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Fraser Thomas
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

362 JONES ROAD,
HUNUA

PROPOSED MANAGED FILL – ENGINEERING REPORT

SCARBRO ENVIRONMENTAL LTD

362 JONES ROAD, HUNUA

PROPOSED MANAGED FILL ENGINEERING REPORT

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SCARBRO ENVIRONMENTAL LTD
362 JONES ROAD, HUNUA

PROPOSED MANAGED FILL – ENGINEERING REPORT

EXECUTIVE SUMMARY

In response to instructions from Scarbro Environmental Ltd (SEL), Fraser Thomas Limited (FTL) has prepared this Engineering Report and associated Assessment of Environmental Effects (AEE) to support a resource consent application for a Managed Fill facility at 362 Jones Rd, Hunua, occupying approximately 12ha of the 25.2ha site.

This Engineering Report and AEE has been prepared in accordance with the requirements of the Resource Management Act, the WasteMINZ Technical Guidelines for Disposal to Land (V3.1, September 2023) and the Auckland Unitary Plan: Operative in Part (AUP:OP).

It covers the following:

- Background information on the site and matters relevant to this application.
- Fill classification and waste acceptance criteria.
- Managed Fill Development.
- Erosion and Sediment Control Plan.
- Assessment of Environmental Effects.

Consents are sought for the following activities:

- Earthworks for filling.
- Operation of a Managed Fill.
- Decommissioning (abandoning) of an existing groundwater bore and construction of a new bore.

Other permitted activity works associated with the Fill development include a new groundwater take for vehicle wheel washing use and dust control and removal of an existing culvert and associated embankment forming a farm crossing.

Supporting technical reports prepared by Fraser Thomas Ltd comprise:

- Geotechnical Investigation Report;
- Preliminary Site Investigation (PSI) for Contamination;
- Fill Management Plan.

SEL are proposing to construct a Managed Fill comprising two separate areas of 9ha and 2ha (including associated drains and sediment ponds) on the northern and southern sides of the site respectively, with corresponding estimated fill volumes of 720,000m^3 and 70,000m^3, giving a combined fill volume of 790,000m^3. Filling will take place over a period of approximately 5-10 years and consent is sought for a total period of 10 years to provide some contingency should fill volumes be less than anticipated.

Erosion and sediment control will be provided by sediment ponds sized to cater for the entire Fill areas, with treated runoff discharged to the site watercourses.

The site will be fully owned by SEL and managed and operated by them.

The Managed Fill has been designed in accordance with best practice, while a Fill Management Plan has been prepared for use during Managed Fill operation. In respect to the matters addressed in this report, implementation of Managed Fill construction and operation in accordance with the design plans and Fill Management Plan, including waste acceptance, inspection, maintenance and site restoration requirements, should ensure that potential adverse environmental effects associated with the filling and associated activities are avoided or mitigated, so that these effects are less than minor.

SCARBRO ENVIRONMENTAL LTD
362 JONES ROAD, HUNUA

PROPOSED MANAGED FILL – ENGINEERING REPORT

1.0 INTRODUCTION

In response to instructions from Scarbro Environmental Ltd (SEL), Fraser Thomas Limited (FTL) has prepared this Engineering Report and associated Assessment of Environmental Effects (AEE) to support a resource consent application for a managed fill facility at 362 Jones Rd, Hunua, occupying approximately 12ha of the 25.2ha site.

This Engineering Report and AEE has been prepared in accordance with the requirements of the Resource Management Act, the WasteMINZ Technical Guidelines for Disposal to Land (V3.1, September 2023) and the Auckland Unitary Plan: Operative in Part (AUP:OP).

The proposed Fill Facility is referred to as a "Managed Fill' based on definitions set out in the AUP:OP while under the WasteMINZ Disposal to Land Guidelines, the proposed fill facility would be classified as a Cleanfill.

It covers the following:

- Background information on the site and matters relevant to this application.
- Fill classification and waste acceptance criteria.
- Managed Fill Development
- Erosion and Sediment Control Plan.
- Assessment of Environmental Effects.
- Fill Management Plan (separate report).

A number of specialist reports have been prepared by Fraser Thomas to support this application, including a Geotechnical Investigation Report and Preliminary Site Investigation (PSI) for contamination. These reports are provided under separate cover, with key points summarised in this report.

Table 1 gives an overview of consenting requirements in relation to this Engineering Report.

Table 1: Overview of Resource Consent Requirements

Activity	Overview	Regulations
Earthworks for filling	790,000m^3 of fill earthworks over 11ha area, including sediment pond and drains.	E11 Land Disturbance Regional: construction and filling of a managed fill: Earthworks over 2,500m^2 where the land has a slope equal to or greater than 10

Activity	Overview	Regulations
		degrees (A8) and earthworks located within a sediment control protection area (A9): **restricted discretionary activity;** Standard E11.4.1.
		E12 Land Disturbance District: construction and filling of a cleanfill - Activities A6 and A10: Earthworks over 2,500m^2 and 2,500m^3: **restricted discretionary activity;** Standard E12.4.1.
Filling	Establishment and operation of a cleanfill of 790,000m^3 capacity operating over an estimated 5-10 year period	H19: Rural zones: Managed Fill – Activity A66: Cleanfill in the Rural-Mixed Rural zone: **discretionary activity**; Standard H19.4.1
Discharge of contaminants		E13 Cleanfills, Managed Fills and Landfills: Activity A5: **restricted discretionary activity –** managed fills that do not comply with Standard E13.6.2.2
Abandoning existing bore	Decommissioning existing bore located in northern fill area	E7 Activity A40 - decommissioning (abandoning) existing bore – **permitted activity** under E7.6.1.20
Bore permit	New groundwater bore and/or pump, to replace existing bore	E7 Taking, using, damming and diversion of water and drilling: Activity A41 – new bores for purposes not otherwise specified – **controlled activity;** Standard E7.6.2.3, E7.7.1 (4) and E7.7.2 (4)
Groundwater take	Use of groundwater from existing bore on site for wheel washing and dust control (estimated max 20m^3/d and 4125m^3/year	E7 Taking, using, damming and diversion of water and drilling: Activity A15 – groundwater take not exceeding 20m^3/d and 5,000m^3 per year: **permitted activity**
Stormwater diversion and discharge	Diversion and discharge of stormwater from impervious areas of the site, excluding unsealed or gravelled tracks	E8: Activity A7 - Diversion and discharge of stormwater runoff from impervious areas up to 5,000m^2 outside an urban area that complies with Standard E8.6.1 and Standard E8.6.2.4: **permitted activity**
OLFP piping	Upper section of OLFP3 will be piped under new haul road using a new culvert	E36: Activity A41 "Diverting the entry or exit point, piping or reducing the capacity of any part of an OLFP: **Restricted discretionary** activity.
Existing culvert removal and new	Removal of the existing culvert of length <10m,	E3: Lakes, rivers, streams and wetlands:

Activity	Overview	Regulations
bridge over stream near site entrance	with associated erosion/ scour management works of max 5m length	Activity A24: Demolition or removal of existing structures complying with E3.6.1.13 standards - **permitted activity;** Activity A29: Bridges or pipe bridges complying with E3.6.1.16 standards **– permitted activity** National Environmental Standard – Freshwater (NES-FW) – not applicable
Soil disturbance and change in land use (NESCS)	Soil disturbance associated with construction of managed fill facility.	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) – not applicable – refer separate PSI report

Note: Traffic, noise and visual effects are covered by others in separate technical reports.

2.0 BACKGROUND INFORMATION

2.1 SITE LOCATION AND IDENTIFICATION

Site location and ownership details are summarised below.

Table 2: Site Location and Ownership Details

Registered Owners	Lynley Ruth Monk, Lance Richard Patrick, Trevor Bryce Patrick, Wayne John Patrick
Street Address	362 Jones Rd, Hunua
Legal Description	Part Allotment 10 and Allotment 264 Parish of Hunua
Title	NA67C/593, NA67C/594
Total Area (ha)	252,000m^2
Zoning	Rural – Rural Production zone

The site is subject to a sale and purchase agreement to SEL, conditional on obtaining resource consents for the Managed Fill operation.

A map showing the location of the site is set out in Figure 1.

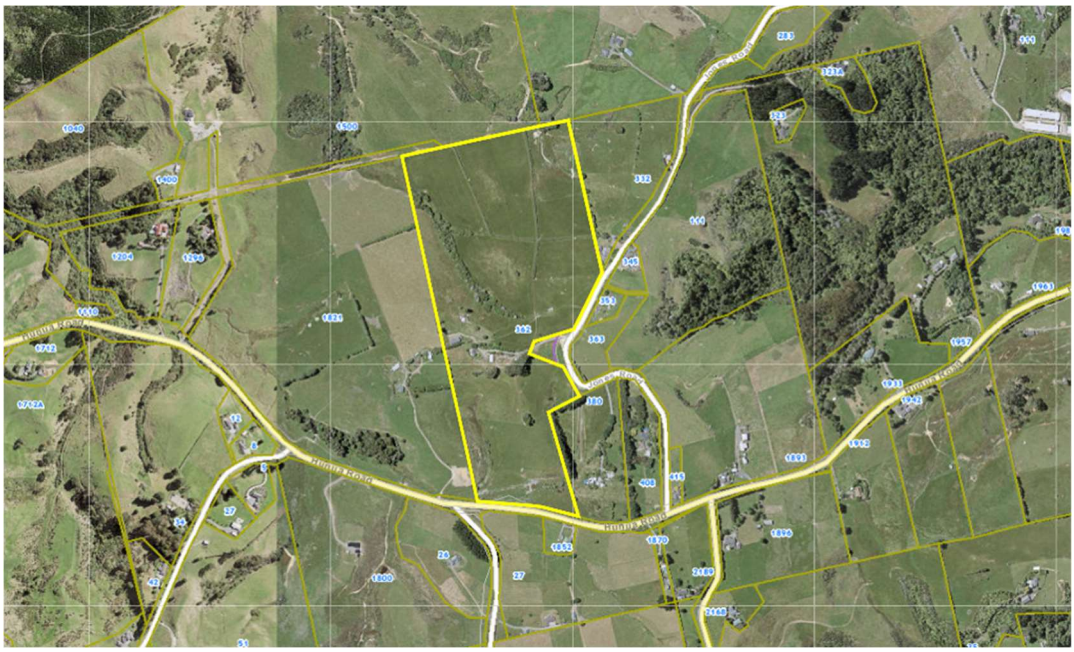


Figure 1: Site Location Plan

2.2 EXISTING LAND USE AND ACCESS

The site comprises one residential dwelling, multiple garages and utility sheds. It has been used for at least the last 80 years as a dry stock farm. The house has a roof rainwater harvesting water supply and its own on-site wastewater septic tank treatment and disposal system.

A groundwater bore is located on the northern half of the site in a paddock. This bore only supplies water for animal drinking to the troughs on the farm. It used to be connected to the dwelling, but the water was discoloured and stained sinks, so was disconnected.

The site is bounded by Jones Rd to the east and Hunua Rd to the south. The existing site access is off Jones Rd.

2.3 TOPOGRAPHY

The site has a moderate sloping landscape, including multiple gullies. The northern area is a gently rolling hill grading down to a stream running along the western boundary of the site, and to the north of the site. The highest point of the area is along the eastern boundary. The southern area is a steeper hill area, which grades from a ridge down to a separate stream along the western boundary of the site.

2.4 SOILS

The Manaaki Whenua - Landcare Research soils map shows the site to have Albic Ultic (UE) soils.

2.5 GEOLOGY

The Institute of Geological and Nuclear Sciences geological web map (NZ 1:250,000) indicates that the site is underlain by sandstone and siltstone rocks of the Waipapa group, consisting of a massive to thin bedded, lithic volcaniclastic metasandstone and argillite, with tectonically enclosed spilite, chert and red and green argillite.

Fraser Thomas Ltd have undertaken a geotechnical investigation of the subject site involving 23 hand augered boreholes (H1 – H23) across proposed filling areas and associated access roading.

Topsoils were generally encountered between 0.2 – 0.4m depth below ground level (BGL). Topsoil was not encountered in Boreholes H10, H12, H14 and H19.

Fill was encountered beneath the surficial topsoil material in Boreholes H15, H18, H21, H22 and H23 to a depth of approximately 1.5m, 1.0m, 1.5m and 0.6m BGL respectively, and to the extent of Borehole H21. The fill material generally comprised of gravelly silts and clayey silts. Borehole locations H15 & H21 – H23 are located in the southernmost section of the site, and location H18 is located by the southern culvert. Due to the proximity of these locations to Hunua Road, it is suggested that the fill may have been reworked during construction of the cut section of road.

2.6 STORMWATER DRAINAGE AND RECEIVING ENVIRONMENT

The site is located at the top of the Slippery Creek catchment and is split into three sub-catchments drained by three stream tributaries that flow to the west or north-west. The two northern flowpaths flow into a large reservoir, the discharge of which combines with the southern flowpath and then flows to the west through the Hunua Gorge to the Manukau Harbour (receiving environment) near Drury township.

The northern sub-catchments collect some runoff from areas upgradient of the site. The western overland flowpath (OLFP) is a permanent watercourse, serving a catchment area of 58.9ha, and combines with the eastern OLFP (permanent watercourse) to form a combined OLFP (permanent watercourse) with a total catchment area of 412ha outside the site's northern boundary. For the western OLFP, this includes some runoff from a small culvert under Jones Rd, that has caused some localised scour/erosion at the discharge point into the site.

Figure 2: Site Drainage (Blue lines = streams from Geomaps)

The drainage for the southern area of the site is more complex. Geomaps shows two OLFPs within the site itself, comprising northern (5.2ha) and southern (14.1ha) OLFPs that exit the site in the south-western corner. The southern OLFP has significant runoff from the upgradient properties and Jones Road. A FTL engineer conducted a site investigation on Hunua Road to identify any drainage features that were not shown on Auckland Council Geomaps. Two stormwater pipes were identified upstream of the site which drained much of the OLFP passing along Hunua Road. The culverts were estimated to be 225mm and 375mm diameter as shown in Figure 3. These drain the stormwater south of Hunua Road to the north of Hunua Road, which will then pass through the stream at the south end of the site. There is a 600mm diameter culvert and associated embankment across this stream, forming an internal farm crossing within the site.

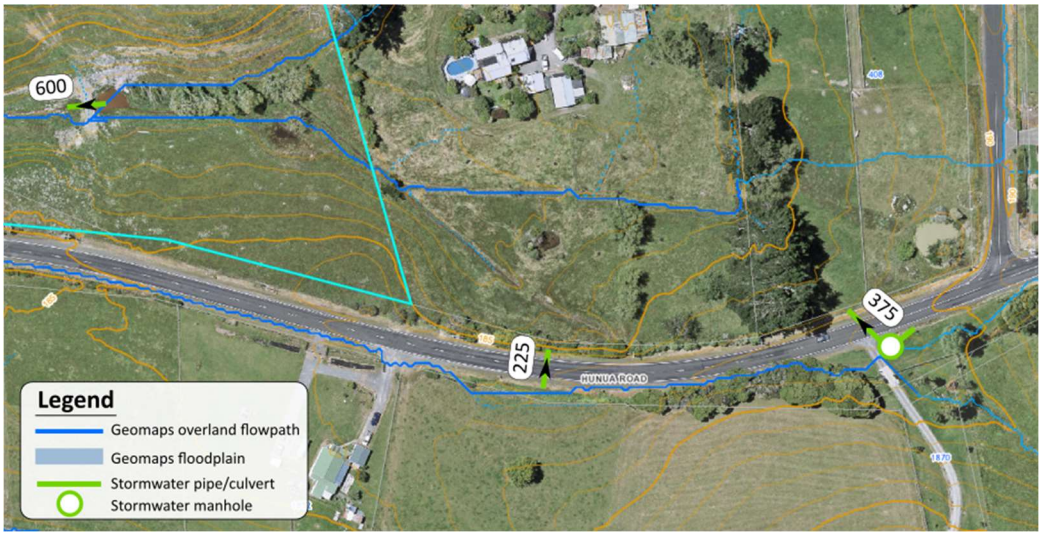


Figure 3: Southern Area Drainage (Blue lines = OLFPs from Geomaps)

There are localised floodplains associated with the streams which are generally restricted to the immediate vicinity of the watercourses and ponding areas. These OLFPs and floodplains are shown in Figure 4.

The Boffa Miskell ecological assessment identified five wetlands within the site at the locations shown in Figure 5. These are briefly described below with further information provided in the Boffa Miskell report:

- Wetland A (963m^2) is a low-lying, concave area located within the headwaters of an intermittent stream draining to the south of the property.
- Wetland B (1,458m^2) is located within the low-lying riparian zone of a permanent stream. The culvert for the farm crossing here has likely restricted flows resulting in ponding and expansion of the wetland feature upstream.
- Wetland C (699m^2) is located within a flat headwater basin which drains into a gully system before channelling into a defined stream channel.
- Wetland D is a small feature (158m^2) located within an OLFP of the western stream in the northern part of the site.
- Wetland E is a large feature (2,171m^2) located in the low-lying basin in the far north-eastern section of the proposed footprint. The wetland feature consisted of two tributaries with a pond located at the confluence.

2.7 GROUNDWATER

2.7.1 Underlying Aquifers

The site is not located in a High Use Aquifer Management Area according to the AUP:OP maps.

The site is located within the north-eastern corner of the former Franklin district. The GNS 2019/81 (September 2019) “Groundwater in the Franklin area” report is the most recent report that FTL have been able to find on groundwater resources in the former Franklin district. However, it is not clear from this report what aquifers lie under the subject site, nor the availability or depth of the groundwater resource in this area.

