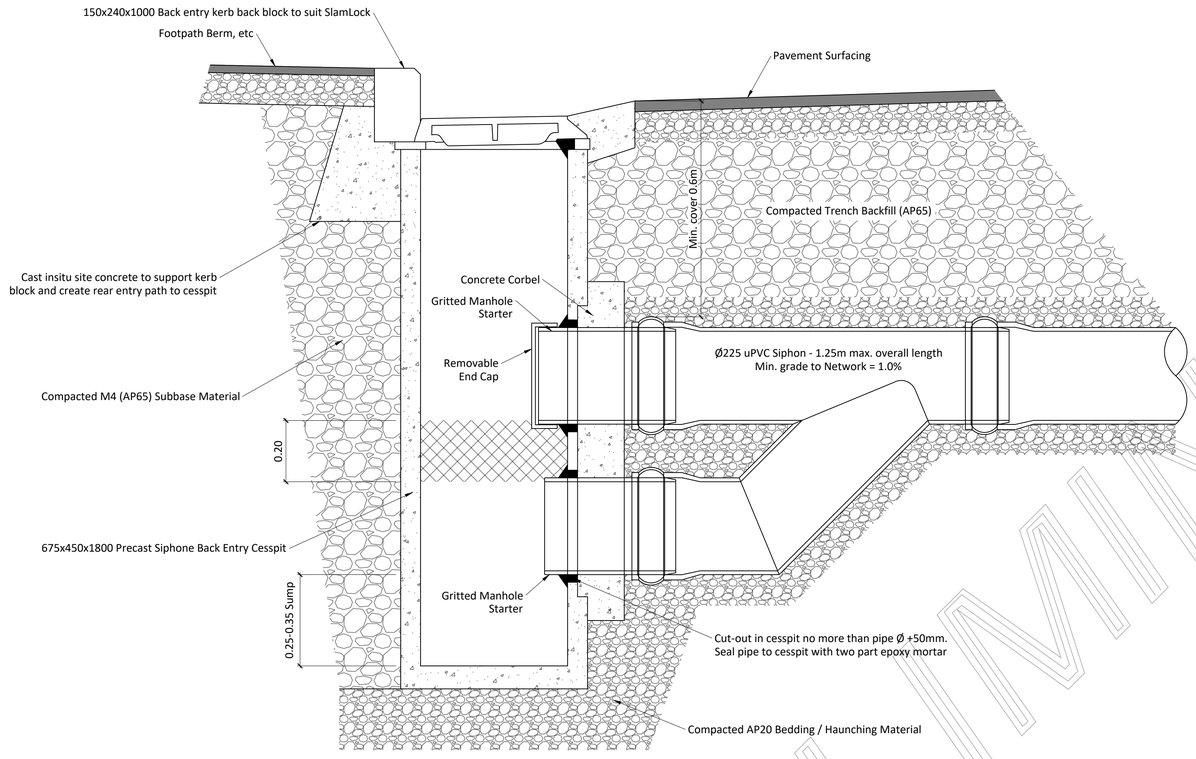
INFRASTRUCTURE SERVICING
TYPICAL ROAD CROSS SECTIONS

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	TD01	B
Scale @ A1	Date	File		
1:40	11-23	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

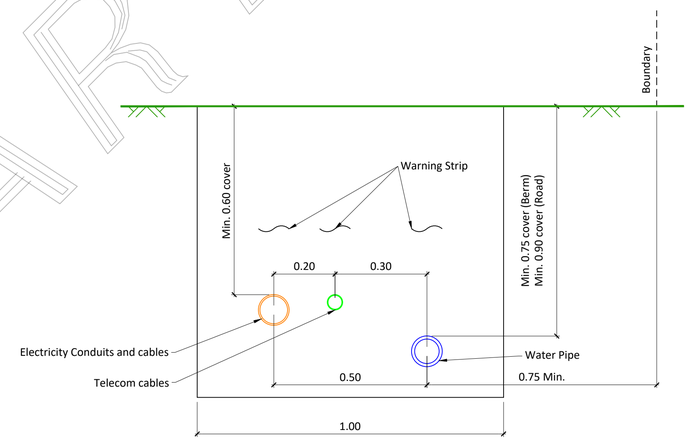
Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



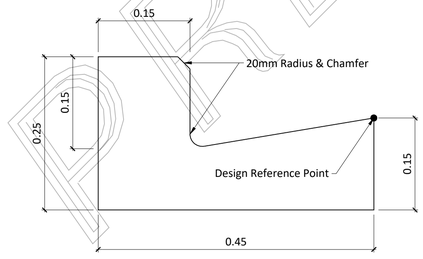
DROWNED OUTLET SUMP DETAIL

Scale 1:10



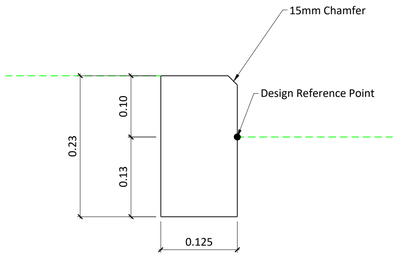
COMMON SERVICES TRENCH DETAIL

Scale 1:10



STANDARD KERB AND CHANNEL

Scale 1:5



STANDARD NIB

Scale 1:5

FOR PLAN CHANGE

NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Road Typical Cross Section.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

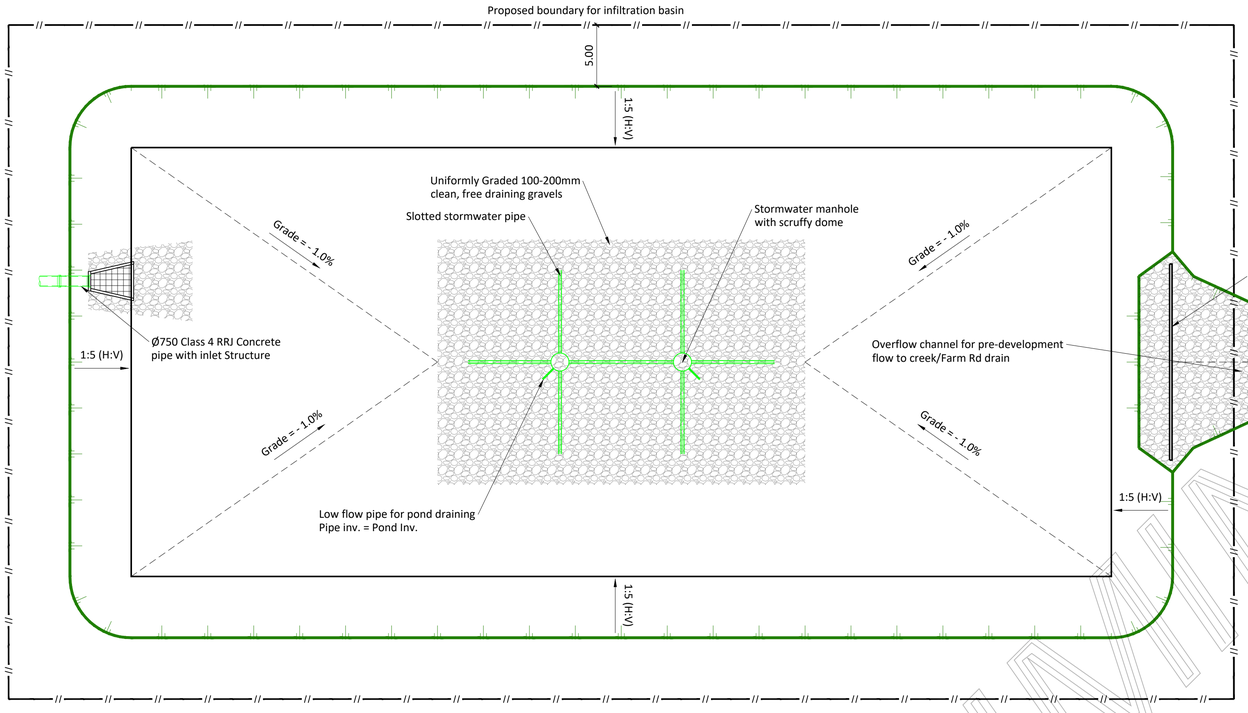
INFRASTRUCTURE SERVICING

TYPICAL DETAILS

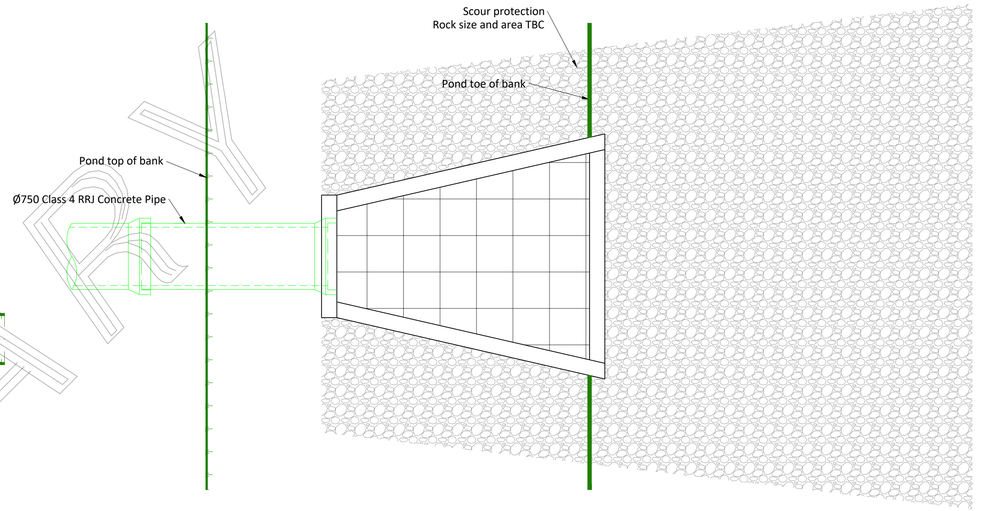
Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	TD02	B;
Scale @ A1	Date	File		
AS SHOWN	11-23	30625		

Issue	Date	Reason	Approved
A	05-23	For Plan Change	PJ
B	11-23	For Plan Change	PJ

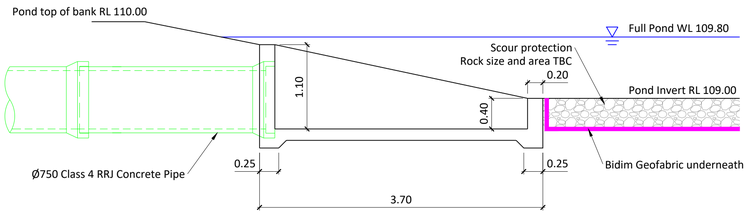
- All dimensions in metres unless shown otherwise;
- Refer to Scheme Plan PL01 & RD01 notes.