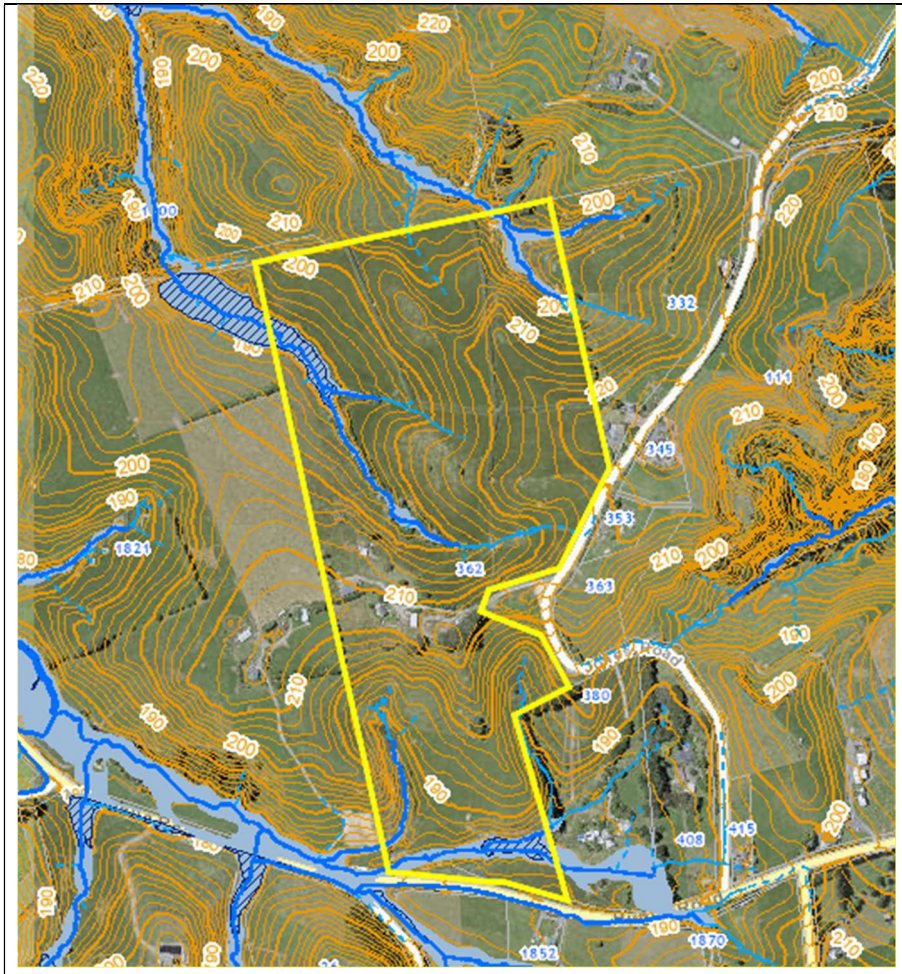


Figure 4: Site with Geomaps OLFP (blue lines), flood prone area (hatched blue areas) and floodplain (shaded blue areas) information

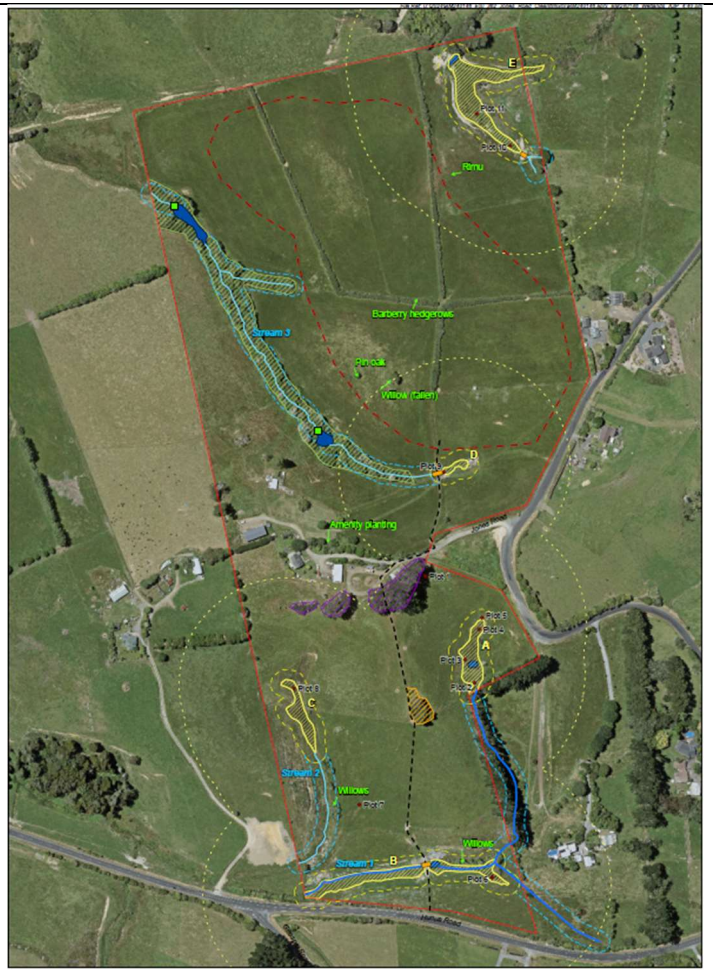


Figure 5: Wetlands (yellow shaded areas) identified within site from Boffa Miskell Ecological Investigation

2.7.2 Nearby Bores

Auckland Council Regulatory Support undertook a bore search within 2km radius of the site at our request. The results of this search are in Appendix C.

This section summarises the results for bore within a shorter 1km radius of the site boundary. There are an estimated 17 groundwater bores within a 1km radius of the site boundary. These bores are shown in Table 3, with further information provided in Appendix C. One bore is listed as having been backfilled and two were installed for geotechnical investigation and monitoring purposes, meaning a maximum of 13 may still be operational. However, the actual number of operational bores is not known. The limited bore drilling information indicates that groundwater in these bores was at around 55-60m or deeper (except for the 1940s bore which refers to a bore depth of 40m).

In response to a query on groundwater information in the area, Nicola Jones, Specialist, Coastal and Water Allocation Team, Auckland Council also sent through a bore log for Permit 98 (refer Appendix C) for Mr Lees of Hunua Rd, which appears to match Bore ID 164 below. This refers to this bore being drilled in 1988 to 123m into hard greywacke rock, (fractured bottom 10m) with 100dia casing grouted to 63m and with a static water level of 37m and a deepwell pump rate of 1.5m^3/hr, supporting taking water from a depth of over 60m.

Nicola Jones further advised "*Unfortunately there are not many groundwater bores in this area and many of them are drilled pre 1987 (such as the stock bore on this site) which is when the consenting process started and we have little information on them.*"

Table 3: Bores within 1km of 362 Jones Road Site Boundary

Consent No	Bore ID	Address	Purpose
LUC 60414022	-	306 Jones Rd	Construction of bore to 52m depth for use on the property
-	27892	210 Jones Rd	For stock use
LUC 60271978-A	-	255 Jones Rd	Change of reference in Conservation Covenant 8058657.11 from Area Marked Y to being Area marked V on DP 575066. Withdrawn.
-	4459	1933 Hunua Rd	Not stated, drilled pre-1987
-	27891	1893 Hunua Rd	Construction of bore for stock purpose
-	21486	2134 Ponga Rd	Not stated (Hunua Greywacke aquifer)
-	4453	5 Batkin Rd	Construction of bore pre-1987 to 55m depth for unknown purpose (Hunua Waitemata aquifer)
-	4452	8 Batkin Rd	Construction of bore pre-1987 to 55m depth for unknown purpose

11026	854	63 Gillespie Rd	Construction of 100dia bore to ~150m depth for stock purposes, with steel casing to ~66m (Franklin Waitemata aquifer)
11017	845	63 Gillespie Rd	Backfilling of an abandoned bore to 78m depth.
-	4447	63 Gillespie Rd	Construction of bore pre-1987 to 67m depth for unknown purpose (Hunua Waitemata aquifer)
-	21476	34 Middleton Rd	Construction of bore around 1940s to 40m depth for unknown purpose (Hunua West greywacke aquifer)
-	21475	1041 Hunua Rd	Construction of bore to 96m depth for shed watering purposes (Hunua west greywacke aquifer)
52095	23292	1041 Hunua Rd	Construction of bore for geotechnical investigation and monitoring purposes
52093	23290	Hunua Road (adjacent 1041 Hunua Rd)	Construction of bore for geotechnical investigation and monitoring purposes
10336	164	1040 Hunua Rd	Construction of 100dia bore to ~80m depth with steel casing to ~60m for stock/domestic purposes
44186	29802	1500 Hunua Rd	Construction of bore for stock and domestic purposes

The locations of these bores are shown in Figure 6.

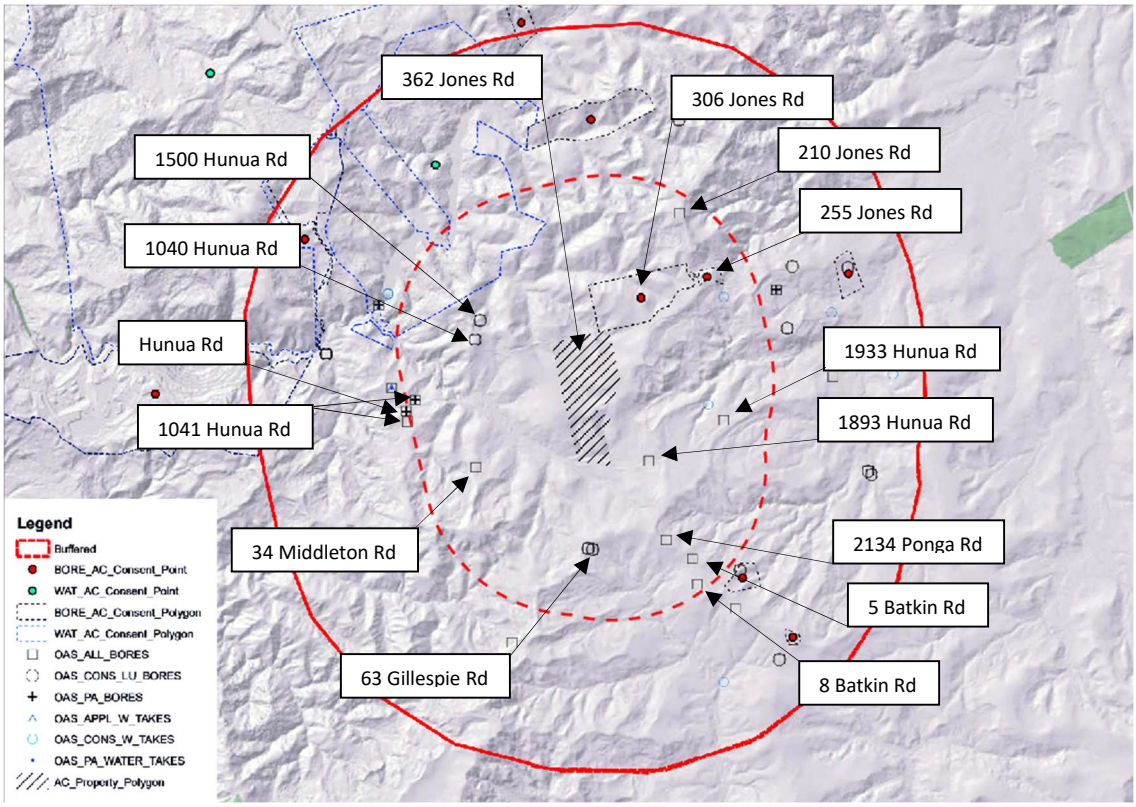


Figure 6: Existing Bores within 1km of 362 Jones Road Site Boundary

2.7.3 Water Takes

Auckland Council Regulatory Support also water take search results within a 2km range of the 362 Jones Road Site Boundary. The 1km range results are summarised below.

This search shows that there are two water takes within a 1km radius of the site boundary. These are shown in Table 4, with further information provided in Appendix G. Both of these are takes from rivers/lakes rather than groundwater.

Table 4: Water Takes within 1km of 362 Jones Road Site Boundary

Consent No	Address	Granted	Purpose
2971	111 Garvie Rd	Feb 1981	To take from a River/lake up to 25m^3/d for pastoral use
5573	1933 Hunua Rd	Jan 1988	To take from a River/lake up to 50m^3/d for pastoral use

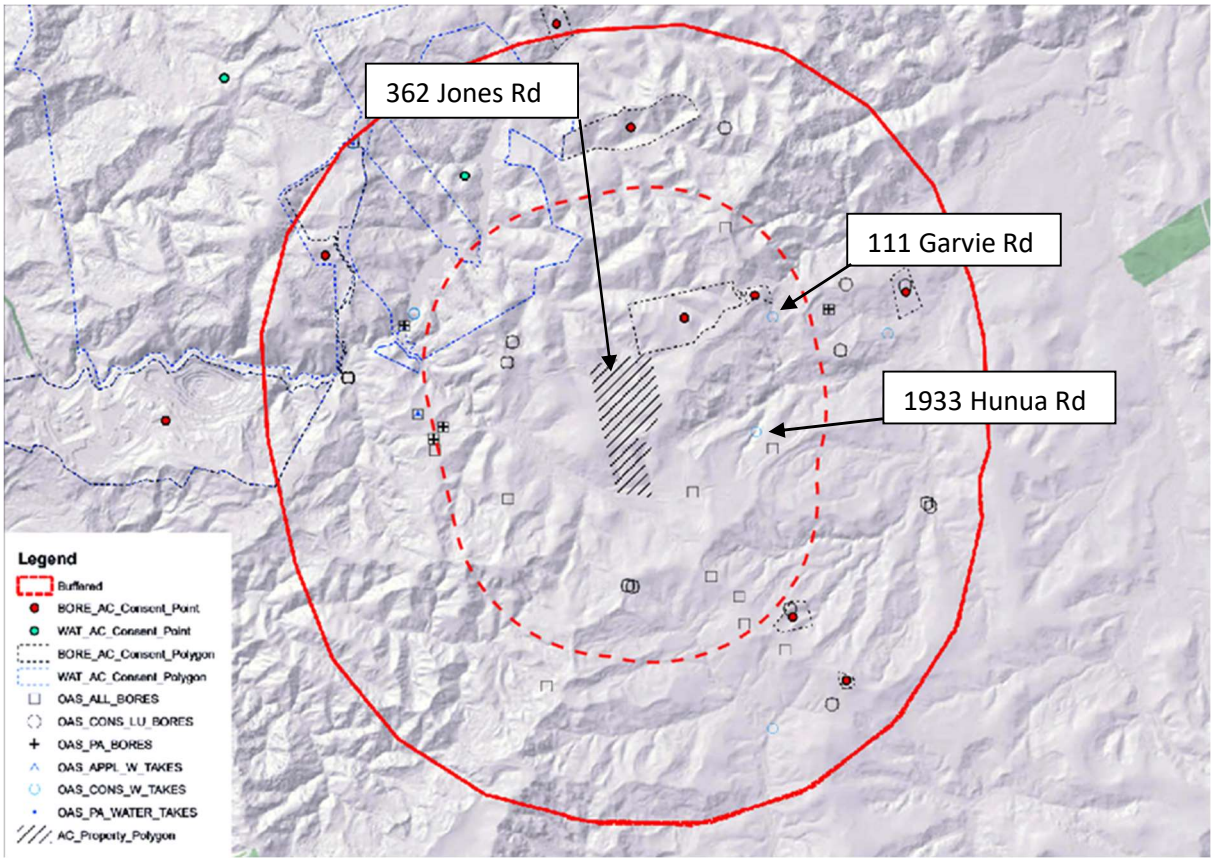


Figure 7: Existing Water Takes within 1km of 362 Jones Road Site Boundary

3.0 FILL CLASSIFICATION

It is proposed that the Fill facility will accept "cleanfill", based on background concentrations for heavy metals in volcanic soils in the Auckland region, as well as some common organic contaminants and "accidental" residual asbestos at low levels. This means it will be a Cleanfill under the WasteMINZ Disposal to Land Guidelines, but a Managed Fill under the AUP:OP guidelines. The rationale for this is discussed in this section.

3.1 WASTEMINZ TECHNICAL GUIDELINES FOR DISPOSAL TO LAND

The WasteMINZ Technical Guidelines for Disposal to Land were originally released in 2016 and updated in August 2018 and again in September 2023. They classify landfills in New Zealand into five categories. Based on this classification system, the proposed cleanfill would be classified as a Class 5 Landfill, namely a **Cleanfill**.

A **Class 5 Landfill (Cleanfill)** accepts only cleanfill material as defined in the WasteMINZ Guidelines. The principal control on contaminant discharges is the waste acceptance criteria. Cleanfill material is defined as "virgin excavated natural materials" (VENM) such as clay, soil and rock that are free of:

- Combustible, putrescible, degradable or leachable components;
- Hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown;
- Products or materials derived from hazardous waste treatment, stabilisation or disposal practices;
- Materials such as medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health if excavated;
- Contaminated soil and other contaminated materials, and
- Liquid waste.

It can also accept:

- Maximum incidental inert manufactured materials (e.g. concrete, brick, tiles) of no more than 5% by volume per load; and
- Maximum incidental or attached biodegradable materials (e.g. vegetation) of no more than 2% by volume per load; and
- Maximum contaminant concentrations consistent with local/regional background soil concentrations; and.
- Some common organic contaminants at low levels.