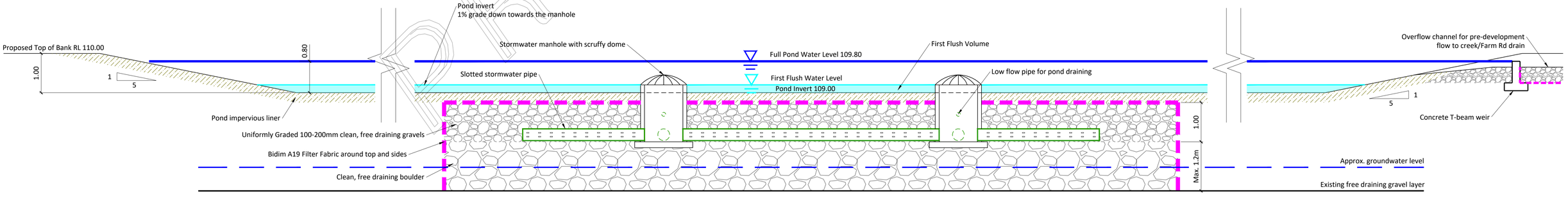
INFILTRATION BASIN TYPICAL PLAN
Scale 1:250



INLET STRUCTURE PLAN VIEW
Scale 1:40



INLET STRUCTURE SIDE ELEVATION
Scale 1:40



INFILTRATION BASIN TYPICAL CROSS SECTION
Scale 1:50

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NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Pond Typical Details.dwg

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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFRASTRUCTURE SERVICING
INFILTRATION TYPICAL PLAN AND DETAILS

Design	Drawn	QA check	dwg	Issue
RL	RL	PJ	TP03	B
Scale @ A1	Date	File		
AS SHOWN	11-23	30625		

APPENDIX D – FARM ROAD WATER MODEL REPORT (EPANET)

WATER MODELLING REPORT:

Water Modelling Parameters

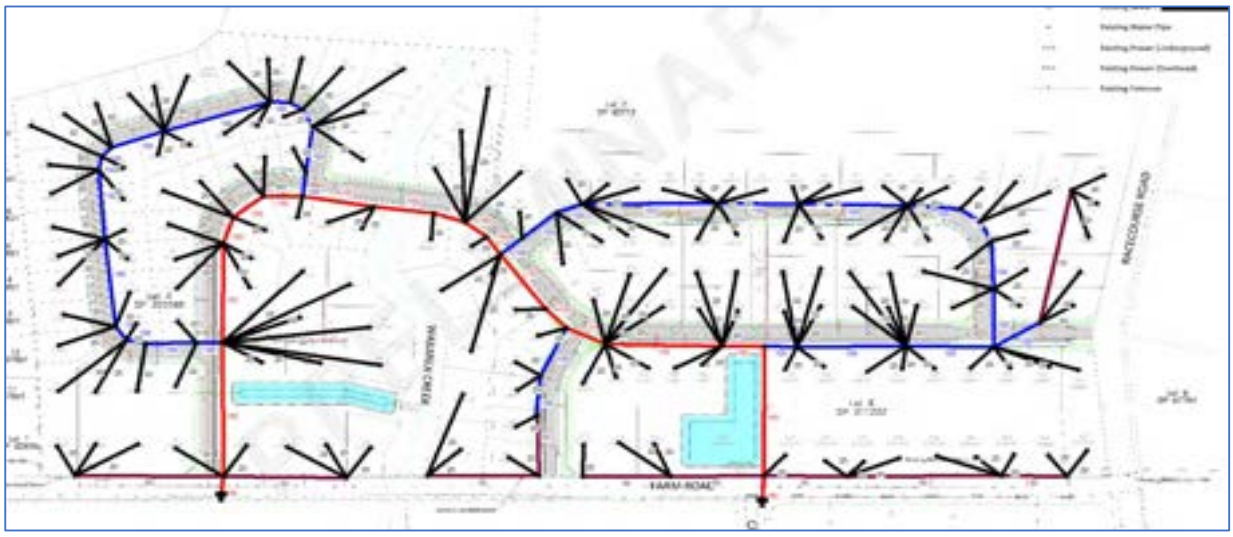
Model	EPANET
File Name	FarmRoad.net
Bmp file	30625-Service Plan-SP01.bmp
Hydraulic Calcs	Darcy Weisbach equation
Pipe Roughness	0.015
Average Daily Demand per property*	980 L/property/day
Peak Daily Demand per property*	2230 L/property/day
Leakages per property*	150 L/property/day
Number of Property	167
Fire Fighting	2 x Fire Hydrant at 12.5 L/s each (total 25 L/s)
Minimum Pressure in property (FH)	12m (120 kPa)
Minimum Pressure in watermain (FH)	12m (120 kPa)
Mains Pressure	300 kPa

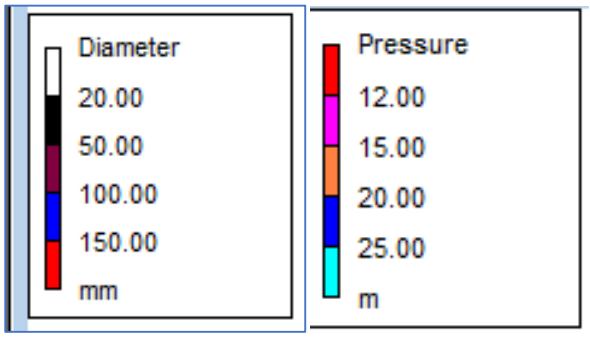
*- information provided by Ashburton District Council model.

When there is a public network draw of about 1500 L/min, the main pressure drops to from 300 kPa to 274 kPa. This is using 239 Racecourse Road water model information provided by Ashburton District Council.

All scenarios simulation is on Peak Daily Demand.

Pipe Diameter:





Scenario 1: Two feed system:

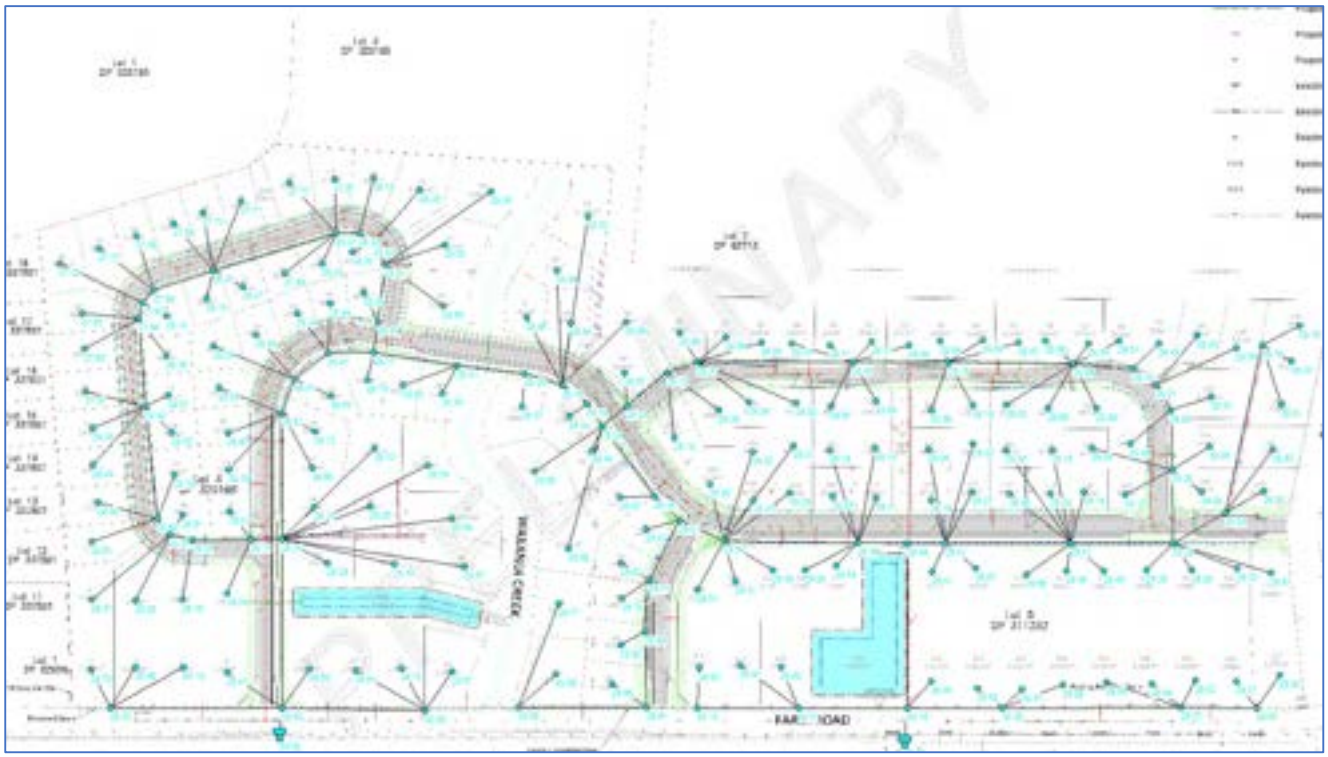


Fig 1: Peak Demand scenario without fire fighting when mains pressure at 300kPa

Main Pressure at 300 kPa	
Pressure range in property	27m - 30m
Pressure range in property during Fire Fighting	21m - 30m
Pressure range in watermain	27m – 30m
Pressure range in watermain during Fire Fighting	22m - 30m
Mains Pressure at 274 kPa	
Pressure range in property	24m - 27m
Pressure range in property during Fire Fighting	18m - 27m
Pressure range in watermain	25m – 27m
Pressure range in watermain during Fire Fighting	19m - 27m

Scenario 2: One feed system (West-open, East-close) + Fire Fighting:

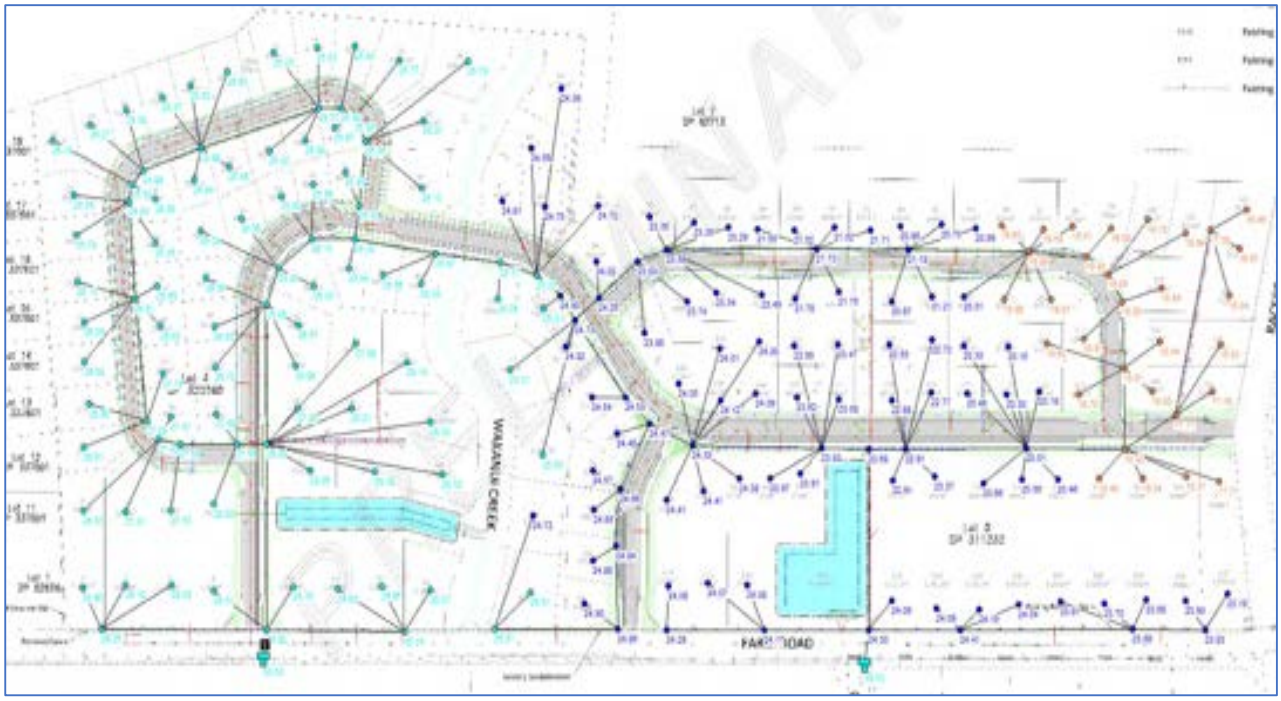


Fig 2: Worst case scenario where the Fire Hydrant is the furthest when mains pressure at 300kPa

Mains Pressure at 300 kPa	
Pressure range in property during Fire Fighting	16m - 30m
Pressure range in watermain during Fire Fighting	17m - 30m
Mains Pressure at 274 kPa	
Pressure range in property during Fire Fighting	13m - 27m
Pressure range in watermain during Fire Fighting	14m - 27m

Scenario 3: One feed system (West-close, East-open) + Fire Fighting:

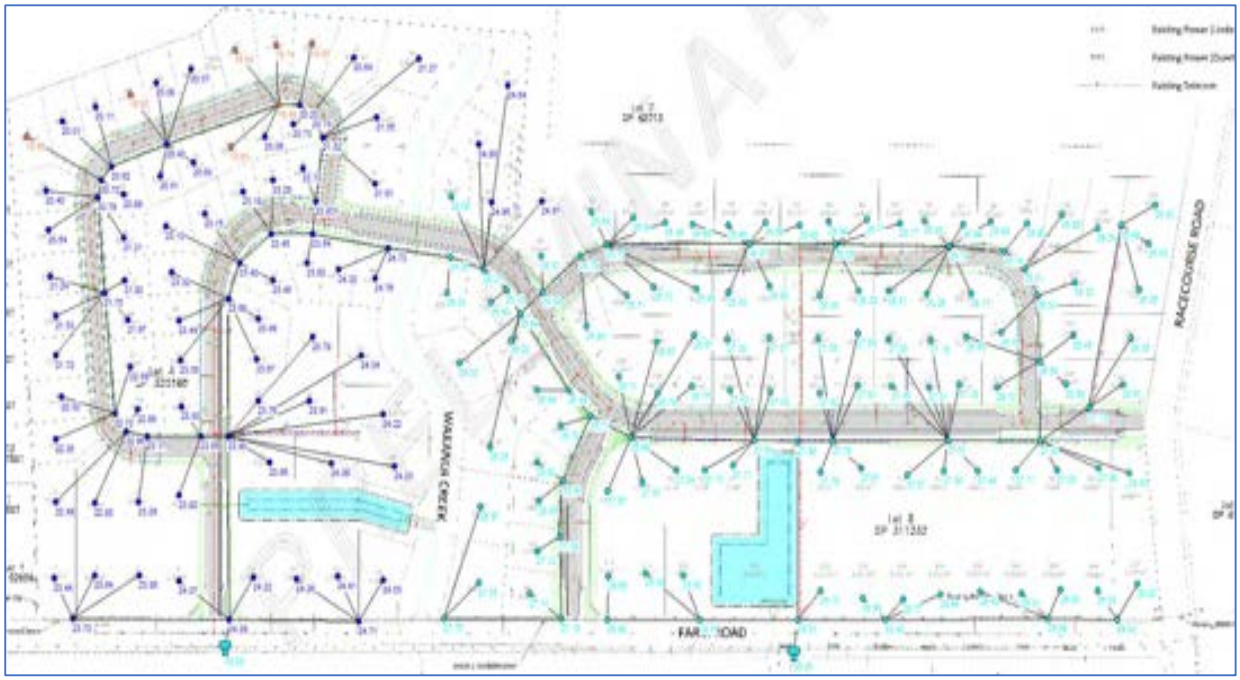


Fig 3: Worst case scenario when the Fire Hydrant is the furthest when mains pressure at 300kPa

Mains Pressure at 300 kPa	
Pressure range in property during Fire Fighting	16m - 30m
Pressure range in watermain during Fire Fighting	17m - 30m
Mains Pressure at 274 kPa	
Pressure range in property during Fire Fighting	16m - 27m
Pressure range in watermain during Fire Fighting	16m - 27m

APPENDIX E – INFILTRATION TEST MEMORANDUM REPORT

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DAVIS OGILVIE
ENGINEERS / SURVEYORS / PLANNERS

MEMORANDUM REPORT

To:	Ashburton District Council
Applicant:	Coniston Park Limited
From:	Ricky Liang – Civil Engineer
Date:	03 April 2023
Subject:	Farm Road, Ashburton Subdivision – Infiltration Testing Memo

1 INTRODUCTION

This document is a summary of ground investigations undertaken at Farm Road, Ashburton (Lot 4 DP 320165 & Lot 8 DP 311232). Thirteen soakage tests were undertaken to confirm whether the land was suitable for disposal of stormwater to land. The information is to support our resource consent application to dispose of stormwater to land and facilitate design.

The land is owned by Golden Mile Trading Ltd & Carl Grove Developments Ltd and will be developed into an approximate 160 Allotments subdivision.

2 DESCRIPTION OF SITE

The total area of the site is approximately 16ha and there's Wakanui Creek runs through the middle of it. The western part has a relatively flat topography with a gentle slope (1V:100H) towards the east corner of the site. 6 infiltration test pits were excavated to a depth of 2.7m to 4.2m. The eastern part has a relatively flat topography with a gentle slope (1V:200H) towards the south corner of the site. 7 infiltration test pits were excavated to a depth of 1.8 to 3.3m.