3.2 AUP:OP

However, under the AUP:OP, the proposed facility would not be classified as a **Cleanfill**. The AUP:OP defines a **Cleanfill** as a facility where cleanfill material is accepted for deposit.

Cleanfill Material is defined in the AUP:OP as natural material such as clay, gravel, sand, soil and rock which has been excavated or quarried from areas that are not contaminated with manufactured chemicals or chemical residues as a result of industrial, commercial, mining or agricultural activities. It excludes:

- hazardous substances and material (such as municipal solid waste) likely to create leachate by means of biological breakdown;
- product and materials derived from hazardous waste treatment, stabilisation and disposal practices;

- materials such as medical and veterinary waste, asbestos, and radioactive substances;
- soil and fill material which contain any trace element specified in Table E30.6.1.4.2 at a concentration greater than the background concentration in Auckland soils specified;
- sulfidic ores and soils;
- combustible components;
- more than 5% by volume of inert manufactured materials (e.g. concrete, brick, tiles); and
- more than 2% by volume of attached biodegradable material (e.g. vegetation).

It would instead by classified as a Managed Fill. This is defined in the AUP:OP as:

"*Facility where managed fill material is accepted for deposit."*

Where Managed Fill Materials are defined as:

"*• contaminated soil and other contaminated materials;*
• natural materials such as clay, gravel, sand, soil, rock; or
• inert manufactured materials such as concrete and brick: and

That does not contain:

- *hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown;*
- *products or materials derived from hazardous waste treatment stabilisation or disposal practices;*
- *materials such as medical and veterinary waste, asbestos, or radioactive substances;*
- *combustible components; or*
- *more than 2 per cent by volume of incidental or attached biodegradable materials (e.g. vegetation)."*

3.3 PROPOSED FILL ACCEPTANCE APPROACH

The proposed facility is referred to in this report as a Managed Fill, given this facility is located to Auckland and subject to the resource consenting requirements of the AUP: OP.

However, it is classified under the WasteMINZ Disposal to Land Guidelines as a Class 5 cleanfill and hence is not subject to the Ministry for the Environment Waste disposal levy that apply to Class 1-4 landfills, including managed fills.

The facility is located in an area with non-volcanic soils, but fill material will come from various parts of Auckland and hence may include volcanic soils, which may contain higher background levels of heavy metals. Hence, it is considered a pragmatic decision to allow for the Fill facility to accept fill with heavy metals within the higher volcanic

background range, as this is unlikely to result in any adverse human health or environmental effects.

The WasteMINZ Land Disposal Guidelines contain further guidance on waste acceptance criteria for cleanfills (Class 5 landfills). These guidelines acknowledge that the presence of synthetic organic compounds, which are not naturally occurring and resulting from man-made sources, are common in natural soils. These synthetic organic compounds can be present at detectable concentrations that do not represent a risk to the receiving environment or influence the potential future land use. It advises that waste acceptance criteria should therefore provide for the presence of these compounds up to concentrations where there is negligible potential for significant adverse effects as a result of direct contact with the waste or fill material or groundwater in contact with the waste or fill material.

Asbestos is another contaminant that is common in the urban environment. From experience at other cleanfill operations and as discussed at the pre-application meeting, Managed Fills occasionally struggle with meeting the no trace asbestos allowed threshold (i.e. no detects from a presence/absence test). Measures may need to be put in place if this is an issue. These include:

- Not accepting any fill material containing asbestos, based on at source testing.
- However, if verification sampling at the Fill site itself does detect trace asbestos, this must be <0.001% AF/FA w/w and/or <0.01 %ACM to be kept on-site or otherwise must be removed from site and disposed of to an appropriate landfill facility. It is anticipated this will be an occasional event (i.e. say 10% of verification samples) rather than routine.

It is proposed (and consent is being sought) to allow for the above for this facility.

Furthermore, relevant material from the WasteMINZ Disposal to Land Guidelines relating to Class 5 landfills has been incorporated into the Fill facility design and operation in this application, where appropriate.

3.4 FILL SOURCES, TESTING AND WASTE ACCEPTANCE CRITERIA

The fill material will come from excess spoil from civil works undertaken by the Scarborough Group. This fill material will be subject to a rigorous pre-acceptance process for compliance with the appropriate Managed Fill thresholds, as described later in this report.

The proposed Managed Fill waste acceptance criteria are set out in Table 5, based on the above discussions.

Table 5: Proposed Waste Acceptance Criteria (WAC)

Parameter	Maximum Acceptable Concentration – Jones Rd Fill (mg/kg)
Heavy Metals	
Arsenic (As)	12
Boron (B)	260
Cadmium (Cd)	0.65
Chromium (Cr)	125
Copper (Cu)	90
Lead (Pb)	65
Mercury (Hg)	0.45
Nickel (Ni)	320
Zinc (Zn)	1160
Organic Contaminants	
TPH C_7-C_9	120
TPH C_{10}-C_{14}	58
Benzene	0.0054
Ethylbenzene	1.1
Toluene	1.0
Total xylene	0.61
Benzo(a)pyrene (equivalent)	2 (interim)
Total DDT	0.7
Asbestos	No detect (P/A test) at source; <0.001 % AF/FA and <0.01 % ACM (max 10% of verification testing)

4.0 PROPOSED MANAGED FILL DEVELOPMENT

4.1 OVERVIEW

SEL are proposing to construct a Managed Fill comprising two separate areas of 9ha and 2ha (including associated drains and sediment ponds) on the northern and southern sides of the site respectively, with corresponding estimated fill volumes of 720,000m^3 and 70,000m^3, giving a combined fill volume of 790,000m^3.

Filling will take place over a period of approximately 5-10 years and consent is sought for a total period of 10 years to provide some contingency should fill volumes be less than anticipated.

Erosion and sediment control will be provided by sediment ponds sized to cater for the entire Fill areas, with treated runoff discharged to the site watercourses.

The site will be fully owned by SEL and managed and operated by them.

The extent of the Managed Fill area, proposed fill depths, proposed final contours and selective cross-sections are shown on drawings 33250/100-181.

4.2 PRELIMINARY FILL PLANS

Preliminary fill plans sufficient for resource consent have been prepared for the site based on filling two separate areas, called the northern and southern areas respectively, using the following:

- 2016 Lidar contour data for the wider area, supplemented by targeted topographical survey of the subject site, covering the proposed new entrance off Hunua Road, and existing culvert.
- Recommendations from the acoustic report on noise bunds;
- Findings and recommendations from the ecological survey, which determined the extent of streams and wetlands and the required offsets to these features.
- Raising the finished ground level of the fill areas and contouring, so as to blend into the existing rural environment and topography in this area, based on advice from the landscape architect and noise specialists.

4.3 NORTHERN AREA

This comprises a mounded landform over an area of 9ha and of approximate volume 720,000m^3 that creates an elevated platform slightly higher (237m RL) than the existing high point on site (223m RL), based on preliminary discussions with the landscape architect on-site that the proposed Managed Fill should blend in with existing contours. It has variable side slopes up to a maximum of 1V:3H based on geotechnical advice, tying back into existing ground.

The perimeter of the Managed Fill has been designed so that all runoff from the Managed Fill area can be conveyed by perimeter gravity drains running around the Managed Fill and directed into two sediment removal ponds (SRPs), located at low points on the perimeter drainage system. This will result in minor changes to the catchment areas draining to the watercourses in the western and north area of the site, and hence will have a negligible effect on peak flows and volumes to these streams, based on all runoff being passed through the sediment ponds first, which has detention capacity in accordance with GD05.

Several hedges will be removed from the northern Fill area prior to filling this area.

The existing water bore within the northern fill area will also be decommissioned and abandoned prior to filling in this area.

4.4 SOUTHERN AREA

The southern area comprises a mounded landform over an area of 2ha and of volume 70,000m^3 that creates an elevated platform of similar height (205m RL) to an existing ridge to the south which is at 198m RL (adjacent to the highest point of the proposed platform). It has 1V:3H side slopes tying back into existing ground.

Provision has been made for a single SRP located on the southern area of the site nearby the stream.

There are signs of a historic slip feature within the proposed fill area. Further geotechnical investigation work is required to prove that this area is suitable for filling. It is requested that geotechnical investigation of this area be done via consent conditions prior to any filling taking place in this location. This was discussed during the pre-application meeting with Council. After the meeting FTL were notified that Council had discussed this with Engineering Team Leader Rajinesh Kumar. It was confirmed that a condition of consent for geotechnical investigation of the southern area can be offered. However, it was noted that:

"This may impact viability of some or all of the proposed fill volume in this area and the applicant will need to accept this as a risk that the full consented volume may not be possible. This would be via a pre-development condition for this stage of the fill."

4.5 STAGING

The Managed Fill will be staged so that a maximum 2ha area is being filled at any one time. Preliminary staging plans are shown on drawing 33250/130. The staging is indicative only, as the filling will be an iterative process, with filling areas changing as required to build the final platforms. The staging plan may also need to be changed as site constraints and operational constraints are realised during either detailed design or once SEL has established on site.

4.6 AMENITIES AND ACCESS

It is proposed to utilise the existing buildings on-site for Managed Fill operations, with the existing house being used as the site office.

The Managed Fill operation will be serviced by existing power and telecom links to the site.

A new site accessway is proposed off Hunua Rd, with the location based on recommendations in the Commute Traffic Assessment and avoiding an existing power pole located in this area.

The road entrance will be off Hunua Road, and have a manual gate set back sufficiently to allow for a truck and trailer to park safely off the road. The road then narrows down to a 6m width suitable as a dual carriageway, sloping down towards the stream. Crossing the stream will be a single lane bridge. From the bridge onwards, the carriageway returns to a 6m width. There will be widenings around any corners as required, which will be worked out at detailed design.

A bridge crossing has been deliberately selected so as to ensure no loss of stream length or effects on the wetland in this area.

There is an existing farm culvert crossing over the stream, which is in poor condition and is to be removed. This will result in a short section (approximately 5.5m) of stream and associated wetland in this area being reinstated.

Fraser Thomas have worked with Commute to confirm the accessway location and dimensions based on manoeuvrability of the largest anticipated vehicle into and out of the access.

The new internal access road will run through the subject site to the new site office, where incoming and exiting loads will be monitored by Managed Fill staff.

Additional internal access roads will run from this area to each Fill sub-stage, with turning circle areas being created for each Fill stage. The existing farm accessway off Jones Road will be retained, but will not be used by trucks bringing fill from the site or exiting the site.

Preliminary access road details are provided in drawing 33250/200-251.

Specific design details will be provided for accessway works for each stage of filling in advance, as they will be designed and constructed progressively as part of Fill operations.

4.7 WATER SUPPLY AND WASTEWATER

Water supply will be provided to the site office by roof rainwater harvesting, as per the existing situation.

Wastewater from staff facilities will be treated and disposed using the existing on-site septic tank and land disposal system.

A separate water supply will be provided from a new bore on-site to water storage tanks (4x30m^3) for use for on-site dust suppression.

Wheel washing will be undertaken using a water blaster near the site office on a gravel pad, as vehicles exit the site. Estimated water usage based on 20L/min x 5 min per vehicle x 100 vehicles per day is 10m^3/day, which is well within permitted activity limits (20m^3/d). Water blasting water (estimated 100L per wash) will be allowed to soak into the ground.

Up to 10m^3/d of bore water may also be used for dust control, primarily on the secondary access roads. Any additional dust control water would be taken from one of the site sediment removal ponds (SRP).

The estimated Managed Fill related water demand is summarised below.

Table 6: Estimated Daily and Annual Water Usage

Use	Description	Source	Daily Usage (L)	Annual Usage (m^3)
Staff	3-4 permanent staff x 50L/person/d	Roofwater harvesting	150-200	41-55
Wheel washing	Manually operated water blaster – estimated 20L/min x 5min x 96 vehicles/d	New bore	9,600	2,640
Dust control	Water for dust control purposes using water truck or similar	New bore + SRP (if required)	Max 10,000 (water bore)	1,375
Total			150-200 (roofwater) 20,000 (water bore)	41-55 4,015

Notes:

1. Staff use based on 5.5 working days per wk x 50 wks per year
2. Wheel washing water usage based on 5.5 days per wk operation, 50 wks of the year.
3. Dust control water usage based on 5.5 days per wk operation over a maximum of 6 mths of the year.

A Council bore database search found no records of any bores on the subject site, from which it is inferred that the existing bore is not consented and groundwater has been taken from it under RMA S14 provisions. The current land owner has no information on the depth of the existing bore, other than noting that it could date back to the 1940s.

Section E7 of the AUP:OP Activity A15 provides for up to 20m^3/day to be taken from a groundwater bore, when averaged over any consecutive five day period and no more than 5,000m^3/year as a **permitted activity**. The proposed groundwater take volumes are within the permitted activity limits. If operational experience finds that these volume thresholds are exceeded, resource consent would then be sought at that time for a groundwater take as a **discretionary activity** under Activity A26.

4.8 TRAFFIC MANAGEMENT

Truck numbers are expected to be up to 100 vehicles/day (100 in, 100 out), comprising primarily truck and trailer units (96 max truck and trailer units).

A speed limit of 20km/h will be imposed within the Managed Fill site, which will also assist with dust management.

4.9 FILLING OPERATIONS

4.9.1 Staging

Filling will occur in a number of sub-stages with a maximum of 2ha open at any one time.

4.9.2 Operational Hours

The operating hours for the site will be:

- Monday to Friday: 7:00am to 6:00pm;
- Saturday: 7:00am to 1:00pm
- Sundays and public holidays: Closed

The Managed Fill will not operate outside these hours. Although the site will be open for up to 11 hours per day, the first and last hours of the day are considered to be less productive due to site start-up and shut-down activities occurring.

4.9.3 Machinery

Proposed machinery for Managed Fill operation is:

- D6 bulldozer or equivalent,
- 21T excavator,
- One 18T Sheepsfoot compactor,
- One $6m^3$ water cart

Any machinery refuelling that has to take place on-site will be conducted via a mobile refuelling service in a dedicated area near the site office. Hence, there will be no permanent fuel storage area on-site.

4.9.4 Access Control

Access to the site will be strictly controlled and limited to Scarborough Group vehicles and other approved contractors. The site will not be open to the general public.

4.10 PROPOSED SEQUENCING

The expected sequence of filling and associated activities is summarised below.

These works will be constructed on a stage-by-stage basis, apart from the sediment controls which will cover the entire northern and southern Fill areas:

- Install all silt/sediment control structures required for the total filling area, including sediment retention ponds, diversion drains/bunds, as appropriate. Obtain approval from the relevant Authorities prior to commencing works.
- Install temporary access roads and turning areas.
- Remove vegetation as required.
- Strip topsoil and unsuitable materials and stockpile (separately) on designated stockpile areas.
- Install underfill drains and connect into perimeter swale.
- Undertake filling and compaction.
- Re-spread topsoil across filled areas.
- Mulch, hydroseed or grass all batters and exposed surfaces, as appropriate. Mulching or hydroseeding will be done on intermediate exposed surfaces, while grassing will be done on completed filling areas. This will be done progressively as different areas are completed.
- Decommission erosion and sediment control devices once exposed surfaces are fully stabilised.

Further details on specific items from the above list are given in the following sections as required.

4.10.1 Erosion and Sediment Control

Erosion and sediment control measures will be installed prior to any vegetation clearance and earthworks activities on the site. The proposed erosion and sediment control measures cater for the entire Managed Fill area (2x2ha ponds for northern Fill and 1x1.2ha pond for southern Fill area including sediment pond and drains) and hence provide a high degree of flexibility for development of the Managed Fill. These measures are described in Section 5 of this report.

4.10.2 Temporary Access Roads

Temporary stabilised access roading, tip heads and vehicle turning circle areas will then be constructed for each stage of filling. These roads will be progressively extended and/or relocated for each stage of filling, as required. Temporary access road details will be provided ahead of each stage of filling for Council approval.

4.10.3 Vegetation Clearance

Vegetation clearance will be undertaken in stages, in accordance with the progression of filling. It will comprise the removal of existing grass/weeds, as the first step of preparing a new area for filling.

Riparian areas will not have any vegetation removal.

The trees on site have been assessed in the Boffa Miskell ecological report. Some macrocarpa trees may need to be removed for construction of the haul road. The Fill

design allows for the identified area of native vegetation in the central southern area of the site to be retained and protected for the duration of the filling activity.

4.10.4 Topsoil and Unsuitables Stripping and Stockpiling

Topsoil and any unsuitables will be stripped from each stage and temporarily stockpiled within part of the fill area, not currently being used for filling or where filling has been completed. All temporary topsoil stockpiles remaining in place for more than one month will either be mulched, hydroseeded or grassed.

4.10.5 Underfill Drainage

In accordance with the recommendations of the FTL geotechnical report, underfill (strip) drains will be constructed prior to the placement of fill to prevent groundwater from reaching elevated levels within the fill material during extreme transient events. These strip drains shall comprise 900mm wide by 300mm deep rectangular strip drains, with TNZ F/2 drainage aggregate fully wrapped in Bidim A29 geotextile or similar. The location of the proposed groundwater drainage system is shown on FTL drawing 33250/350-351.

Underfill drains may also be installed in other locations, if required, following stripping of topsoil.

4.10.6 Fill Placement and Compaction

Fill operations will be undertaken in small stages within the Fill footprint. Filling should be undertaken in accordance with the recommendations of the geotechnical report. New fill areas will be opened only as required. Filling will then commence with fill material brought to the site in trucks, deposited in the relevant area and re-positioned as necessary by excavator and/or bulldozer.

The fill will be shaped to direct runoff to dirty water diversion drains and fill material track rolled by site machinery for compaction to similar levels to the existing situation, in accordance with the fill specification in the geotechnical report. Drying or wetting of imported fill material should be undertaken, as required to achieve this. This level of compaction is appropriate, as the Fill area will revert to productive pastoral farming on the completion of filling. Hence, there is no need to compact the fill in accordance with development codes for residential development.

The outer faces of the fill will be at a maximum 1V:3H. 4m wide benches will be installed at appropriate vertical intervals, with further details of these benches provided at detailed design. These benches are primarily for erosion control purposes during Fill construction. It is expected they will be constructed at intervals of approximately 1 bench per 10m vertical height and will generally run along the contour to minimise the concentration of stormwater runoff. The northern area will

have between 2 benches on the eastern side, and 4 benches on the western side. The southern area will have no benches. The Slope/W analyses in the geotechnical report allow for this scenario.

Any filling proposed on existing slopes greater than 11° (1V:5H) should be placed and compacted on benches cut into the slopes at the site.

Post filling, the benches will generally remain and will function as farm access tracks.

Actual fill locations will vary depending on considerations such as the type of material received, the season and the filling situation for the overall site. Some areas may be opened and closed several times during the life of the operation, and temporary and permanent stabilisation measures will therefore both be used.

A Geotechnical Completion Report should be provided on completion of each stage of filling works.

4.10.7 Final Landform and Site Restoration

The finished northern fill profile will reach a height of up to 237m RL and be gently sloping (i.e. natural rolling pasture) with a predominantly westerly aspect towards the western stream.

The finished southern fill profile will reach a height of up to 205m RL and be gently sloping with a predominantly westerly aspect towards the western watercourse.

Final completion works will involve shaping the surface to ensure a natural, non-engineered appearance and for it to merge naturally with the surrounding land. The sediment ponds and associated perimeter drainage will be decommissioned on completion of filling and site stabilisation, with site flow to be generally dispersed as sheet flow in accordance with existing overland flow patterns.

Final cover will comprise a minimum 150mm thickness of topsoil, sourced from the temporary topsoil stockpiles on-site. If necessary, additional topsoil will be imported to achieve the desired coverage.

Completed areas will be progressively stabilised with a protective surface cover (i.e. grass) to stabilise it against soil erosion and return the area to grazing.

4.10.8 Riparian Planting

The 10m riparian yard will be fenced and planted, as set out in the separate Planting Plan prepared by Boffa Miskell.

4.11 FILL MANAGEMENT PLAN

A Fill Management Plan has been prepared for the proposed Fill and is included in this application as a separate report. This Plan provides an overview of filling activity and sets out how the Fill will be managed and operated. This plan will be updated as required during the consenting process to address specific feedback received from Council and relevant consent conditions.

In accordance with the requirements of Section E13 of AUP:OP and best practice, the Management Plan addresses the following:

(a) A plan of the property showing the areas to be filled.
(b) The approximate quantity of material to be deposited, type of material, timing and progress of the operation, its operating hours and the Fill's completion date.
(c) Operation of the site, including placement and compaction of fill materials, daily operating procedures, Fill acceptance controls and monitoring, responses to natural hazards and unexpected discharges and conditioning of wet material.
(d) Proposed site operation records, including waste acceptance processes, load inspection records and monitoring, testing and sampling documentation.
(e) Sub-staging plans and details of internal access roads.
(f) Management measures for dealing with noise, dust and other detractions from the amenities of the area.
(g) Security (to prevent public dumping) and signage measures.
(h) Drainage measures.
(i) Erosion and sediment control measures.
(j) Mitigation and contingency measures.

5.0 EROSION AND SEDIMENT CONTROL

Required erosion and sediment control measures will be installed and maintained during the works in accordance with best practice, utilising recommended measures set out in GD05 (Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region 2016/005) (June 2016). This section summarises the proposed erosion and sediment control measures for the site during filling. The erosion and sediment control measures are shown on drawings 33250/121, 161, and 251.

The final design, location and sequencing of these measures may vary from that shown here, and will be determined on-site by the Operator prior to commencement of works within each stage of substage. Approval for any significant changes will be sought from Auckland Council, as required.

5.1 OBJECTIVES

Appropriate erosion and sediment control measures will be provided on-site in accordance with the AUP: OP and GD05. The main rational and objectives of these measures are:

- To minimize disturbance to areas where erosion may occur, including steeper slopes and exposed land.
- To stage filling to minimize the area worked on at any one time, to minimize the extent and duration of temporary topsoil stockpiles and to ensure revegetation can occur in a staged manner, so as to reduce the risk of silt/sediment running off the site and entering the downstream receiving environment.
- To ensure exposed areas are stabilized as soon as practicable by sowing, hydroseeding or mulching to prevent erosion.
- To install perimeter controls such as diversion drains and retention ponds to prevent sediment leaving the site.
- To maintain the gravel surface of the access road to minimize the potential for silt/sediment to be tracked off site.
- To provide guidance in case of unforeseen events including poor weather.
- To ensure all control measures are inspected and repaired after storm events.
- To ensure that the site is rehabilitated prior to the removal of sediment control measures.
- To mitigate dust emissions from the site during earthworks so as not to adversely affect any nearby properties.
- To minimize potential environmental effects.

5.2 EROSION AND SEDIMENT CONTROL MEASURES

The two fill areas are located within different catchments and the proposed perimeter drainage system means that they will form their own sub-catchments during Fill operation.

Hence proposed erosion and sediment control measures comprise open channel drains/bunds (referred to as dirty water drains) located around the Fill perimeter which will collect all runoff (i.e. both clean and dirty runoff) from the Fill area and convey it into three sediment ponds sized for their entire contributing catchments as shown in drawings 33250/121 and 161. These measures will be in place for the duration of filling.

Clean runoff will derive from areas that have been fully stabilised and revegetated following filling and areas that have yet to be disturbed for filling. Dirty runoff will derive from areas that are being filled and from areas that are in the process of being stabilised and restored.

Runoff will generally be conveyed into these dirty water drains as overland flow to avoid unnecessary concentrations of site runoff. However, additional temporary measures may be installed at the discretion of the Fill Operator such as temporary dirty/clean water diversion drains, compacted bunds, contour drains, etc. This may be particularly useful to improve sediment removal, or to reduce chemical costs, if chemical flocculation has to be used.

5.2.1 Drains (up to 10% gradient)

All drainage channels will be constructed in accordance with GD05. They will have earthen bunds on the downgradient side and will be sized to take the 5% AEP storm with additional freeboard. The dimensions of the drains are shown on drawing 33250/181 and longitudinal gradients generally in the range of 1-10% as shown on drawings 33250/122 and 162. Any drains in excess of 2% gradient or 1m/s design velocity will be lined to provide for protection against scour/erosion. Drain sizings are based on the most conservative drain gradient for each drain type. Prior to construction, sizings may be revised to reflect actual gradients for different sections.

5.2.2 Drains (>10% gradient)

Drawings 33250/122 and 162 show that there are some sections of the perimeter dirty water drains that are over 10% in gradient, notably:

- Drain 1 – chainage 0-45m, and chainage 178-196 (63m)
- Drain 2 – chainage 94-134m and chainage 257-296 (52m)
- Drain 3 – chainage 196-246m (50m)
- Drain 4 – chainage 23-81 (58m)
- Drain 5 – chainage 7-123m and chainage 193-275 (198m)

Specific design will be required for these sections of drain to ensure they are adequately lined to provide for scour/erosion protection. If lined open channels are used, drop pits or manholes or other scour/erosion devices will be required at the end of each steep section of drain to reduce velocities and minimize scour/erosion.

Consideration will also be given to using pipe drop structures or flumes in some areas. These comprise a temporary pipe structure or constructed flume placed from the top to bottom of a steep slope. Any pipe drop structures or flumes would be designed in accordance with GD05 or by specific design.

5.2.3 Drop Out Pits

Drop out pits may be used on steeper sections of the site within the dirty water diversion drain to allow heavier sediment particles to drop out before they enter the sediment ponds, reducing the load on the ponds. Drop out pits are approximately 500-1,000mm deep and 1,000mm wide. They are easier to maintain and typically cheaper to desilt than desilting the sediment ponds.

5.2.4 Sediment Retention Ponds

Three sediment retention ponds (SRPs) are proposed, sized for the maximum dirty water catchment expected in each case, including the area of drains and sediment

pond area. In reality, the worst-case scenario is considered to be a total catchment area of 2ha. General details of the sediment retention pond are shown in Table 7.

Table 7: Sediment Pond Details

Item	Northern Area – Ponds N1 & N2	Southern Area
Catchment Area (ha)	2.0	1.2
Design volume (3% criteria) (m^3)	600	360
Dead storage (m^3)	180	108
Live storage (m^3)	420	252
Freeboard (m)	0.3	0.3
Side slopes	1V:2H	1V:2H
Decants	2 x standard decants; 133 holes in each decant	1 x standard decant with 160 holes
Discharge pipe	150	150
Primary spillway	150mm riser pipe	150mm riser pipe
Secondary spillway	7.8m base width, 0.3m depth, 1V:3H side slopes	

5.2.5 Chemical Flocculation

During the very early stages of filling, dirty runoff generated from the fill area will contain dissolved and particulate particles deriving from the natural soils on-site. As fill material is brought in, the characteristics of the dirty runoff will change, being increasingly controlled by the nature of the fill being disposed of on-site. In this case the nature of the combined clean and dirty runoff entering the sediment pond will depend on the type and extent of the exposed soil types for dirty runoff and the extent and ground cover of stabilized/restored or yet to be disturbed areas.

For these reasons, flocculation bench testing will be undertaken of the natural soils on-site to determine if chemical flocculation is needed during the early stages of filling and the required dosing rate. Ongoing monitoring will then determine if any changes are required to the flocculant dosing regime. Bench testing will be undertaken for PAC (polyaluminium chloride), while the potential use of an organic flocculant will also be considered, subject to performance and cost considerations.

5.2.6 Mulching, Temporary and Permanent Seeding

The primary objective of erosion and sediment control is to minimise the time ground is exposed prior to permanent stabilisation. If delays occur during the works or an intermediate form of stabilisation is required (such as on stockpiles or on fill prior to topsoil placement), mulching, geotextile fabric or hydroseeding may be utilised.

Permanent stabilisation can be achieved via the application of topsoil (150mm minimum), followed by seeding or planting. Permanent stabilisation is designed to

permanently stabilise soil on disturbed areas to reduce sediment and runoff to downstream or off-site areas.

Application rates for seeding and mulching shall be as stated in Table 8 (from GD05).

Table 8: Typical Seeding, Fertiliser and Mulching Application Rates

Activity	Description	Application Rate
Temporary Seeding	Annual ryegrass	100-250kg/ha
Permanent Seeding	Perennial ryegrass – 70% Fescues/cocksfoot – 20% Clover/lotus – 5% Browntop – 5%	200-400kg/ha
Fertiliser Application	N:P:K (15:10:10)	200-800kg/ha
Maintenance fertiliser	N:P:K (15:10:10) and urea	As required
Mulching	Straw or hay	4,000-6,000kg/ha
	Hydromulch (minimum 80% virgin or recycled wood)	2,200-2,800kg/ha
	Wood chip	10,000-13,000kg/ha

5.2.7 Dust Control Measures

Dust control aims to prevent or reduce the movement of dust from disturbed soil surfaces that may create nuisance, health hazards, traffic safety problems and/or off-site damage and discharge to the environment. Dust control should follow the guidance provided in the Ministry for the Environment Good Practice Guide for Assessing and Managing Dust 2016.

Areas subject to dust generation and movement include open fill areas exposed to wind, stockpiles of materials, bulk materials handling or vehicle movements.

Dust will be controlled at the Fill site by a range of measures from the following toolbox:

- Minimising the extent of the exposed area at any one time.
- Limiting traffic to established haul roads and minimising travel distances by optimising site layout.
- Controlling vehicle speeds.
- Maintaining road surfaces.
- Minimising tracking of dirt on vehicle wheels onto paved surfaces.
- Minimising drop heights when loading and unloading vehicles.,
- Limiting stockpile heights.
- Providing shelter from the wind for stockpiles, where practical.
- Consolidating and sealing off loose surface material.
- Progressive mulching and grass establishment, as works are completed in different areas.

- Use of a water cart to dampen exposed areas, if necessary, using water sourced from the sediment ponds, or from a dedicated storage tank supplied by the existing on-site bore and/or rainwater harvesting, if insufficient water is available from the ponds.
- Use of soil binders to form a cohesive membrane or protective crust that reduces windblown dust generation (refer GD05, Section G8.0 for further details) (contingency measure).
- Use of textiles as temporary covers on stockpiles or partially completed batter slopes, or as permanent cover (e.g. vegetation promotion blanket) on completed areas (contingency measure).

5.2.8 Litter

The fill materials deposited on-site are not expected to create any litter problems as they are relatively dense and unlikely to be blown around by the wind. Any minor bits of litter found on-site will be picked up and disposed of appropriately.

5.2.9 Weather Monitoring

Monitoring and predicting rainfall is essential to the performance of erosion and sediment control and civil works in general. All efforts shall be made to predict rainfall and undertake any high-risk work when extended periods of fine weather are predicted. When rainfall is predicted, all efforts shall be made to ensure that the measures mentioned above are in place prior to rainfall and further inspections are made during rainfall and after to ensure that erosion and sediment control measures are functioning as intended.

5.3 MAINTENANCE

The sediment control measures shall be regularly monitored during operations and after any significant rain event. Maintenance of all structures including diversion drains/bunds and sediment ponds shall be carried out throughout the course of site earthworks and restoration.

Maintenance shall be the responsibility of the Operator and shall be carried out at appropriate frequencies ranging from daily to weekly, as appropriate and subsequent to any storm event that produces runoff. The maintenance inspection shall include, but not be limited to, the following:

- Inspection of the accessway to the site, including:
  - Repair of any accessway damage, including aggregate loss.
  - Inspection of the Hunua Road frontage and removal of any silt/sediment or other accumulated debris manually and/or by machine sweeping.
  - Check surrounding areas for dust and rubbish associated with works.
- Inspection and maintenance of any temporary roading/tracking.
- Inspection of topsoil and unsuitable stockpiling areas, including:

  - Inspecting and repairing silt controls, as necessary.
  - Inspecting the condition of mulch, hydroseed, grass and undertaking any remedial works required.
- Inspection of temporary diversion bunds and channels, including:
  - Checking for scour, sediment build-up, bund/channel integrity and outlet erosion, with remedial measures undertaken as required;
  - Checking for exposed areas and re-hydroseeding, where relevant.
- Inspection of sediment retention ponds, including:
  - Checking embankments, spillways, level spreader and any exposed areas.
  - Checking the sediment depth in the pond forebay and cleaning out as required (generally when 50% full of sediment);
  - Checking the sediment depth and removing sediment once it reaches 20% of the total sediment retention pond volume. To assist in gauging sediment loads, clearly mark the 20% volume height on the decant riser. The sediment shall be moved to a securely isolated and covered area such as the spoil storage area.
  - Checking the operation of the decant arrangement.
  - Checking the clarity of treated runoff to determine if supplementary chemical application is needed.
- Dust monitoring:
  - Monitor dust emissions on a daily basis. In windy, dry conditions, review dust emissions continuously.
  - Reapply water as required to effectively manage levels of dust generation, especially when soil moisture conditions become low during hot and windy conditions.
- Inspection of completed fill areas including:
  - Checking for exposed areas and re-seeding, mulching or turfing the exposed area;
  - Checking for erosion and regrading the slopes and stabilizing, as necessary.

5.4 DECOMMISSIONING

Sediment control works may only be decommissioned once it has been determined that relevant Fill areas have been suitably stabilized through consultation and inspection by the Operator and Council. Decommissioning shall be undertaken by light weight equipment or manually where possible and include the following:

- Respread any topsoil stockpiled and decommission the topsoil stockpiling area.
- Backfill any temporary collection drains and/or remove any diversion bunds. Regrade localised areas to ensure overland flow occurs as broad sheet flow and is not channelised. Turf or sow grass seed as appropriate.
- Remove the embankments, bunds and decant structure and fill in the sediment removal ponds. Reinstate the areas by grassing.

5.5 INFORMATION AND MONITORING

It is important that good relations be maintained with Auckland Council and potentially affected neighbours throughout the duration of filling.

Immediate neighbours will be informed of the intended scope and duration of filling and kept informed of any changes to filling activity throughout the duration of the works.

All site staff and truck drivers bringing fill to the site shall be made familiar with the Fill Management Plan prior to entering the site.

The Operator should provide feedback regarding the performance of the erosion and sediment control measures and amendments shall be made as required.

No other monitoring is proposed other than what is required in the consent conditions.

6.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

This assessment of environmental effects focuses on the matters to be addressed under the earthworks and cleanfill requirements (Sections E11, E12 and E13) and other related matters of the AUP:OP specific to this engineering report.

6.1 ALTERATION TO NATURAL LANDSCAPE

The proposed Fill area is currently covered in pasture. The proposed filling activity will result in the staged stripping of existing grass/weed vegetation from the cleanfill area over a period of up to 10 years, with not more than 2ha being bare earth at any one time, followed by the restoration (topsoiling and grassing) of completed fill areas. The effects of the vegetation removal will be temporary in nature and confined to a small area and are considered to be less than minor.