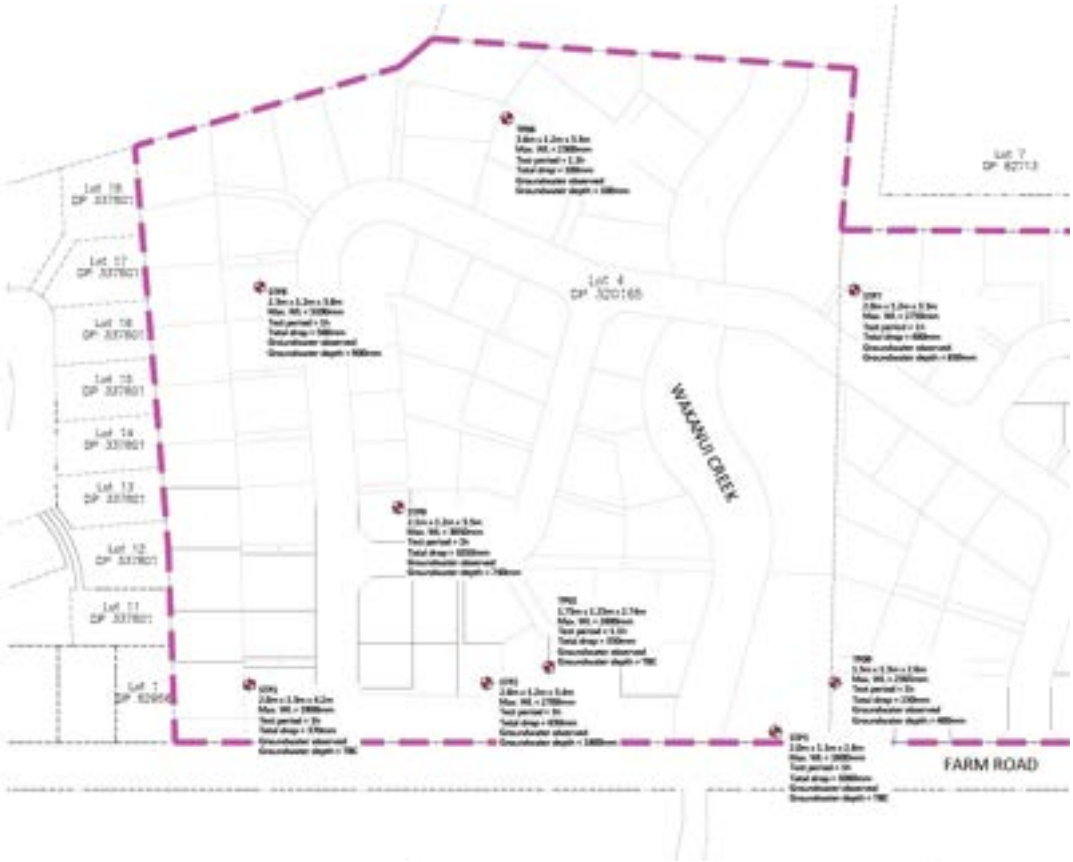

Figure 1. Infiltration Test Pit Location Plan (Western Part)

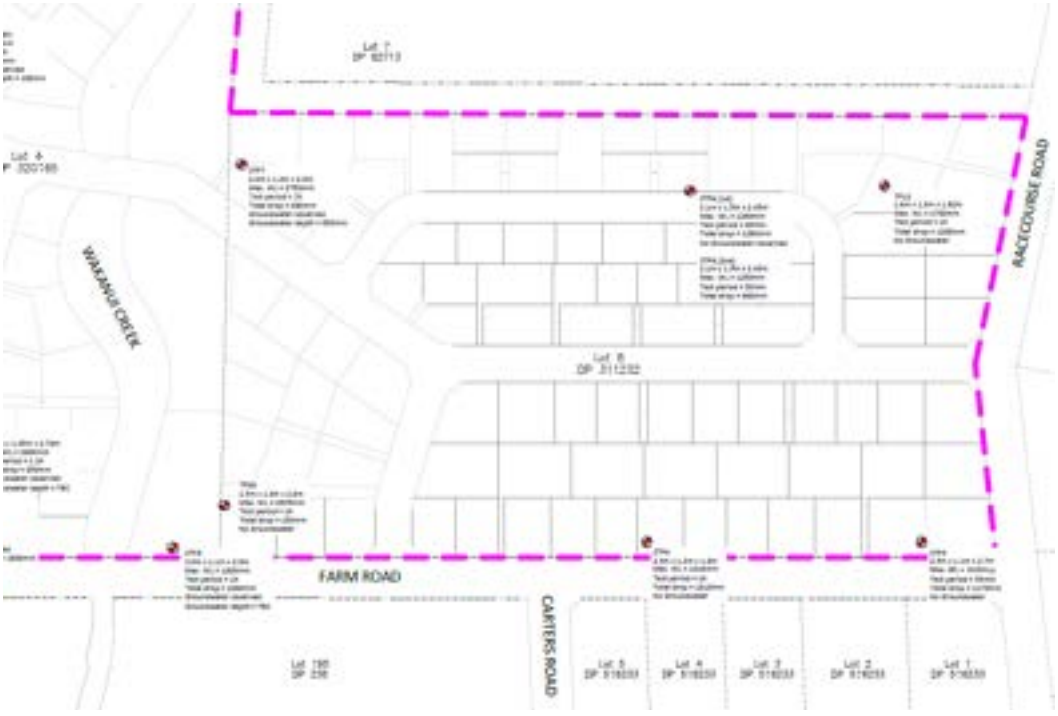

Figure 2. Infiltration Test Pit Location Plan (Eastern Part)

3 INFILTRATION TEST PIT

TP02

Test date: 14/03/2023

Infiltration test pit size: 1.75m(L) x 1.25m(W) x 2.74m(D)

Max. water level for testing: 2.6m

Test period: 1.1 hour

Total water drop during the test period: 350mm

Groundwater: observed

Groundwater depth in the pit: TBC

Photo - Test Pit 02

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	14 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		TP02	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	1.65	10.0
2	3.13	20.0
3	4.46	30.0
4	5.95	40.0
5	7.52	50.0
6	8.65	60.0
7	10.50	70.0
8	12.33	80.0
9	15.45	100.0
10	24.52	150.0
11	34.63	200.0
12	46.40	250.0
13	58.92	300.0
14	69.75	350.0
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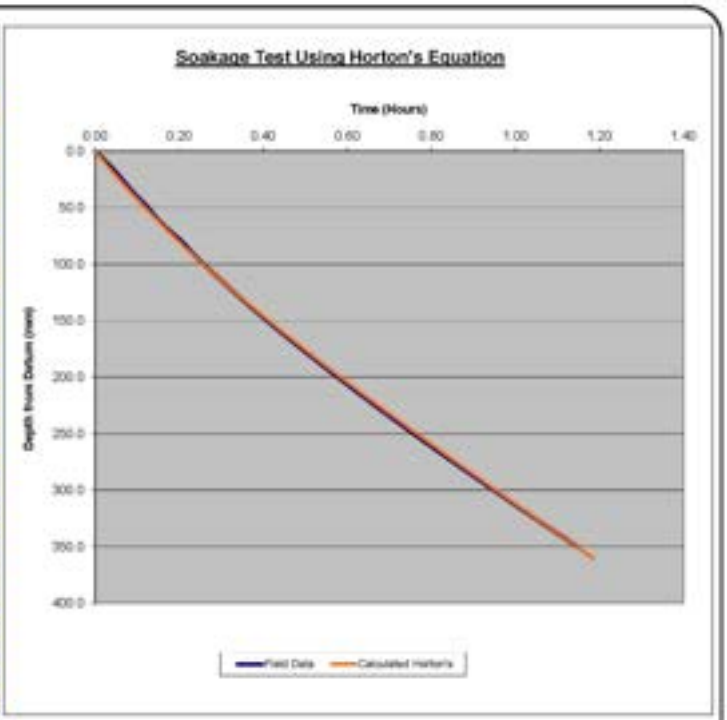

Initial Infiltration Rate:	455	mm per hour
Ultimate Infiltration Rate:	254	mm per hour
Horton's Decay Coefficient:	3	per hour
Final infiltraion rate	258	mm per hour

TP06

Test date: 14/03/2023

Infiltration test pit size: 3.60m(L) x 1.20m(W) x 3.30m(D)

Max. water level for testing: 2.3m

Test period: 1.1 hour

Total water drop during the test period: 100mm

Groundwater: observed

Groundwater depth in the pit: 100mm

Photo – Test Pit 06

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	14 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		TP06	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	30.08	50.0
2	35.30	55.0
3	38.85	60.0
4	45.28	70.0
5	47.58	75.0
6	50.82	80.0
7	53.85	85.0
8	58.28	90.0
9	62.63	95.0
10	67.30	100.0
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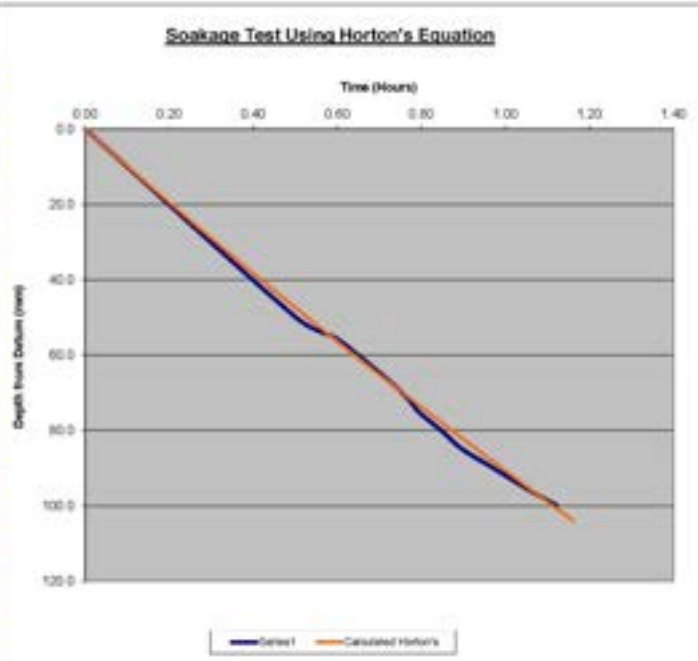

Initial Infiltration Rate:	100	mm per hour
Ultimate Infiltration Rate:	58	mm per hour
Horton's Decay Coefficient:	1	per hour
Final infiltraion rate	82	mm per hour

TP09

Test date: 14/03/2023

Infiltration test pit size: 1.50m(L) x 1.30m(W) x 2.60m(D)

Max. water level for testing: 2.505m

Test period: 1.0 hour

Total water drop during the test period: 150mm

Groundwater: no

Photo – Test Pit 09

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	14 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		TP09	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	20.15	80.0
2	39.98	91.0
3	49.58	95.0
4	60.77	150.0
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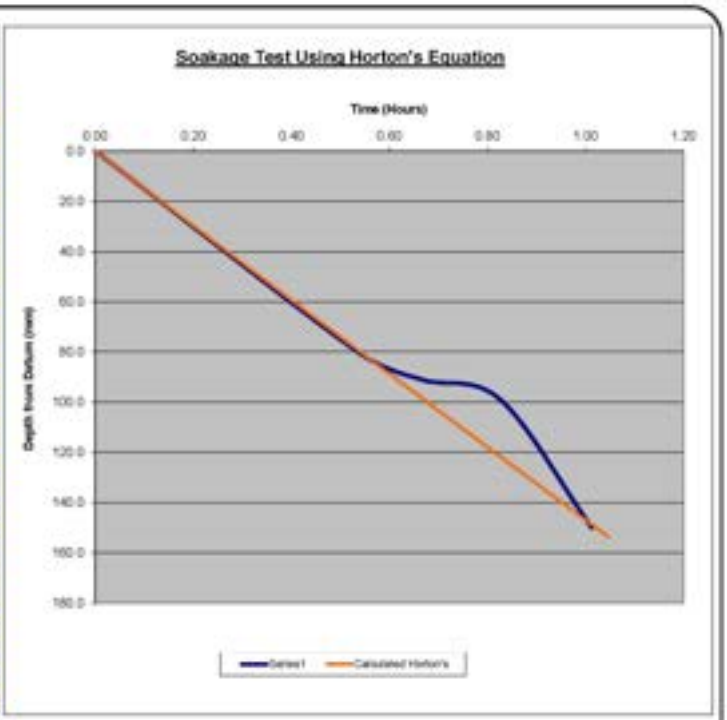

Initial Infiltration Rate:	149	mm per hour
Ultimate Infiltration Rate:	50	mm per hour
Horton's Decay Coefficient:	0.05	per hour
Final infiltraion rate	144	mm per hour

TP12

Test date: 14/03/2023

Infiltration test pit size: 1.60m(L) x 1.30m(W) x 1.92m(D)

Max. water level for testing: 1.7m

Test period: 1.0 hour

Total water drop during the test period: 1200mm

Groundwater: no

Photo – Test Pit 12

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	14 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		TP12	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	4.36	100.0
2	9.33	200.0
3	14.25	300.0
4	19.17	400.0
5	24.10	500.0
6	29.17	600.0
7	34.12	700.0
8	39.17	800.0
9	44.47	900.0
10	50.05	1000.0
11	55.78	1100.0
12	61.85	1200.0
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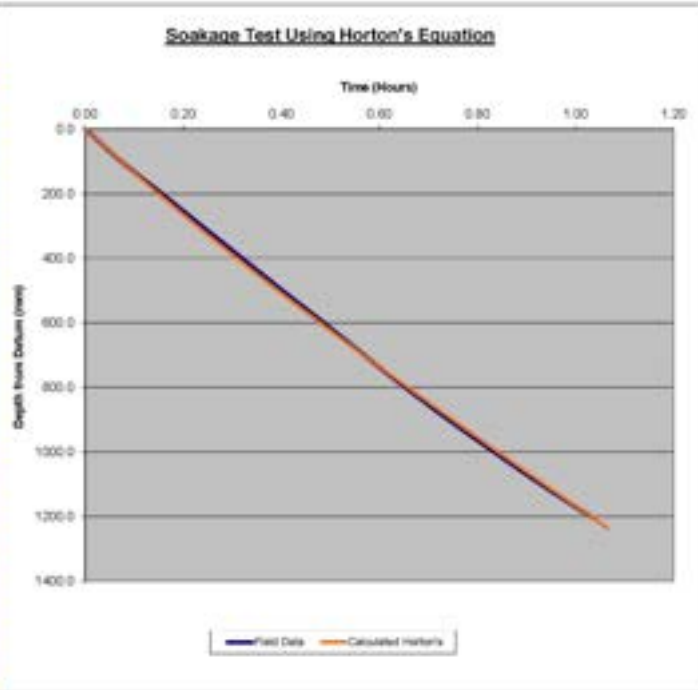

Initial Infiltration Rate:	1388	mm per hour
Ultimate Infiltration Rate:	989	mm per hour
Horton's Decay Coefficient:	2	per hour
Final infiltraion rate	1057	mm per hour

STP1

Test date: 24/03/2023

Infiltration test pit size: 2.00m(L) x 1.30m(W) x 4.20m(D)

Max. water level for testing: 1.9m

Test period: 1.0 hour

Total water drop during the test period: 370mm

Groundwater: observed

Groundwater depth in the pit: TBC

Photo – Soakage Test Pit 1

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP1	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	100.0
2	10.00	160.0
3	15.00	210.0
4	20.00	250.0
5	25.00	280.0
6	30.00	310.0
7	35.00	330.0
8	40.00	350.0
9	50.00	360.0
10	60.00	370.0
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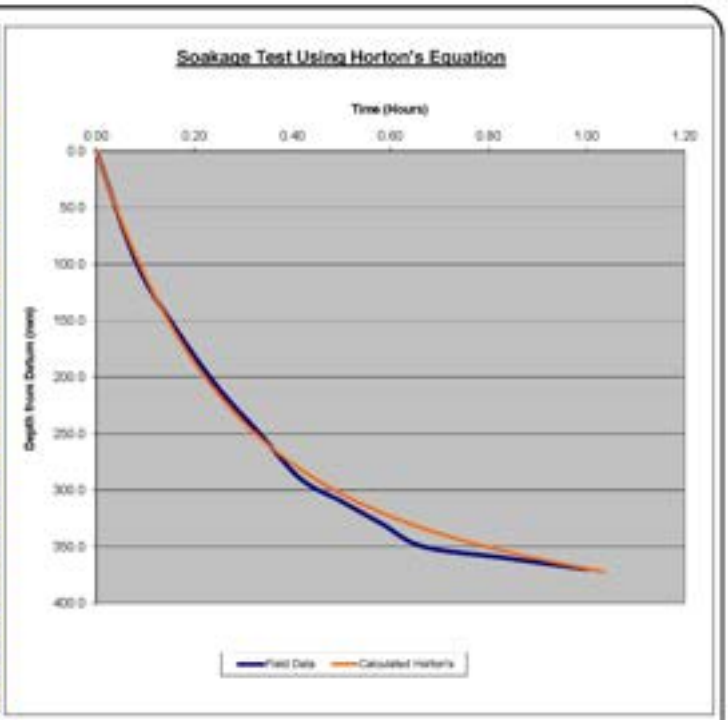

Initial Infiltration Rate:	1336	mm per hour
Ultimate Infiltration Rate:	60	mm per hour
Horton's Decay Coefficient:	4	per hour
Final infiltraion rate	82	mm per hour

STP2

Test date: 24/03/2023

Infiltration test pit size: 2.00m(L) x 1.20m(W) x 3.40m(D)