The proposed fill activity will alter the landform, infilling the northern 9ha area with an average of 8m of fill with the maximum fill depth being 24m and infilling the southern 2ha area with an average of 3.5m of fill with the maximum fill depth being 10m. The effects of this change in landform are considered in the separate visual effects and planning assessment reports and not commented on further here, other than to advise that to assist this assessment, FTL has prepared lighting shadow effects graphics showing the effects of the changed fill landform for the northern Fill on "shadow time" compared with the permitted activity scenario for this zoning of 12m high (approx.) trees 5m offset from the boundary. These graphics are included in Appendix B of this report.

6.2 EROSION AND SEDIMENT

The northern and southern fill areas have been designed to form their own sub-catchments during filling. The proposed sediment ponds will capture all runoff from these sub-catchments and discharge treated runoff to the existing watercourses running through the site.

Sediment will be removed primarily by the sediment retention ponds. These ponds and the associated diversion drains/bunds have been designed in accordance with GD05 and best practice.

All installation works for the proposed stormwater system including any minor earthworks and trenching will be undertaken in accordance with relevant Council requirements for erosion prevention and sediment control.

The universal soil loss equation (USLE) has been applied to the Fill area based on a worst case scenario of 2.0ha of bare soil areas for 9 months and 2.0ha of completed filling area being restored for 3 months, based on the following approach:

- The existing fill areas vary in gradient and length in relation to sediment generation and overland flow. Runoff flow paths have been considered for each area with average gradients and lengths calculated.
- For the Fill, the topography on completion of filling has been considered. This gives a worst case scenario in terms of gradient (33.3%). Multiple runoff flow path lengths were calculated down the Fill batter slope to the perimeter drain and use to calculate an average length.
- Adopted K value of 0.40 based on site bore log information, with an adopted soil erodibility factor based on 35% clay, 60% silt and 5% sand content, representing in-situ soil conditions.
- Sediment delivery ratio of 0.7 adopted, based on gradients generally being over 10 degrees for both the existing and Managed Fill situations.
- Allowance for flocculant dosing in the sediment ponds, with an adopted sediment removal efficiency of 95%.

These results are summarised in Table 9.

Table 9: USLE Calculations

Area	Scenario	Pond N1/N2	Pond S1
Gradient (%)	Existing	11.5	12.5
	Filling	33.3	33.3
Length (m)	Existing	300	200
	Filling	150	75
LS Factor	Existing	5.3	4.9
	Filling	20.9	14.8
Sediment Loss (T/yr)	Existing	4.3	4.0
	Filling	18.6	13.1

The USLE estimated sediment loss ranges from 4.0-4.3 tonnes for the existing situation over a year, compared with approximately 13-18 tonnes over a 9 month filling and 3 month restoration cycle with floc dosing. The main reason for the calculated increase in sediment losses is that the Fill gradient is steeper than the existing situation, resulting in the slope length and steepness factor, LS, being much higher for the Managed Fill situation, compared with the existing situation.

In reality, it is quite difficult to apply the USLE methodology to this situation and the USLE results are considered likely to be over conservative in this case, for the following reasons:

- The assessment is based on site bore log information, with an adopted soil erodibility factor based on 35% clay, 60% silt and 5% sand content, representing in-situ soil conditions. These conditions represent the start of filling, but as filling progresses the soil erodibility factor is likely to change depending on the nature of the imported cleanfill material, and could potentially decrease.
- The USLE "existing situation" baseline calculation does not allow for any increased sediment generation from grazing activity on site compared with a grassed area.
- The USLE method has been applied to the end of each Fill stage, where the fill gradient is maximum. Prior to this, gradients will be intermediate between existing and final and sediment losses are expected to be less.
- The USLE calculations do not take into account the proposed 4m wide benching in the Fill profile. These benches will act to slow down runoff down the fill batter slopes, and remove some silt/sediment closer to source. Silt fences or similar could be installed along these benches as a primary means of removing sediment closer to source.
- The USLE calculations do not allow for the effect of the perimeter drain, most sections of which are graded at considerably less than 33%, giving an opportunity for some sediment to be removed during transit through the drain system. This could be promoted through incorporating check dams, drop out pits, filter socks, etc. at periodic intervals along the drain system to enhance silt/sediment removal.
- The sediment delivery ratio is likely to be less than 0.7, as the fill surface will be relatively rough for a significant proportion of the time, meaning more silt/sediment will be captured closer to source and not delivered to the ponds.

For these reasons, the USLE analysis is considered to be more useful qualitatively than quantitatively. In our opinion, its key message is that silt and sediment losses need monitoring particularly as the Fill gradient increases and some additional erosion sediment controls may be required closer to source to mitigate the effects of any increased sediment losses compared with the existing situation.

Sediment losses will be minimised by restricting the area of exposed soil at any one time to 2ha, while portions of the Fill should be able to be completed in less than the

allocated time. Hence, the net effect is expected to be less than calculated above and is unlikely to have an adverse effect on the receiving environment, provided the Fill operation is managed well.

In response to Iwi comments during their site visit, some scour/erosion protection measures will be placed at the outlet of the culvert under Jones Rd that drains to the western watercourse in the northern area. These will comprise two layers of D50 150mm riprap on Bidim A28 geotextile, or similar approved. Indicative dimensions to be confirmed on-site are 0.5m wide by 3m long. Haul road crossings of this gully will also be culverted, with appropriate scour/erosion protection provided.

6.3 RUNOFF CONTROL

Runoff volumes are likely to increase during filling due to a change in the ground surface from grass and vegetation to bare soil and subgrade and an overall increase in contributing catchment steepness. This has been provided for in design of the runoff collection system, through the provision of a perimeter drainage system of relatively gentle gradient while all runoff will pass through the sediment ponds, which will result in a significant reduction in peak flows leaving the site, while some volume reduction may also occur as a result of infiltration through the base of the ponds and evaporative losses. Additional measures such as the check dams, pipe drop structures and/or flumes can also be used if necessary to control runoff.

Earthworks will be monitored on site by the Operator, who will review sediment control performance. Overall, given the modest scale of the proposed filling activity, the comprehensive stormwater collection and treatment system proposed, and subject to effective application and management of the aforementioned erosion and sediment control measures, the associated potential adverse environmental effects are considered to be less than minor. However, additional mitigation measures for runoff control are able to be installed where deemed necessary.

6.4 IMPERVIOUS AREA CHANGES

New “impervious areas” comprise the new site entrance off Hunua Road (sealed to match existing road), new bridge (surface to be confirmed) and gravel access road. These areas amount to 3,838m^2 from drawing 33250/200, of which the majority is gravelled.

Additional haul roads (gravel) will extend into the Fill areas in accordance with staging plans. According to the indicative staging plans shown in drawing 33250/130, these additional haul roads may extend approximately another 300m across the site, which would add an additional impervious area of 1,800m^2, based on a two lane 6m width.

This increases the overall new impervious area on the site to a maximum of 5,638m^2. This total impervious area would reduce as filling moves southwards, due to the

relocation of the temporary haul roads within the fill footprint. By the time the southern area is filled, any temporary haul roads would be relatively short.

Existing impervious areas comprise the existing farm access track (gravel) and six buildings on the site including the bore pump shed. These six buildings have an approximate total roof area of 810m^2 while the existing farm access tracks have an approximate area of 1,590m^2 measured off Geomaps aerial photographs.

Under AUP:OP Section E8 (stormwater diversion and discharge), Activity A7 is potentially applicable. This applies to diversion and discharge of stormwater runoff from impervious areas up to 5,000m^2 outside an urban area that complies with Standard E8.6.1 and Standard E8.6.2.4. For the purposes of these standards "'the total impervious area" includes any additional impervious areas plus existing impervious areas on the site.

Standard E8.6.2.4 needs to be considered first. It requires:
(1) The total impervious area on the site excludes unsealed or gravelled tracks.
(2) Connection to a stormwater network is not practicable.

For this site, item (1) means that the majority of the new impervious areas do not need considering and new non-gravelled impervious areas reduces to 508m^2 new areas (new site entrance and likely the new bridge surfacing) and 810m^2 existing roofing areas, giving a total of 1318m^2. Item 2 is not practicable as there is no stormwater network in this area.

Table 10: Impervious and Gravelled Areas Summary

Item	Existing	Proposed
Roofing (6 buildings)	810	810
Gravelled Access roads (permanent)	1,590	5,428
Landfill Haul gravel roads (temporary)	0	0 to 1,800
Total	**2,400**	**6,238 to 8,038**
Net impervious areas, excluding gravelled roads	810	1318

Notes:
1. Assumed new bore pump shed will have similar roof area to existing bore pump shed; no changes proposed to other buildings
2. New impervious areas in this context are the new site entrance and likely the new bridge surfacing

General Standards from E8.6.1 to be considered are listed below, followed by an assessment of compliance with each criteria:

(1) The design of the proposed stormwater management device(s) must be consistent with any relevant precinct plan that addresses or addressed stormwater matters.

Assessment: Not applicable – no precinct plan applies to this area.

(2) The diversion and discharge must not cause or increase scouring or erosion at the point of discharge or downstream.

Assessment: Complies. Stormwater runoff from the site entrance will be by sheet flow and follow the natural topography, flowing overland before entering the southern stream. The bridge will be flat and small volumes of runoff will likely flow diffusely off its sides into the underlying stream. The additional impervious area represents 0.3% of the 19ha OLFP1 catchment area, which is negligible. Hence, neither runoff source are expected to result in any scour or erosion at the point of discharge or downstream. Similarly roof runoff is expected to discharge to the ground surface and become overland flow from the six individual buildings or be collected in roof water tanks for reuse (existing dwelling).

(3) The diversion and discharge must not result in or increase the following:
- *a) flooding of other properties in rainfall events up to the 10 per cent annual exceedance probability (AEP); or*
- *b) inundation of buildings on other properties in events up to the 1 per cent annual exceedance probability (AEP).*

Assessment: Complies. The new impervious area is a very small proportion (0.3% of the total OLFP1 catchment area) and hence is not expected to cause any adverse flood effects for the 10% and 1% AEP storm events affecting other properties and/or buildings. Geomaps does not show any downstream dwellings located in close proximity to the 1% AEPO floodplain extent. The building roof runoff will be low volume and is an existing situation and thus will have no impact on flooding.

(4) The diversion and discharge must not cause or increase nuisance or damage to other properties.

Assessment: Complies. Again, due to the new impervious area being a very small proportion (0.3% of the total OLFP1 catchment area, this is not expected to cause or increase nuisance or damage to other properties. Similarly, the building roofing already exists and is not to be changed, so will not result in any adverse nuisance related effects.

(5) The diversion and discharge of stormwater runoff must not give rise to the following in any surface water or coastal water:
- *a) the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials;*
- *b) any conspicuous change in the colour or visual clarity;*
- *c) any emission of objectionable odour;*
- *d) the rendering of fresh water unsuitable for consumption by farm animals; or*
- *e) any significant adverse effects on aquatic life.*

Assessment: Complies. This is not expected to occur, due to the small impervious area involved and the relatively low volume of traffic expected across the new entrance and bridge. Stormwater runoff from the new entrance will also flow overland across grass before entering the southern stream, which will effectively function as a filter

strip and provide some contaminant removal. Similarly, roof runoff that is not collected in water tanks, is expected to flow overland across grass before entering any streams, which will achieve some contaminant removal.

(6) Where the diversion and discharge is to ground soakage, groundwater recharge or peat soil areas any existing requirements for ground soakage, including devices to manage discharges or soakage, must be complied with.

Assessment: Not applicable.

Overall, this shows that the stormwater diversion and discharge from the site will be a permitted activity under the AUP:OP E8, Activity A7.

6.5 OVERLAND FLOW AND FLOODING

6.5.1 Council Geomaps

Council Geomaps shows that the site is subject to four OLFPs. The southern side of the site is subject to two OLFPs (Figure 8). OLFP1 runs along the main stream along the southern boundary (FTL estimated 19ha catchment area). The contributing catchment of the OLFP is from upstream of the site as well as from the southern side of Hunua Road, as there are culverts under the road that will take runoff under Hunua Road. OLFP2 runs along the western boundary (FTL estimated 5ha catchment area). Estimated 1% AEP flows are 6.39m^3/s and 2.14m^3/s respectively for OLFP1 and OLFP2.

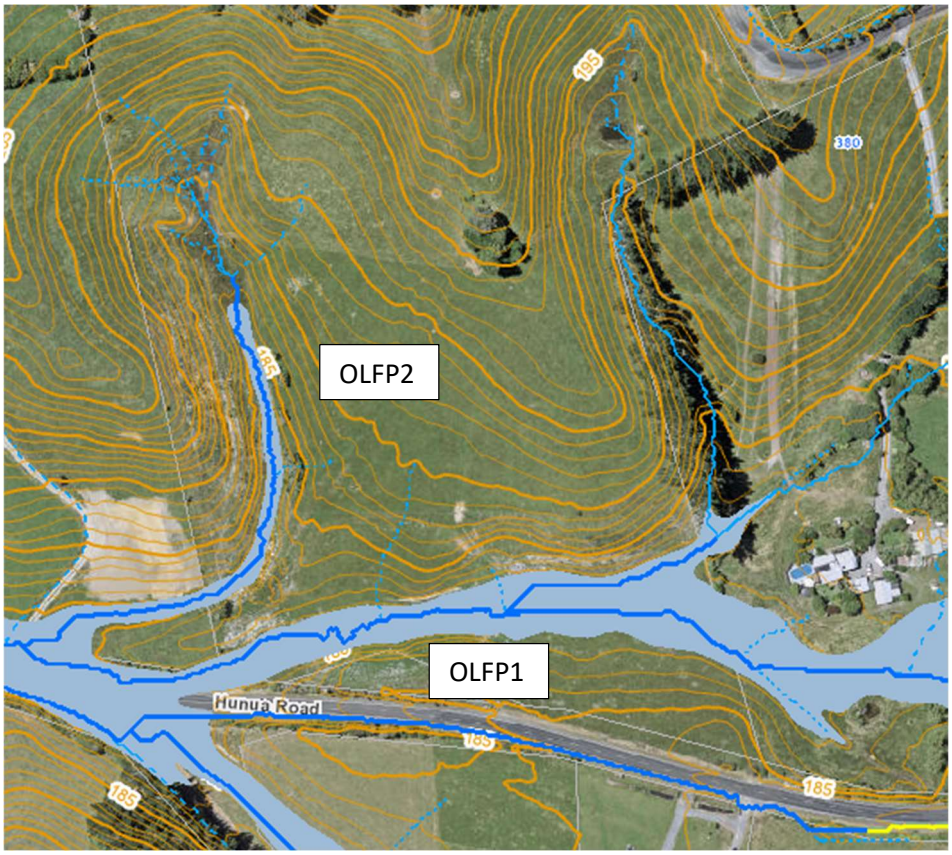


Figure 8: Geomaps OLFP and Floodplain Data for the Southern Area of the Site

The northern side of the site is also subject to two OLFPs. OLFP3 runs along the main stream along the north western boundary (FTL estimated 15ha catchment area), and OLFP4 along the northern boundary (FTL estimated 12ha catchment area). The estimated 1% AEP flows for each OFLP are 5.15m^3/s and 5.07m^3/s respectively for OLFP3 and OLFP4. OLFPs 3 and 4 are shown in Figure 9 below.

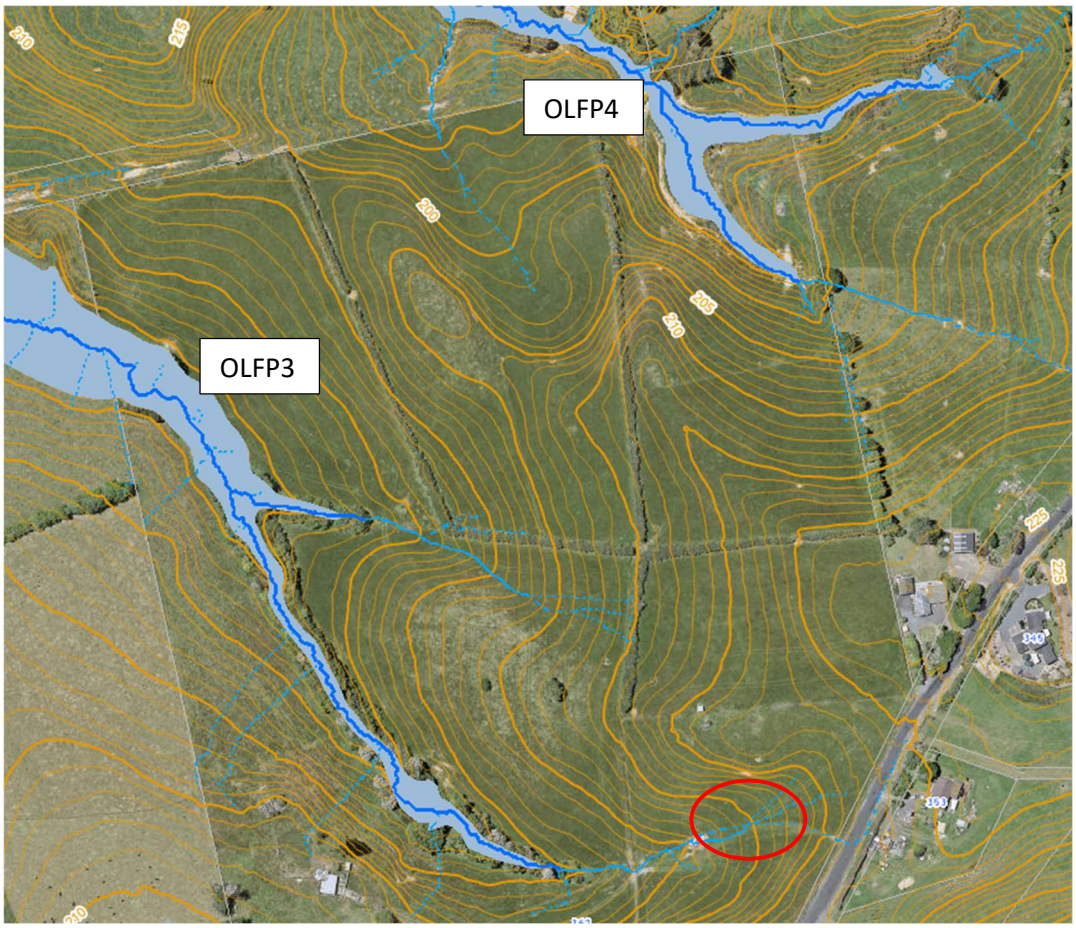


Figure 9: Geomaps OLFP and Floodplain Data for the Northern Area of the Site

6.5.2 Assessment

Our assessment has found:

- All of the OLFPs are classified as both OLFPs and floodplains under AUP:OP definitions.
- For OLFP1, the contributing catchment is mostly sheet flow from the site itself. The southern fill platform will be outside of the floodplain extent, and the fill platform will not impact the OLFP or floodplain. It is proposed to remove the culvert in the stream and associated embankment, which will reduce the floodplain extent on the site. It is proposed to install a bridge across the OLFP, which will be designed such that it has no impact on OLFP1 or its associated floodplain.