Max. water level for testing: 2.7m

Test period: 1.0 hour

Total water drop during the test period: 630mm

Groundwater: observed

Groundwater depth in the pit: 1600mm

Photo – Soakage Test Pit 2

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP2	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	70.0
2	10.00	140.0
3	15.00	200.0
4	20.00	250.0
5	25.00	310.0
6	30.00	360.0
7	35.00	420.0
8	40.00	465.0
9	45.00	500.0
10	50.00	550.0
11	55.00	590.0
12	60.00	630.0
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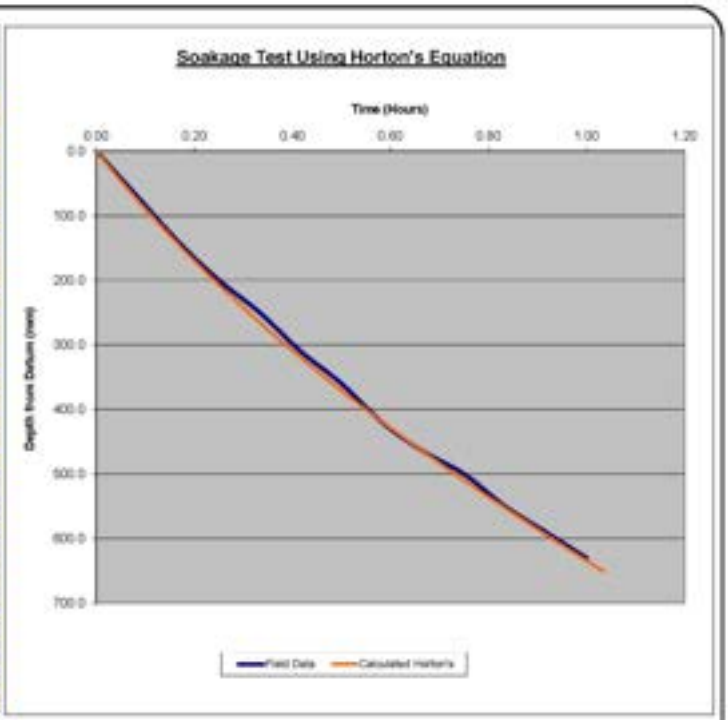

Initial Infiltration Rate:	950	mm per hour
Ultimate Infiltration Rate:	420	mm per hour
Horton's Decay Coefficient:	2	per hour
Final infiltraion rate	479	mm per hour

STP3

Test date: 24/03/2023

Infiltration test pit size: 2.00m(L) x 1.10m(W) x 2.80m(D)

Max. water level for testing: 1.08m

Test period: 1.0 hour

Total water drop during the test period: 1080mm

Groundwater: observed

Groundwater depth in the pit: TBC

Photo – Soakage Test Pit 3

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP3	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	200.0
2	10.00	340.0
3	15.00	480.0
4	20.00	590.0
5	25.00	700.0
6	30.00	790.0
7	35.00	880.0
8	40.00	950.0
9	45.00	970.0
10	50.00	1020.0
11	55.00	1050.0
12	60.00	1080.0
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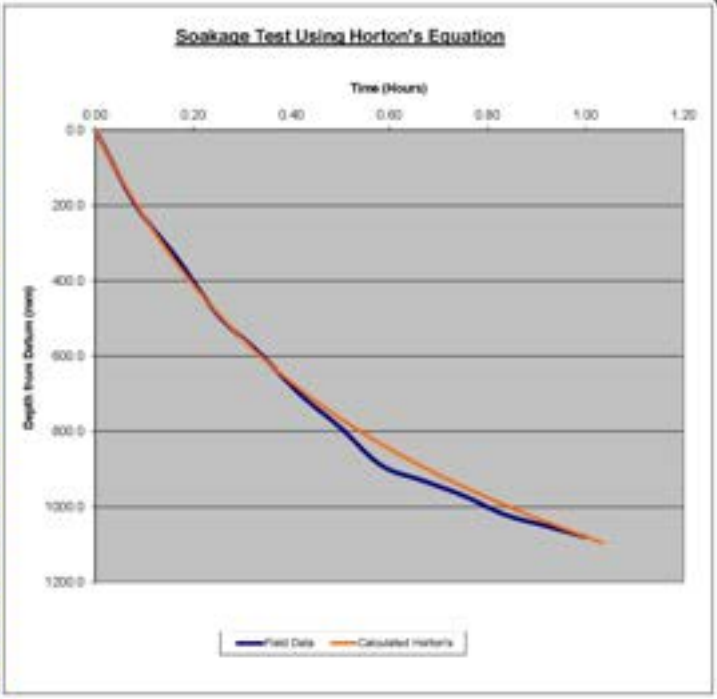

Initial Infiltration Rate:	2600	mm per hour
Ultimate Infiltration Rate:	360	mm per hour
Horton's Decay Coefficient:	3	per hour
Final infiltraion rate	477	mm per hour

STP4

Test date: 24/03/2023

Infiltration test pit size: 2.00m(L) x 1.20m(W) x 1.80m(D)

Max. water level for testing: 1.41m

Test period: 1.0 hour

Total water drop during the test period: 1310mm

Groundwater: no

Photo – Soakage Test Pit 4

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:			Matt Bennett
Weather/ground conditions:			Sunny
Test/photographs taken:			STP4
Health and safety:			✓

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	130.0
2	10.00	270.0
3	15.00	450.0
4	20.00	570.0
5	25.00	720.0
6	30.00	870.0
7	35.00	980.0
8	40.00	1100.0
9	45.00	1210.0
10	50.00	1310.0
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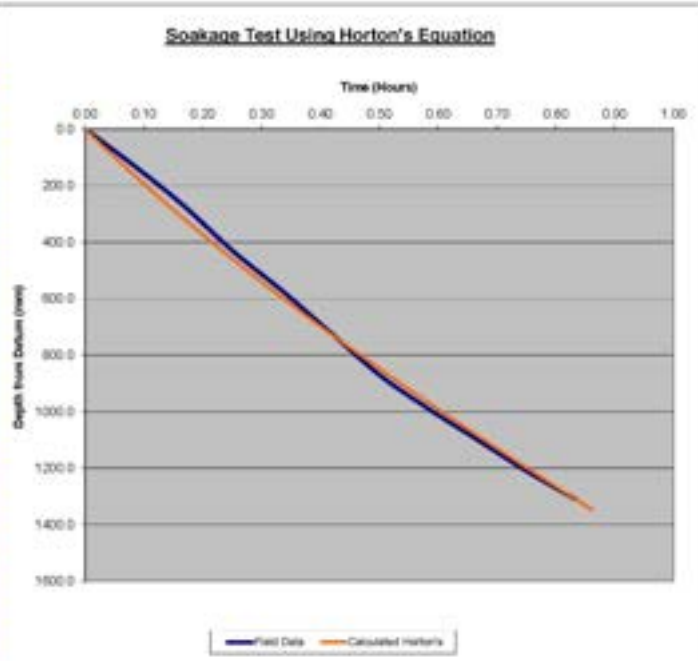

Initial Infiltration Rate:	2035	mm per hour
Ultimate Infiltration Rate:	1200	mm per hour
Horton's Decay Coefficient:	2	per hour
Final infiltraion rate	1323	mm per hour

STP5

Test date: 24/03/2023

Infiltration test pit size: 2.50m(L) x 1.10m(W) x 2.70m(D)

Max. water level for testing: 1.62m

Test period: 55 min.

Total water drop during the test period: 1170mm

Groundwater: no

Photo – Soakage Test Pit 5

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP5	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	240.0
2	10.00	440.0
3	15.00	620.0
4	20.00	720.0
5	25.00	840.0
6	30.00	920.0
7	35.00	1000.0
8	40.00	1040.0
9	45.00	1110.0
10	50.00	1140.0
11	55.00	1170.0
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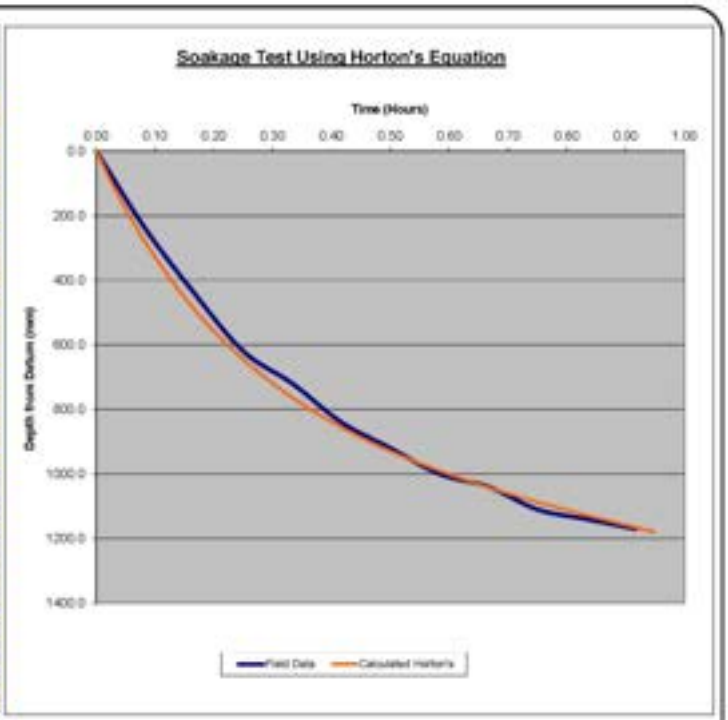

Initial Infiltration Rate:	3946	mm per hour
Ultimate Infiltration Rate:	360	mm per hour
Horton's Decay Coefficient:	4	per hour
Final infiltraion rate	436	mm per hour

STP6

Test date: 27/03/2023

Infiltration test pit size: 2.10m(L) x 1.50m(W) x 2.45m(D)

1st Test

Max. water level for testing: 1.29m

Test period: 45 min.

Total water drop during the test period: 1290mm

2nd Test

Max. water level for testing: 1.25m

Test period: 50 min.

Total water drop during the test period: 600mm

Groundwater: no

Photo – Soakage Test Pit 6

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP6 1st Test	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	420.0
2	10.00	660.0
3	15.00	840.0
4	20.00	960.0
5	25.00	1080.0
6	30.00	1160.0
7	35.00	1230.0
8	40.00	1260.0
9	45.00	1280.0
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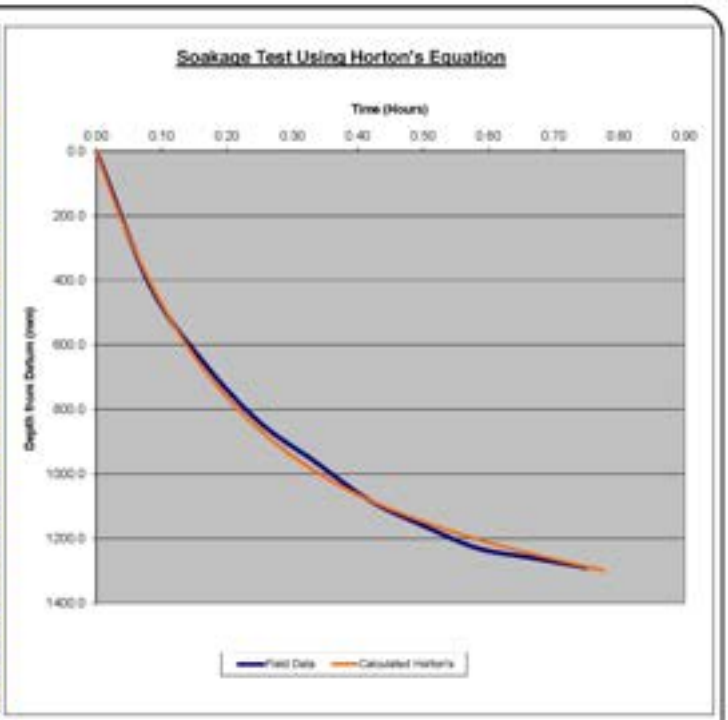

Initial Infiltration Rate:	6050	mm per hour
Ultimate Infiltration Rate:	360	mm per hour
Horton's Decay Coefficient:	6	per hour
Final infiltraion rate	452	mm per hour

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	24 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP8 2nd Test	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	350.0
2	10.00	530.0
3	15.00	580.0
4	20.00	610.0
5	25.00	630.0
6	30.00	640.0
7	40.00	650.0
8	50.00	660.0
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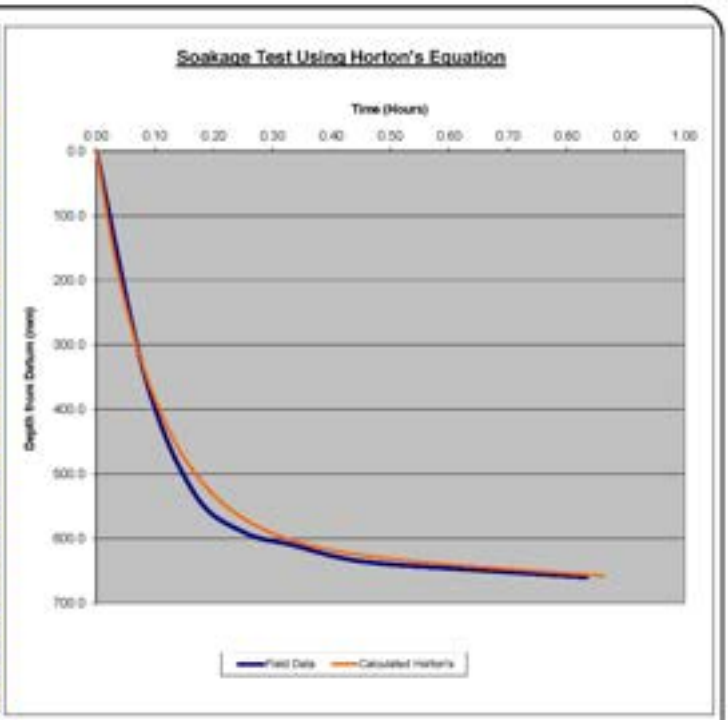

Initial Infiltration Rate:	6000	mm per hour
Ultimate Infiltration Rate:	60	mm per hour
Horton's Decay Coefficient:	10	per hour
Final infiltraion rate	62	mm per hour

STP7

Test date: 27/03/2023

Infiltration test pit size: 2.00m(L) x 1.20m(W) x 3.30m(D)

Max. water level for testing: 2.75m

Test period: 1.0 hour

Total water drop during the test period: 480mm

Groundwater: observed

Groundwater depth in the pit: 650mm

Photo – Soakage Test Pit 7

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DAVIS OGILVIE
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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	27 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP7	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	40.0
2	10.00	80.0
3	15.00	120.0
4	20.00	170.0
5	25.00	210.0
6	30.00	250.0
7	35.00	290.0
8	40.00	330.0
9	45.00	370.0
10	50.00	400.0
11	55.00	440.0
12	60.00	480.0
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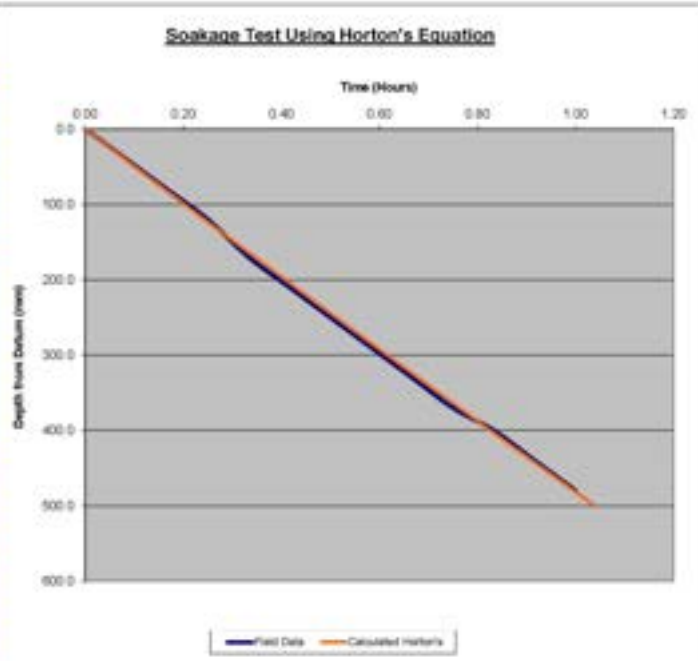

Initial Infiltration Rate:	497	mm per hour
Ultimate Infiltration Rate:	360	mm per hour
Horton's Decay Coefficient:	0.25	per hour
Final infiltraion rate	467	mm per hour

STP8

Test date: 27/03/2023

Infiltration test pit size: 2.30m(L) x 1.20m(W) x 3.80m(D)

Max. water level for testing: 3.1m

Test period: 1.0 hour

Total water drop during the test period: 560mm

Groundwater: observed

Groundwater depth in the pit: 900mm

Photo – Soakage Test Pit 8

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	27 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP8	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	70.0
2	10.00	130.0
3	15.00	180.0
4	20.00	240.0
5	25.00	280.0
6	30.00	320.0
7	35.00	370.0
8	40.00	420.0
9	45.00	465.0
10	50.00	490.0
11	55.00	530.0
12	60.00	560.0
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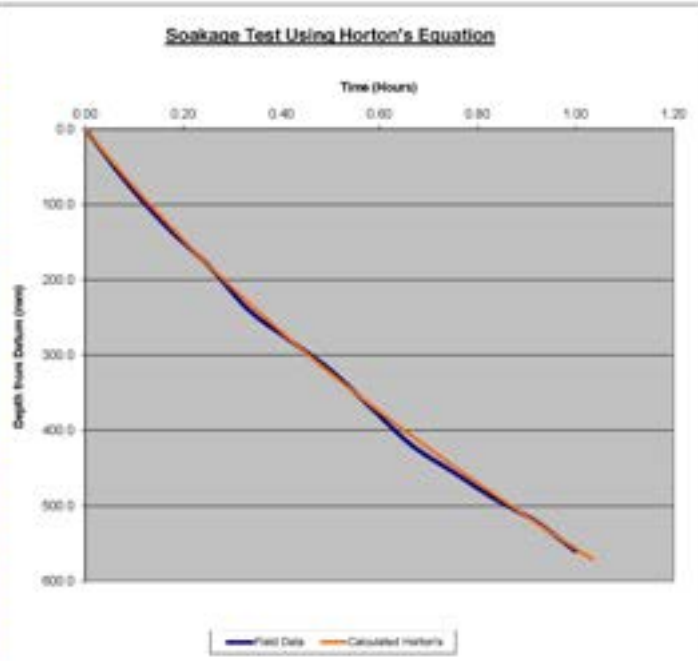

Initial Infiltration Rate:	815	mm per hour
Ultimate Infiltration Rate:	360	mm per hour
Horton's Decay Coefficient:	2	per hour
Final infiltraion rate	422	mm per hour

STP9

Test date: 27/03/2023

Infiltration test pit size: 2.10m(L) x 1.20m(W) x 3.50m(D)

Max. water level for testing: 3.05m

Test period: 1.0 hour

Total water drop during the test period: 1010mm

Groundwater: observed

Groundwater depth in the pit: 740mm

Photo – Soakage Test Pit 9

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INFILTRATION TEST RESULTS

Issued to:	File		
Date:	27 March 2023	Job name:	Farm Road Subdivision
Time:		Job no:	30625
People/equipment/materials on site:		Matt Bennett	
Weather/ground conditions:		Sunny	
Test/photographs taken:		STP9	
Health and safety:		✓	