- For OLFP2, the contributing catchment is largely runoff from the upstream catchment. The southern fill platform will be outside of the floodplain extent, and the fill platform will not impact the OLFP or floodplain.
- For OLFP3, the contributing catchment is almost entirely from the site itself. The southern fill platform will be outside of the floodplain extent, and the fill platform will not impact the OLFP or floodplain.
- For OLFP4, the contributing catchment is largely runoff from the upstream catchment. The southern fill platform will be outside of the floodplain extent, and the fill platform will not impact the OLFP or floodplain.
- None of the overland flowpath entry or exit points on the site will be changed.
- The proposed two fill areas and associated bunds and stockpile areas are all located outside the major OLFPs and associated floodplains. They are subject to only minor overland flows which are more likely to occur as shallow sheet flow of low magnitude. Filling these areas should not be an issue in relation to affecting overland flow conveyance or flood storage, with the proposed fill drainage system providing alternative means for catering for these minor flows.
- The proposed erosion and sediment control ponds are located outside the major OLFPs and associated floodplains.

Overall, it is considered that the proposed Fill areas are likely to have less than minor effects on overland flows and flooding.

6.5.3 New Haul Road Crossing of OLFP3

It is however noted that the northern Fill access road will cross the upper area of OLFP3, within the area indicated by the red circle in Figure 7. There are three small OLFPs shown in this area with associated catchment areas off Geomaps of 3,646m^2, 2,611m^2 and 9,042m^2 going from north to south, giving a combined catchment area of 15,299m^2. Collectively, these three OLFPs and the southern most OLFP alone quality as OLFPs in terms of the minimum 4,000m^2 catchment requirement.

These OLFPs will need to be piped under the haul road using a culvert. This will trigger a resource consent under AUP:OP Section E36 A41 "Diverting the entry or exit point, piping or reducing the capacity of any part of an OLFP as a **restricted discretionary** activity."

Assessment criteria are listed under E36.8.1 (12) and repeated below, along with an assessment against each criteria:

(a) potential effects on the OLFP including:
- *(i) the obstruction of flows; and*
- *(ii) any change to location and capacity; and*
- *(iii) any changes in depth and velocity of flow; and*
- *(iv) any change to overland flow on other properties.*

(b) the provision of alternative overland flow paths;
(c) the extent of any associated earthworks; and
(d) the extent to which methods for long term maintenance of areas affected by flooding, such as easements, are provided.

Assessment: The haul road crossing of this OLFP will be designed with a culvert at the crossing point that will allow for estimated peak flows for the 1% AEP storm event with provision for climate change to be conveyed through it. Hence, there will be no obstruction of flows along the OLFP alignment and no changes to the location or capacity of the existing OLFP. There may be some localised changes in flow velocity and depth at the culvert inlet, as some heading up of flow is expected, but flow depth and velocities will revert to existing conditions downgradient of the culvert reasonably quickly based on the existing land gradient along the OLFP alignment (12%). There will be no changes to overland flow on other properties.

It is not necessary or practical to provide alternative OLFPs as the haul road runs across the entire OLFP catchment, while the extent of any associated earthworks will be minor, restricted to the width of the haul road (6m) plus 1-2m either side. Methods for long term maintenance of areas affected by flooding does not apply.

Overall, the proposed culvert crossing complies with all of these requirements and will not result in any adverse environmental effects.

6.6 SLOPE AND LAND STABILITY

The following measures will be taken to ensure that no adverse stability issues arise from the placement of fill material on-site:

- Unsuitable material will be removed prior to filling;
- Underfill drainage will be installed along the base of the shallow gullies running through the fill areas and other relevant locations where it is considered necessary;
- Benching of side slopes will be undertaken;
- The front batter slopes will not be steeper than 1V:3H (33%);
- Stormwater will be controlled with fill laid with a slight positive fall to avoid surface ponding;
- Completed fill areas will be topsoiled and grassed as soon as practicable, particularly all temporary and final batter slopes.

The FTL geotechnical investigation undertook specific slope stability analyses to determine the stability of the proposed fill profile, particularly the stability of the proposed end batter slope, using the computer programme Slope/W for various potential slip surfaces within the soil veneer. Theoretical factor of safety values of 1.48-1.52 and 1.30-1.34 were obtained for the three cross-sections analysed for assumed wet winter and extreme transient (saturated) groundwater conditions respectively, for the moderately steep to steep slope represented by Cross Section

AA, BB and CC (refer drawing G00417/02). These factor of safety values are considered to be satisfactory, being greater than the limiting values of 1.5 and 1.3 for wet winter and extreme transient (saturated) groundwater conditions respectively.

Overall, the effects of filling activity on slope and land stability are considered to be less than minor.

6.7 VEGETATION INCLUDING RIPARIAN VEGETATION

The existing vegetation (grass/weeds) will be progressively removed prior to filling and progressively replaced with productive pasture on completion of filling. The associated short-term absence of vegetation is minor in nature, while the restored pasture is likely to be of better quality than the existing grass/weeds.

6.8 WORKS WITHIN A WATERCOURSE

6.8.1 Sediment Pond Discharges

The discharge points from the three sediment ponds to the existing watercourses will be provided with riprap for scour/erosion protection. These outlets are located outside the nearby watercourse OLFP/floodplains and hence will not extend down the banks of the associated watercourses or across stream beds, nor will they change or alter the stream cross-sectional flow area. The extent of these works will be determined during preparation of construction drawings. The works will be undertaken in accordance with best practice and will have a less than minor effect on the existing watercourses. They will be a permitted activity under the AUP:OP.

6.8.2 Removal of Existing Culvert Crossing

The existing culvert crossing over the southern stream near the new site entrance is to be removed. These works are to be undertaken during a forecast period of fine weather (minimum 2-3 days) in summer season, ideally when no water is flowing in stream. The proposed methodology is set out below:

(a) Establish erosion and sediment controls, comprising super silt fence across stream channel downgradient of culvert. Provide for portable pump and sand bags to be available on-site for damming stream on upstream side, in event of unexpected rainfall or stream low flows;
(b) Remove any vegetation from culvert crossing;
(c) Remove road embankment (soil material) to stockpile. Place suitable materials in Fill facility and dispose of excess or unsuitable spoil off-site to appropriate facility. Contamination testing of fill material in embankment may be required based on visual observations (at discretion of SQEP).
(d) Remove existing 375mm dia culvert and any hardfill bedding material and associated inlet/outlet structures.

(e) Remove residual stream embankment down to existing stream bed level and undercut by 150mm.
(f) Trim stream banks to tie in with existing stream profile.
(g) Place 150mm clean topsoil on restored stream bed and stream batters and cover with biodegradable coir matting or similar, pinned in place.
(h) Grass stream bed and banks, using water tolerant grass (Outfield 'Rye' grass or similar approved). Supplier – Prebble Seeds, 09 273 4682
(i) Remove erosion/sediment controls and any temporary dams.

Notes:

- Works extent is approximately 100m^2 with estimated embankment volume of 33m^3.
- Estimated works duration is two days, but three days allowed to provide some contingency.
- Stream bed disturbance during construction will be limited to the minimum practical area and not more than 5m either side of the old culvert, excluding the length of the culvert itself.
- All construction materials and ancillary materials will be removed from the stream bed following completion of construction.

Post-culvert removal, the stream and associated wetland in this area will be enhanced.

It is assumed that the existing culvert was lawfully established. Hence, removal of the existing culvert will be a permitted activity under Rule E3.4.1 (Activity A24) of the AUP:OP, subject to complying with the requirements set out below, which will also ensure that there are no associated adverse environmental effects.

E3.6.1.13. Works on structures lawfully existing on or before 30 September 2013 and the associated bed disturbance or depositing any substance, diversion of water and incidental temporary damming of water for the demolition or removal of existing structures

(1) The activity must comply with the standards in E3.6.1.10 above (below).

(2) The structure must be removed from the bed as far as practicable.

(3) Any remaining sections must not be a hazard to public access, navigation or health and safety.

(4) The bed must be restored to a profile that does not inhibit water flow or prevent the passage of fish upstream and downstream in waterbodies that contain fish.

The proposed works will comply with items (2) – (4), as the existing culvert and embankment structure will be removed from the stream bed completely and no sections will be left in place, while the stream bed will be restored to a profile that ties in with existing upstream and downstream sections, that does not inhibit water flow or prevent fish passage.

E3.6.1.10. Standards for works on structures lawfully existing on or before 30 September 2013 and the associated bed disturbance or depositing any substance, diversion of water and incidental temporary damming of water

(1) All works on existing structures must comply with all of the following standards:

(a) during the activity bed disturbance upstream or downstream of the structure must not exceed 10m either side, excluding the length of the structure;

(b) best practice erosion and sediment control measures must be used to minimise any discharge of sediment, including sediment impounded behind an existing structure;

(c) debris or other material must not be re-deposited elsewhere in the bed of the lake, river or stream, or within the one per cent annual exceedance probability (AEP) flood plain;

(d) the activity must not cause more than minor bed erosion, scouring or undercutting immediately upstream or downstream; and

(e) the activity must not compromise the structural integrity of the structure.

The proposed culvert removal works will comply with E3.6.1.10, as the 10m limit either side of the structure will be achieved, best practice erosion and sediment controls will be put in place, no debris redeposition will occur; no more than minor bed erosion, scouring or undercutting will occur and the structure will be removed so item (e) is irrelevant.

Note that National Environmental Standard – Freshwater Management (NES-FM) has no controls on the removal of an existing culvert but controls the placement, use, alteration, extension, or reconstruction of a new culvert and hence is not relevant to this situation.

6.8.3 New Bridge

The new southern stream crossing will involve a bridge, with no works proposed within the watercourse. The new bridge shall be designed to take the 1% AEP storm event with allowance for climate change without heading up. The new bridge will have a design life of at least 50 years.

Installation of the new bridge will be a permitted activity under Rule E3.4.1 (Activity A29) of the AUP:OP, subject to complying with the requirements set out below, which will also ensure that there are no associated adverse environmental effects.

E3.6.1.16 New structures and the associated bed disturbance or depositing any substance, diversion of water and incidental temporary damming of water for bridges or pipe bridges. It requires:

(1) The activity must comply with the standards in E3.6.1.14 above.

(2) Piles must not be located in, on or under the bed of the lake, river, stream or wetland.

Compliance with E3.6.1.14 is addressed below. The bridge will be designed at building consent stage and will ensure that no pipes are located in, on or under the bed of the stream/wetland that the bridge crosses.

E3.6.1.14. Standards for new structures and the associated bed disturbance or depositing any substance, diversion of water and incidental temporary damming of water

(1) Structure length must comply with all of the following:

(a) the total length of any extended structure must not exceed 30m measured parallel to the direction of water flow. This includes the length of any existing structure and the proposed extension but excludes erosion or scour management works;

(b) any required erosion or scour management works must not exceed 5m in length, either side of the extended structure. Such works protruding into the bed do not require a separate consent as they are authorised under this rule; and

(c) a new structure must not be erected or placed in individual lengths of 30m or less where this would progressively encase or otherwise modify the bed of a river or stream.

(2) During construction bed disturbance upstream or downstream of the structure must not exceed 10m either side, excluding the length of the structure.

(3) The structure must not prevent the passage of fish upstream and downstream in waterbodies that contain fish, except that temporary restrictions to fish passage may occur to enable construction work to be carried out.

(4) The structure must not cause more than minor bed erosion, scouring or undercutting immediately upstream or downstream.

(5) Construction material and ancillary structures must be removed from the bed following completion of the activity.

(6) Other than provided for by another rule, the activity must not increase the height or storage capacity of any existing dam.

(7) The 1per cent annual exceedance probability (AEP) flood shall be accommodated by the structure and/or by an overland flow path without increasing flood levels up stream or downstream of the structure, beyond the land or structures owned or controlled by the person undertaking the activity.

(8) Calculation of flow rates will be made using the Auckland Council Technical Publication 108: Guideline for stormwater runoff modelling in the Auckland Region, April 1999.

The proposed bridge will comply with E3.6.1.14, as set out below:

(1) The proposed bridge will be a single lane bridge and easily comply with the 30m length requirement (rule a). No erosion and sediment control works will be required within the stream extent as the bridge will span the stream (rule b). Rule (c) does not apply.

(2) Construction will not involve any stream bed disturbance, as the bridge will span the stream and be installed by crane.
(3) The bridge will span the stream and not interfere with fish passage, including during construction.
(4) The bridge will not cause any minor bed erosion, scour or undercutting.
(5) It is unlikely that any construction materials or ancillary structures would be required within the stream bed. If any are required these would be removed post-construction.
(6) This is not applicable.
(7) The bridge design will accommodate the 1% AEP storm event, including an allowance for climate change, without affecting flood levels upstream or downstream.
(8) The bridge design will use peak flows calculated from TP108.

6.9 STREAM, WETLAND AND GROUNDWATER EFFECTS

Effects on the wetlands on-site are discussed in the Boffa Miskell Ecological report, with key points summarised below.

In the southern area, the wetland crossed by the haul road is deemed to be of low value, and there are benefits to this wetland due to the removal of the culvert. The bridge is to be built outside of the wetland extent, and therefore the impact on the wetland will be a net positive benefit.

In the northern area, there is a wetland at the head of a stream at least 10m away from the main filling area and a larger wetland in the north-eastern corner of the site. Both wetlands are considered likely to be fed by surface runoff and shallow groundwater flows. Filling the northern area will load and compress the ground under the fill and there will be some relatively minor changes in surface water catchments. However, shallow groundwater flows to the streams and wetlands in this area are generally expected to be maintained, so that baseflows are not expected to be changed. Similarly, infiltration to deep groundwater is considered unlikely to change. Overall, there is not expected to be any significant change in flows to these streams, wetlands and groundwater recharge.

There are also three wetland features in the southern area, outside of the proposed fill area. Again, there will be some changes to surface water catchments, but combined surface and shallow groundwater flows to these wetland features are expected to remain similar to the existing situation, and thus no adverse effects on stream function or wetland ecology are expected. Again, recharge to groundwater is expected to be similar to the existing situation.

The proposed activities will be located and managed to ensure that the ecological function of these streams and wetlands is maintained. In particular, there will be no

change to the water level range or hydrological function of the wetlands. Planting the wetland features would further enhance biodiversity values.

Overall, with appropriate measures to avoid and minimise adverse effects, the residual adverse effects to these wetlands would be low or potentially a net gain.

6.10 NEW GROUNDWATER TAKE

The new groundwater will be a permitted activity subject to complying with the following criteria:

E7.6.1.4. Take and use of groundwater up to 20m^3/day when averaged over any consecutive 20-day period and no more than 5000m^3/year:

(1) The groundwater take must not be geothermal water unless it is for a purpose specified in section 14(3)(c) of the Resource Management Act 1991.
(2) The groundwater take must not be from the High-use Aquifer Management Areas Overlay.
(3) The groundwater take must not be for the purpose of dewatering or groundwater level control.
(4) The groundwater take must be located at least 100m from any other existing lawfully established groundwater take from the same aquifer.
(5) Notice on the prescribed form must be received by the Council 15 working days before undertaking this permitted activity.

The groundwater take is not from a high use aquifer management area and is not from geothermal water or for dewatering or groundwater level control. There are no known other lawfully established groundwater takes within 1000m of the proposed take and Council will be advised 15 working days before this activity begins. Hence, the proposed groundwater take will comply with all E7.6.1.4 requirements.

6.11 NEW GROUNDWATER BORE

The proposed new bore will comply with the permitted activity standards in E7.6.2.3 (Drilling and Use of holes and bores - New bores not otherwise specified) as listed and then assessed below:

(1) The bore must not be in a Wetland Management Areas Overlay.
(2) The drilling of the hole or bore must not destroy, damage or modify any places scheduled in the Historic Heritage Overlay.
(3) The bore must be constructed to avoid contaminants entering the aquifer penetrated by the bore.
(4) The bore must be constructed to avoid a hydraulic connection between penetrated aquifers with different pressures, water quality or temperature.
(5) The bore must be operated and maintained to avoid the leakage of groundwater to waste.
(6) The drilling and construction of the bore must comply with section 1, 2, 3 and 4 of "New Zealand Standards - NZS 4411:2001 Environmental Standard for Drilling of Soil and Rock".

(7) The records required under section 4 of "New Zealand Standards - NZS 4411:2001 Environmental Standard for Drilling of Soil and Rock" must be kept and forwarded to the Council no later than one month after the bore is drilled.

The new bore is not located in a wetland management area overlay nor in the historic heritage overlay. It will be constructed by suitably qualified and experienced drillers in accordance with the relevant New Zealand standards (NZS4411:2001) and best practice and hence will avoid contaminants entering the aquifer penetrated by the bore, avoid hydraulic connections between different aquifers and avoid the leakage of groundwater to waste. Drilling records will be provided to Council within one month of the bore being drilled.

It will also comply with the requirements for controlled activities for new bores not otherwise specified under E7.7.1 (4) and E7.7.2 (4), as listed and then assessed below:

E7.7.1 (4):
(a) the location, depth and design of the bore and the design of the head works;
(b) effects on areas any scheduled historic heritage place;
(c) the provision for bore identification;
(d) maintenance of the bore;
(e) monitoring and reporting requirements; and
(f) the duration of the consent and the timing and nature of reviews of consent conditions.

E7.7.2 (4):
(a) the options for the location, depth and design of the bore and the design of the head works to avoid adverse effects on the groundwater resource and other groundwater users;
(b) the options to locate and design the bore and the head works to avoid adverse effects on any scheduled historic heritage places;
(c) the most effective method to identify the bore; and
(d) an effective programme of maintenance for the bore.

The bore has been located close to the internal haul road and near the site office, so that it is relatively close to where exiting vehicles are likely to have their wheels cleaned, so as to reduce associated pumping head. The design of the bore and headworks will be based on New Zealand standards and best practice. A bore ID tag will be installed on the bore and recorded in the Fill Management Plan with the ID being the bore permit number. Bore maintenance primarily involves regular pump servicing in accordance with supplier recommendations and periodic pump flow calibration. Monitoring and reporting requirements are set out in the separate Fill Management Plan. The consent duration requested is two years, as this consent relates to putting down the new bore, which will be done prior to any filling works taking place on site. There are no scheduled historic heritage places near the proposed bore location and hence this item is not relevant.

6.12 NEIGHBOURHOOD EFFECTS

The main neighbourhood effects associated with earthworks are noise, truck movements and dust.

6.12.1 Noise

Noise will be produced by trucks, bulldozer, compactor and excavator movements during normal working hours over the duration of filling activity. Construction noise shall meet the limits in and be measured and assessed in accordance with the requirements of NZS 6803P:1999 "The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work", as required.

Work shall not continue on the site if compliance with the above standard is not achieved. Mitigation measures to reduce noise levels will be implemented, if required (refer FMP).

Noise effects are addressed in a separate specialist noise report and are not commented on further here.

6.12.2 Truck Movements

Truck movements will not exceed 96 vehicles per day each way (192 vehicle movements in total). The average number of trucks is considered to likely be around 60 per day. These movements are not expected to impact on normal vehicle movements along Hunua Road, as assessed in the separate traffic assessment.

6.12.3 Dust

Dust from site earthworks and associated activities is considered to be minor and will be minimised by a wide range of measures as set out earlier in this report, including controls on vehicle movements (routes, speed, etc.), wetting, mulching and progressive grassing, to mitigate potential negative effects on neighbours.

Provided these measures are implemented, the effects of dust are considered likely to be less than minor.

6.13 ECOSYSTEMS

As outlined in Boffa Miskell's specialist ecological report, there are no significant ecosystems within the proposed Fill footprint. Adequate measures are being taken to minimise the potential for silt/sediment to enter the downstream receiving environment, while the proposed maintenance regime will check that these measures are in place and functioning properly. 10m setbacks are maintained to all streams and wetlands.

Hence, it is considered that the potential negative effects of filling activity on any ecosystems in the receiving environment will be avoided or mitigated by these means provided the proposed erosion and sediment control measures are correctly constructed and maintained.

6.14 CONTAMINATION

A Preliminary Site Investigation for contamination has been undertaken of the subject site focusing on the proposed filling areas (refer separate report). The contamination investigation involved a desktop study, site walkover and reporting associated with potential land contamination issues.

The following potential or actual HAIL activities on the subject site were identified, but all of these are located outside of the proposed works area and hence do not trigger the NESCS. For completeness, these activities are:

- Wastewater treatment system has been carried out at the site at a domestic scale and the system is still in use (*HAIL Category G6: Waste recycling or waste or wastewater treatment).*
- Possible soil contamination from historical asbestos and lead based paint usage (*HAIL Category: I Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment).*
- Potential uncertified filling of the northern culvert and southern section of site *(HAIL Category: I).*

Potential HAIL activities that are located within the proposed works area and hence do trigger the NESCS are:

- Potentially uncertified filling observed around the southern culvert (*HAIL Category: I).*

However, based on the information gathered in the PSI, it was concluded that the likelihood of the fill being offsite sourced was low. Furthermore, the area is small and localised; therefore, if the fill material is potentially contaminated, it is highly unlikely that there would be sufficient quantity to pose a risk to human or environmental health.

Therefore, it was considered that HAIL activity I does not apply and the contaminated land provisions of the NESCS do not apply to this site. Similarly, the contaminated land provisions of the Auckland Unitary Plan: Operative in Part (AUP: OP) do not apply to this subject site, as HAIL activities have been confirmed to not be present on site.

In summary, based on the information presented in the PSI report, it is unlikely that HAIL activities have occurred at the site where proposed works are to take place, and therefore it is highly unlikely that there may be a risk to human health if the areas of

the site where HAIL activities have taken place are developed as part of the Managed Fill soil disturbance works.

6.15 MITIGATION AND CONTINGENCY MEASURES

Multiple measures have been included in the design of sediment control measures during the filling and restoration period to prevent excess sediment loads entering the existing stormwater system of open watercourses. These measures include:

- Undertaking the majority of the filling activity during drier weather conditions over summer months.
- Installation of appropriately sized sediment ponds, with chemical flocculation of dirty runoff.
- Stabilising exposed surfaces as soon as practicable upon completion of filling with mulch, hydroseed or grass to reduce erosion.

Other possible mitigation measures that may be employed as required include:

- Placement of geotextile fabrics securely over any soil stockpiles to minimize soil loss from these stockpiles.
- Installing clean runoff diversion bunds/drains to minimise the loading on the sediment ponds.
- Installing additional silt/sediment controls closer to source to reduce sediment loads to the sediment ponds, including drop out pits, check dams, filter socks or similar along the perimeter drain system.

Provided these mitigation measures are in place and correctly maintained the risk of sediment runoff impacting on the local environment is less than minor.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This Engineering report and AEE has been prepared in accordance with relevant statutory requirements and technical guidelines.

SEL are proposing to construct a Managed Fill comprising two separate areas of 9ha and 2ha (including associated drains and sediment ponds) on the northern and southern sides of the site respectively, with corresponding estimated fill volumes of 720,000m^3 and 70,000m^3, giving a combined fill volume of 790,000m^3. Filling will take place over a period of approximately 10 years and consent is sought for a total period of 10 years to provide some contingency should fill volumes be less than anticipated.

Erosion and sediment control will be provided by sediment ponds sized to cater for the entire Fill areas, with treated runoff discharged to the site watercourses.

The site will be fully owned by SEL and managed and operated by them.

The Managed Fill has been designed in accordance with best practice, while a Fill Management Plan has been prepared for use during Managed Fill operation. In respect to the matters addressed in this report, implementation of Managed Fill construction and operation in accordance with the design plans and Fill Management Plan, including waste acceptance, inspection, maintenance and site restoration requirements, should ensure that potential adverse environmental effects associated with the filling and associated activities are avoided or mitigated, so that these effects are less than minor.

Figures and Drawings

(refer separate volume)

Appendix A

Calculations

Fraser Thomas Overland Stormwater Runoff - Rational Method			
Job no:	33250	Date:	17/09/2024
Client:	SCARBOROUGH BROTHERS LTD	Revision:	1
Job Name:	362 Jones RD, Hunua	Designer:	FV
		Reviewer:	TB
Purpose:	20 year ARI Drains		

As per New Zealand Building Code E1/VM1, 2.0

117 mm/hr used as the intensity. Midway between both the 8.5 climate time frames.

Catchment runoff

Q = (C · i · A) / 360

Catchment coefficient based on NZBC clause E1

Stormwater intensity is taken from the HIRDS database output

RCP	8.5	Climate scenario - IPCC Representative Concentration Pathway (RCP)
ARI	20	yearly
Time of concentration method	Calculated	As per New Zealand Building Code E1/VM1, 2.3.2 b) or user input
User Time of concentration	N/A	minutes
Period	N/A	years

Catchment area	Surface type	Area, A_i ha	Run-off Coeff, Table 1 Ci	Slope correction Table 2 %	Run-off Coeff, Ci	T_c (min)	Intensity (mm/hr)	Flow Q (m^3/s)
D1A	Grass	0.400	0.67	0-5%	0.72	10	117.00	0.093
		0.400						**0.093**
D1B	Grass	0.800	0.67	0-5%	0.72	10	117.00	0.173
		0.800						**0.173**
D2	Grass	2.000	0.67	0-5%	0.72	10	117.00	0.433
		2.000						**0.433**
D3	Grass	2.000	0.67	0-5%	0.72	10	117.00	0.433
		2.000						**0.433**
D4	Grass	0.950	0.67	0-5%	0.72	10	117.00	0.206
		0.950						**0.206**
D5	Grass	0.950	0.67	0-5%	0.72	10	117.00	0.206
		0.950						**0.206**

Fraser Thomas Overland Stormwater Runoff - Rational Method			
Job no:	33250	Date:	17/09/2024
Client:	SCARBOROUGH BROTHERS LTD	Revision:	1
Job Name:	362 Jones RD, Hunua	Designer:	FV
		Reviewer:	TB
Purpose:	20 year ARI Drains		

As per New Zealand Building Code E1/VM1, 2.0

Catchment runoff

Q = (C · i · A) / 360

Catchment coefficient based on NZBC clause E1

Stormwater intensity is taken from the HIRDS database output

RCP	Historical	Climate scenario - IPCC Representative Concentration Pathway (RCP)
ARI	20	yearly
Time of concentration method	Calculated	As per New Zealand Building Code E1/VM1, 2.3.2 b) or user input
User Time of concentration	N/A	minutes
Period	N/A	years

Catchment area	Surface type	Area, A_i ha	Run-off Coeff, Table 1 Ci	Slope correction Table 2 %	Run-off Coeff, Ci	T_c (min)	Intensity (mm/hr)	Flow Q (m^3/s)
D1A	Grass	0.400	0.67	0-5%	0.72	10	111.00	0.088
		0.400						**0.088**
D1B	Grass	0.800	0.67	0-5%	0.72	10	111.00	0.164
		0.800						**0.164**
D2	Grass	2.000	0.67	0-5%	0.72	10	111.00	0.411
		2.000						**0.411**
D3	Grass	2.000	0.67	0-5%	0.72	10	111.00	0.411
		2.000						**0.411**
D4	Grass	0.950	0.67	0-5%	0.72	10	111.00	0.195
		0.950						**0.195**
D5	Grass	0.950	0.67	0-5%	0.72	10	111.00	0.195
		0.950						**0.195**

Fraser Thomas Overland Stormwater Runoff - Rational Method			
Job no:	33250	Date:	17/09/2024
Client:	SCARBOROUGH BROTHERS LTD	Revision:	1
Job Name:	362 Jones RD, Hunua	Designer:	FV
		Reviewer:	TB
Purpose:	100 year ARI Drains		

As per New Zealand Building Code E1/VM1, 2.0

155 mm/hr used as the intensity. Midway between both the 8.5 climate time frames.

Catchment runoff

Q = (C · i · A) / 360

Catchment coefficient based on NZBC clause E1

Stormwater intensity is taken from the HIRDS database output

RCP	8.5	Climate scenario - IPCC Representative Concentration Pathway (RCP)
ARI	100	yearly
Time of concentration method	Calculated	As per New Zealand Building Code E1/VM1, 2.3.2 b) or user input
User Time of concentration	N/A	minutes
Period	N/A	years

Catchment area	Surface type	Area, A_i ha	Run-off Coeff, Table 1 Ci	Slope correction Table 2 %	Run-off Coeff, Ci	T_c (min)	Intensity (mm/hr)	Flow Q (m^3/s)
D1A	Grass	0.400	0.67	0-5%	0.72	10	155.00	0.123
		0.400						**0.123**
D1B	Grass	0.800	0.67	0-5%	0.72	10	155.00	0.230
		0.800						**0.230**
D2	Grass	2.000	0.67	0-5%	0.72	10	155.00	0.574
		2.000						**0.574**
D3	Grass	2.000	0.67	0-5%	0.72	10	155.00	0.574
		2.000						**0.574**
D4	Grass	0.950	0.67	0-5%	0.72	10	155.00	0.273
		0.950						**0.273**
D5	Grass	0.950	0.67	0-5%	0.72	10	155.00	0.273
		0.950						**0.273**

Fraser Thomas Overland Stormwater Runoff - Rational Method			
Job no:	33250	Date:	17/09/2024
Client:	SCARBOROUGH BROTHERS LTD	Revision:	1
Job Name:	362 Jones RD, Hunua	Designer:	FV
		Reviewer:	TB
Purpose:	100 year ARI Drains		

As per New Zealand Building Code E1/VM1, 2.0

Catchment runoff

Q = (C · i · A) / 360

Catchment coefficient based on NZBC clause E1

Stormwater intensity is taken from the HIRDS database output

RCP	Historical	Climate scenario - IPCC Representative Concentration Pathway (RCP)
ARI	100	yearly
Time of concentration method	Calculated	As per New Zealand Building Code E1/VM1, 2.3.2 b) or user input
User Time of concentration	N/A	minutes
Period	N/A	years

Catchment area	Surface type	Area, A_i ha	Run-off Coeff, Table 1 Ci	Slope correction Table 2 %	Run-off Coeff, Ci	T_c (min)	Intensity (mm/hr)	Flow Q (m^3/s)
D1A	Grass	0.400	0.67	0-5%	0.72	10	146.00	0.116
		0.400						**0.116**
D1B	Grass	0.800	0.67	0-5%	0.72	10	146.00	0.216
		0.800						**0.216**
D2	Grass	2.000	0.67	0-5%	0.72	10	146.00	0.541
		2.000						**0.541**
D3	Grass	2.000	0.67	0-5%	0.72	10	146.00	0.541
		2.000						**0.541**
D4	Grass	0.950	0.67	0-5%	0.72	10	146.00	0.257
		0.950						**0.257**
D5	Grass	0.950	0.67	0-5%	0.72	10	146.00	0.257
		0.950						**0.257**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Oct 31 2024

Drain Type 1 (1%)

Trapezoidal

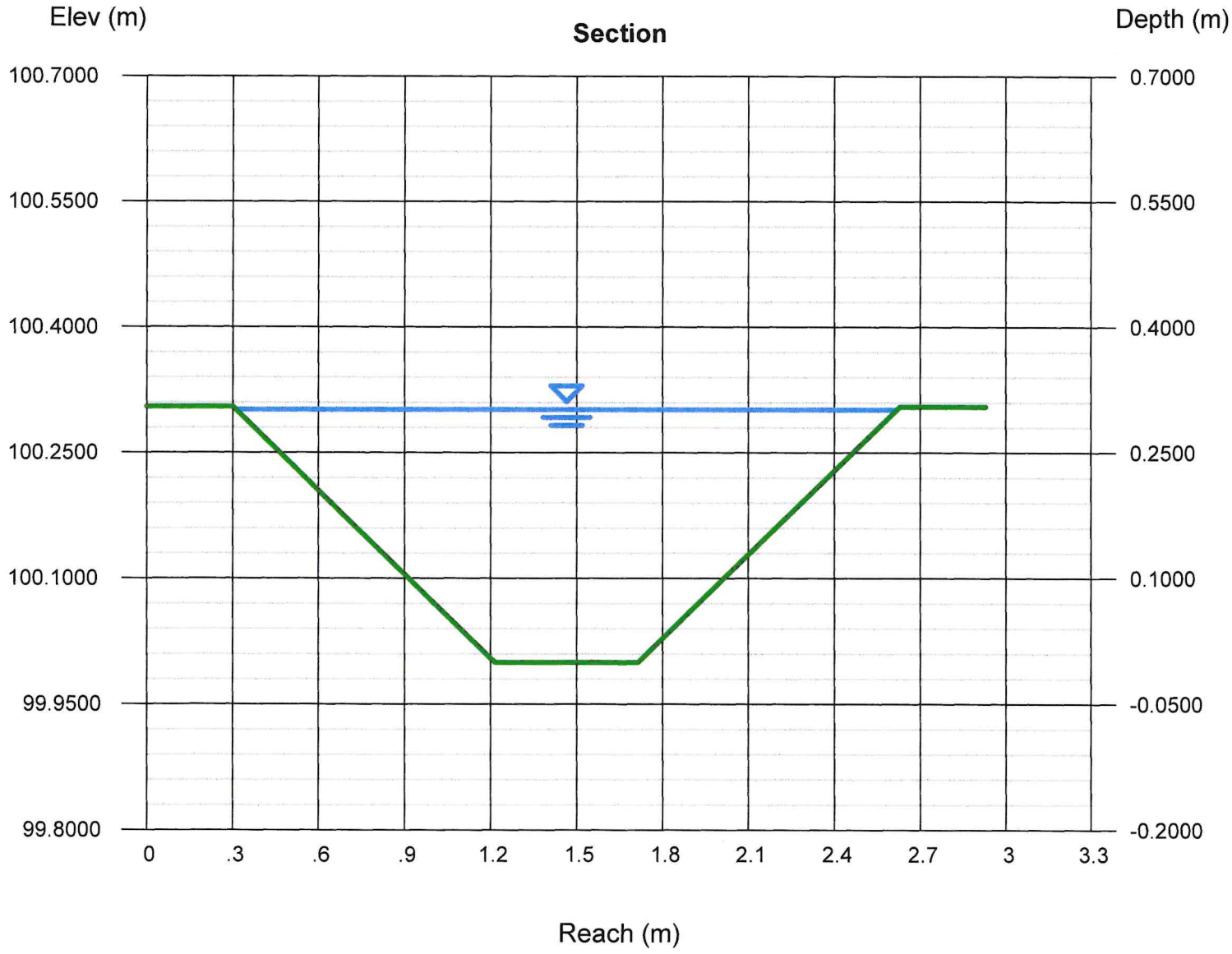
Bottom Width (m)	= 0.5000
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.3050
Invert Elev (m)	= 100.0000
Slope (%)	= 1.2000
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.5740