Timestep	Time (mins)	Depth from Datum (mm)
0	0.00	0.0
1	5.00	130.0
2	15.00	300.0
3	20.00	400.0
4	25.00	471.0
5	30.00	580.0
6	40.00	730.0
7	45.00	801.0
8	50.00	870.0
9	55.00	940.0
10	60.00	1010.0
11	140.00	1620.0
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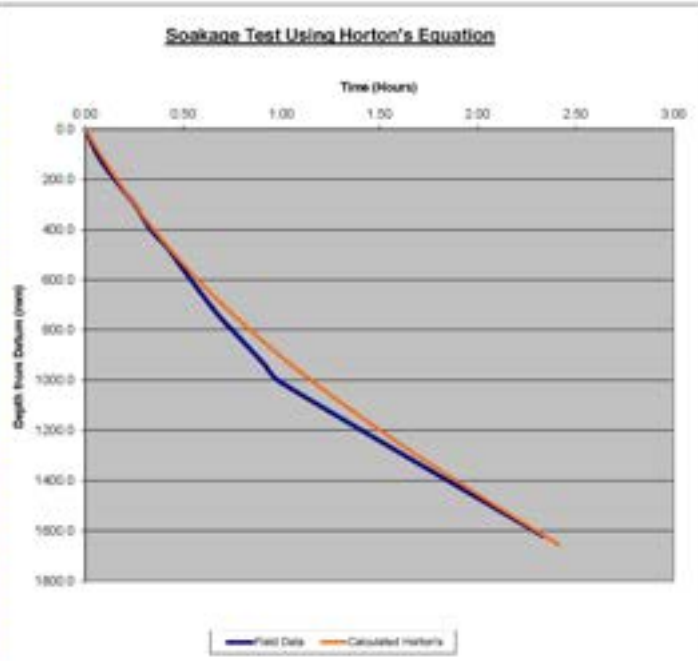

Initial Infiltration Rate:	1357	mm per hour
Ultimate Infiltration Rate:	458	mm per hour
Horton's Decay Coefficient:	2	per hour
Final infiltraion rate	479	mm per hour

APPENDIX F – SOAKAGE BASIN CALCULATIONS

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Western Pond

C (post development)	0.664	
e	0.38	
Sealed	23881	m^2
Roof	15046	m^2
Grass	25274	m^2
Infiltration Rate (Soakpit)	140	mm/h
First Flush Volume	597	m^3

												Soakpit					
Duration (min)	Intensity (mm/hr) 2% AEP	Catchment Area (ha)	C (pre-development)	Pre-development Q (l/s)	C (post development)	Post development Q (l/s)	Total volume (Post - Pre) during the event (m^3)	Allotment Tanks Total Storage (m^3)	First Flush Volume (m^3)	Time to fill up First Flush (min)	Extra Pond Storage m^3	Total Pond Storage m^3	Area (soakpit) m^2	Volume soaked away (m^3)	Volume needed for storage (m^3)	Volume needed/e (m^3)	Depth (m)
10	110.00	6.420	0.300	588.509	0.664	1302.17	428.20	330	597	8	380	977	750	4.13	-882.96	-2323.57	-3.10
20	69.20	6.420	0.300	370.226	0.664	819.18	538.75	330	597	12	380	977	750	13.74	-782.02	-2057.94	-2.74
30	53.80	6.420	0.300	287.834	0.664	636.88	628.28	330	597	16	380	977	750	25.16	-703.90	-1852.37	-2.47
60	36.20	6.420	0.300	193.673	0.664	428.53	845.49	330	597	23	380	977	750	64.37	-525.90	-1383.94	-1.85
120	24.70	6.420	0.300	132.147	0.664	292.40	1153.80	330	597	34	380	977	750	150.45	-303.68	-799.15	-1.07
360	13.60	6.420	0.300	72.761	0.664	161.00	1905.87	330	597	62	380	977	750	521.84	77.00	202.63	0.27
720	9.19	6.420	0.300	49.167	0.664	108.79	2575.72	330	597	91	380	977	750	1099.94	168.76	444.10	0.59
1440	6.08	6.420	0.300	32.529	0.664	71.97	3408.14	330	597	138	380	977	750	2278.06	-176.95	-465.66	-0.62
2880	3.93	6.420	0.300	21.026	0.664	46.52	4405.91	330	597	214	380	977	750	4665.71	-1566.82	-4123.21	-5.50

Eastern Pond

C (post development)	0.662	
e	0.38	
Sealed	34076	m^2
Roof	21726	m^2
Grass	36752	m^2
Infiltration Rate (Soakpit)	300	mm/h
First Flush Volume	852	m^3

												Soakpit					
Duration (min)	Intensity (mm/hr) 2% AEP	Catchment Area (ha)	C (pre-development)	Pre-development Q (l/s)	C (post development)	Post development Q (l/s)	Total volume (Post - Pre) during the event (m^3)	Allotment Tanks Total Storage (m^3)	First Flush Volume (m^3)	Time to fill up First Flush (min)	Extra Pond Storage m^3	Total Pond Storage m^3	Area (soakpit) m^2	Volume soaked away (m^3)	Volume needed for storage (m^3)	Volume needed/e (m^3)	Depth (m)
10	110.00	9.255	0.300	848.412	0.662	1871.45	613.82	505	852	8	660	1512	500	6.03	-1409.11	-3708.19	-7.42
20	69.20	9.255	0.300	533.728	0.662	1177.31	772.30	505	852	12	660	1512	500	19.85	-1264.45	-3327.50	-6.66
30	53.80	9.255	0.300	414.950	0.662	915.31	900.64	505	852	16	660	1512	500	36.22	-1152.48	-3032.83	-6.07
60	36.20	9.255	0.300	279.205	0.662	615.88	1212.02	505	852	23	660	1512	500	92.37	-897.25	-2361.17	-4.72
120	24.70	9.255	0.300	190.507	0.662	420.23	1653.97	505	852	34	660	1512	500	215.53	-578.46	-1522.26	-3.04
360	13.60	9.255	0.300	104.895	0.662	231.38	2732.07	505	852	61	660	1512	500	746.59	-31.42	-82.70	-0.17
720	9.19	9.255	0.300	70.881	0.662	156.35	3692.31	505	852	91	660	1512	500	1572.97	102.43	269.56	0.54
1440	6.08	9.255	0.300	46.894	0.662	103.44	4885.58	505	852	137	660	1512	500	3256.85	-388.17	-1021.50	-2.04
2880	3.93	9.255	0.300	30.311	0.662	66.86	6315.89	505	852	212	660	1512	500	6669.12	-2370.12	-6237.16	-12.47

2% AEP, RCP8.5 for the period 2081-2100

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DAVIS OGILVIE
ENGINEERS / SURVEYORS / PLANNERS

Western Pond

C (post development)	0.664	
e	0.38	
Sealed	23881	m^2
Roof	15046	m^2
Grass	25274	m^2
Infiltration Rate (Soakpit)	140	mm/h
First Flush Volume	597	m^3

	A	B	C	D	E	F	G	H	Criteria	
Duration (min)	Total volume (Post) during the event (m^3)	Total volume (Pre) during the event (m^3)	Total volume (Post - Pre) during the event (m^3)	Allotment Tanks Total Storage (m^3)	Total Pond Storage (m^3)	Volume soaked away during the event (m^3)	Soakage volume storage, depth = 0.6m (m^3)	Total Attenuation (m^3) (D+E+F+G)	H > C	
10	781	353	428	330	977	4	171	1482	Achieved	
20	983	444	539	330	977	14	171	1492	Achieved	
30	1146	518	628	330	977	25	171	1503	Achieved	
60	1543	697	845	330	977	64	171	1542	Achieved	
120	2105	951	1154	330	977	150	171	1628	Achieved	When H<A, the weir starts to function
360	3478	1572	1906	330	977	522	171	2000	Achieved	
720	4700	2124	2576	330	977	1100	171	2578	Achieved	When H is cloest to C, that's criticle event
1440	6219	2810	3408	330	977	2278	171	3756	Achieved	
2880	8039	3633	4406	330	977	4666	171	6144	Achieved	

Eastern Pond

C (post development)	0.662	
e	0.38	
Sealed	34076	m^2
Roof	21726	m^2
Grass	36752	m^2
Infiltration Rate (Soakpit)	300	mm/h
First Flush Volume	852	m^3

	A	B	C	D	E	F	G	H	Criteria	
Duration (min)	Total volume (Post) during the event (m^3)	Total volume (Pre) during the event (m^3)	Total volume (Post - Pre) during the event (m^3)	Allotment Tanks Total Storage (m^3)	Total Pond Storage (m^3)	Volume soaked away during the event (m^3)	Soakage volume storage, depth = 0.6m (m^3)	Total Attenuation (m^3)(D+E+F+G)	H > C	
10	1123	509	614	505	1512	6	114	2137	Achieved	
20	1413	640	772	505	1512	20	114	2151	Achieved	
30	1648	747	901	505	1512	36	114	2167	Achieved	
60	2217	1005	1212	505	1512	92	114	2223	Achieved	
120	3026	1372	1654	505	1512	216	114	2346	Achieved	When H<A, the weir starts to function
360	4998	2266	2732	505	1512	747	114	2877	Achieved	
720	6754	3062	3692	505	1512	1573	114	3704	Achieved	When H is cloest to C, that's criticle event
1440	8937	4052	4886	505	1512	3257	114	5388	Achieved	
2880	11554	5238	6316	505	1512	6669	114	8800	Achieved	