Highlighted

Depth (m)	= 0.3018
Q (cms)	= 0.5740
Area (sqm)	= 0.4240
Velocity (m/s)	= 1.3536
Wetted Perim (m)	= 2.4084
Crit Depth, Yc (m)	= 0.3048
Top Width (m)	= 2.3105
EGL (m)	= 0.3952



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Oct 31 2024

Drain Type 1 (5%)

Trapezoidal

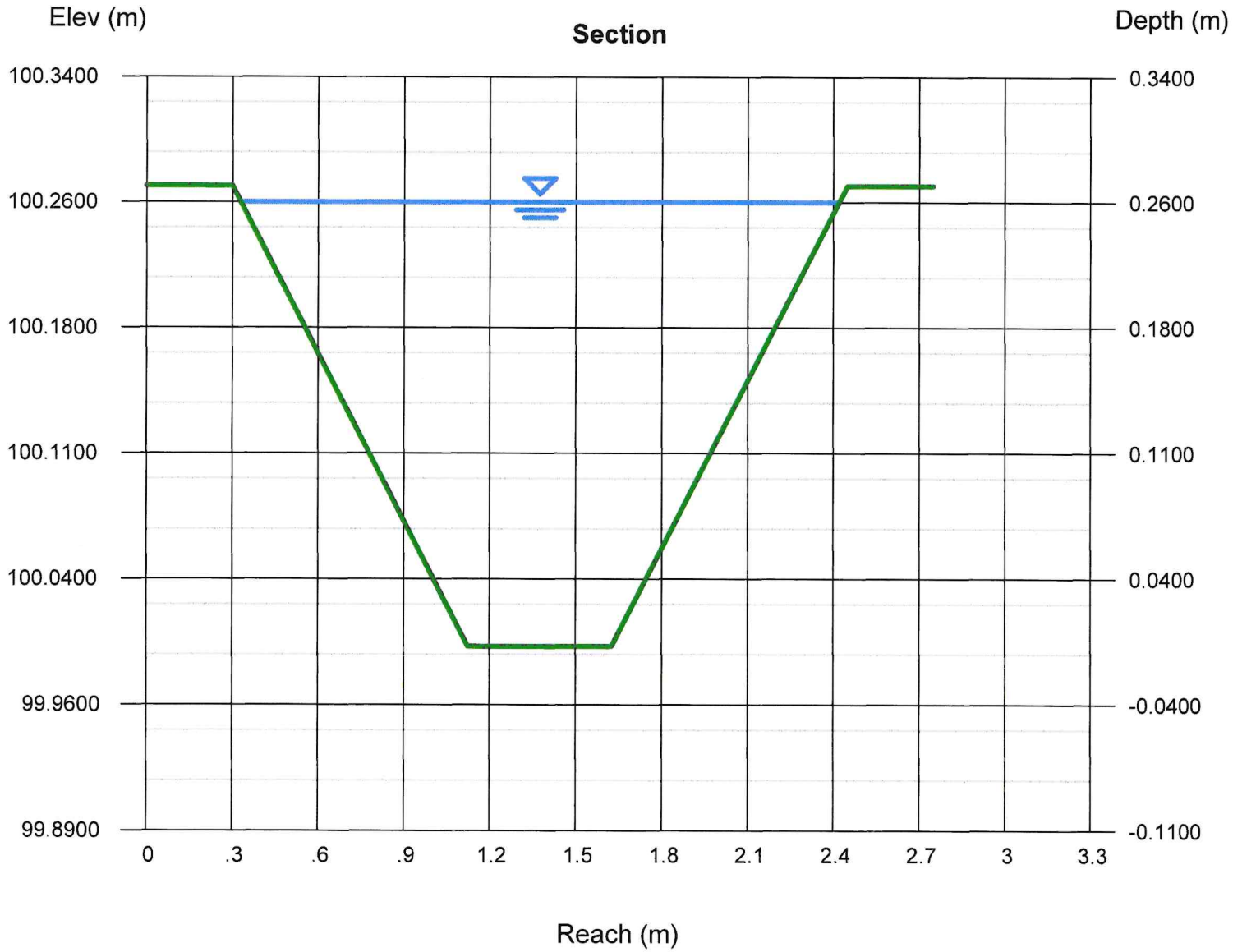
Bottom Width (m)	= 0.5000
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.2750
Invert Elev (m)	= 100.0000
Slope (%)	= 1.2000
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.4330

Highlighted

Depth (m)	= 0.2652
Q (cms)	= 0.4330
Area (sqm)	= 0.3435
Velocity (m/s)	= 1.2604
Wetted Perim (m)	= 2.1771
Crit Depth, Yc (m)	= 0.2652
Top Width (m)	= 2.0911
EGL (m)	= 0.3462



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Oct 31 2024

Drain Type 2 (1%)

Trapezoidal

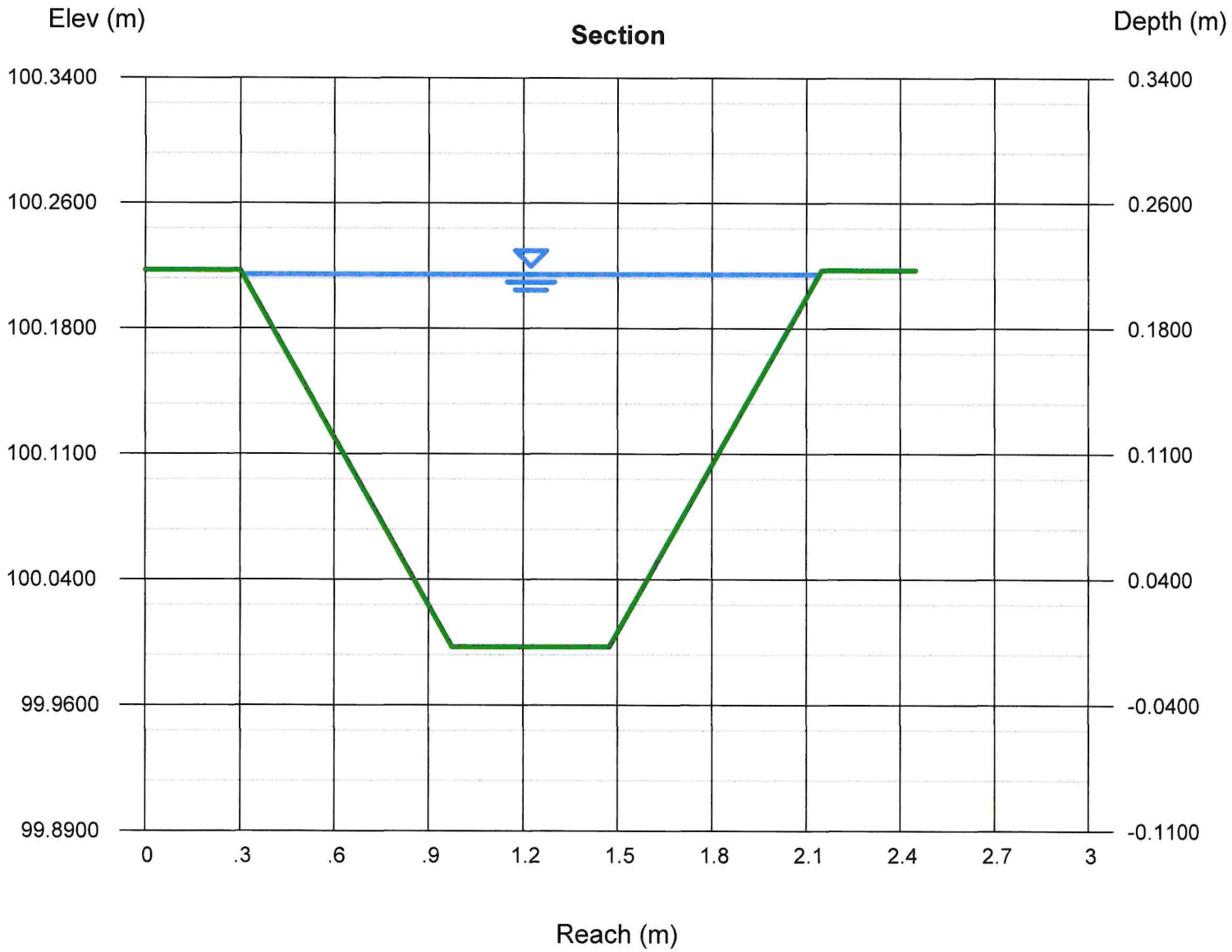
Bottom Width (m)	= 0.5000
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.2250
Invert Elev (m)	= 100.0000
Slope (%)	= 1.0000
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.2730

Highlighted

Depth (m)	= 0.2225
Q (cms)	= 0.273
Area (sqm)	= 0.2598
Velocity (m/s)	= 1.0509
Wetted Perim (m)	= 1.9072
Crit Depth, Yc (m)	= 0.2103
Top Width (m)	= 1.8350
EGL (m)	= 0.2788



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Oct 31 2024

Drain Type 2 (5%)

Trapezoidal

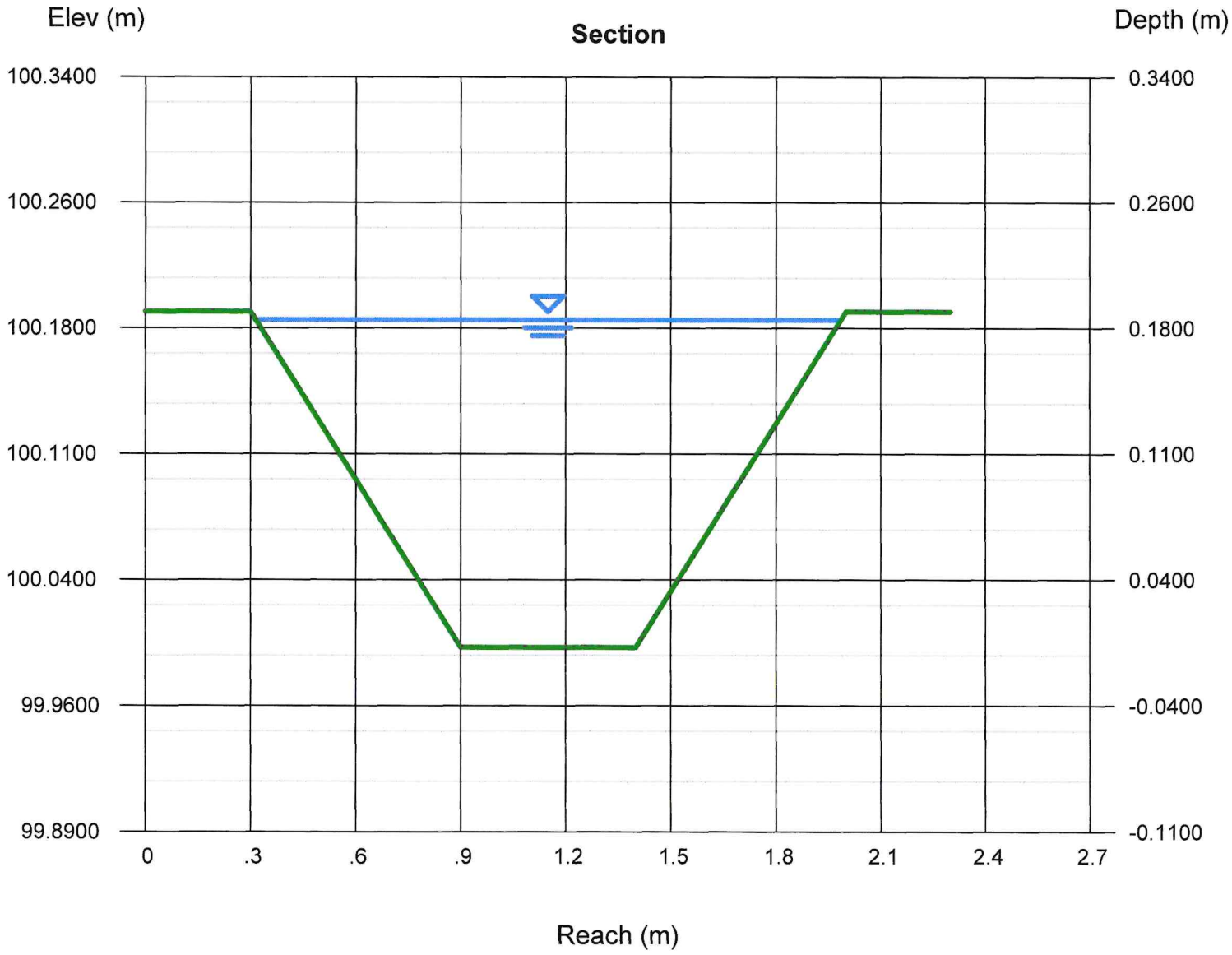
Bottom Width (m)	= 0.5000
Side Slopes (z:1)	= 3.0000, 3.0000
Total Depth (m)	= 0.2000
Invert Elev (m)	= 100.0000
Slope (%)	= 1.0000
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.2060

Highlighted

Depth (m)	= 0.1951
Q (cms)	= 0.206
Area (sqm)	= 0.2117
Velocity (m/s)	= 0.9731
Wetted Perim (m)	= 1.7337
Crit Depth, Yc (m)	= 0.1829
Top Width (m)	= 1.6704
EGL (m)	= 0.2434



Client	Scarbro Environmental L		**Northern**	By	TB	Date	30/08/2024
Job	33250		**Both ponds**	Checked	SF	Date	24/09/2024

Job location: Auckland

Catchment area: 2 ha Maximum catchment area = 5 ha
Catchment slope: 10 %
Catchment length: 250 m

Storage Volume Requirement

If catchment slope > 18 % then 3% catchment
Or if slope length > 200 then 3% catchment, else 2%
Volume requirement: 3% of catchment area
Storage volume: 600 m^3

Pond Parameters

Depth 1.8 m from invert to primary spillway
Length to width ratio 3
Internal batter slopes 1: 2
Entry batter slope 1: 3
Pond invert level 10 m RL
Baffles required: No

Location	Depth	Level	Width	Length	Area	Volume	Required
Base	0	10	5.9	30.3	179	0	
Dead storage	0.76	10.76	8.9	34.1	305	182	180
Primary spillway	1.8	11.8	13.1	39.3	515	605	600
Emergency spillway	2.1	12.1	14.3	40.8	583	769	
Top of pond	2.4	12.4	15.5	42.3	656	955	

Check:

Max decant operating range no more than 1.5m: OK
Live storage = 70% of storage volume OK
Dead storage = 30% of storage volume OK
Dead storage depth must be between 0.4 m and 0.8 OK

Decants

Number of decants: 2
Decant rate: 3 L/s per ha
Required decant flow: 6 L/s
Design decant flow: 6 L/s

Decants	RL	Holes
Decant 1	10.76	133.33333
Decant 2	11.28	133
Decant 3	NA	NA
Decant 4	NA	NA

Total holes
266.66667

Discharge Pipe

Spillway diameter 150 mm
Pipe gradient 1% (Pipe to be at 1-2% grade)
Pipe capacity 15 L/s
Pipe sufficient: Yes

Emergency spillway

Catchment C value 0.6
Rainfall rate 125 mm/hr 1% AEP storm event
Q_p 0.42 m^3/s

Emergency (1% AEP) spillway dimensions

Bottom width: 6 m
Side slope = 1V: 3 H
Spillway depth 0.3 m
Top width 7.8 m
Spillway capacity 1.86 m^3/s
Spillway sufficient: Yes

Forebay design

Level spreader level 12.2 m RL (100-200mm above emergency spillway level)
Forebay top width: 14.70 m
Forebay base width: 10.70 m
Forebay top length: 3 m
Forebay base length 1 m
Forebay depth 1 m
Forebay volume #N/A m^3

Client	Scarbro Environmental L		**Southern**	By	TB	Date	30/08/2024
Job	33250			Checked	SF	Date	24/09/2024

Job location: Auckland

Catchment area: 1.2 ha Maximum catchment area = 5 ha
Catchment slope: 10 %
Catchment length: 250 m

Storage Volume Requirement

If catchment slope > 18 % then 3% catchment
Or if slope length > 200 then 3% catchment, else 2%
Volume requirement: 3% of catchment area
Storage volume: 360 m^3

Pond Parameters

Depth 1.7 m from invert to primary spillway
Length to width ratio 3
Internal batter slopes 1: 2
Entry batter slope 1: 3
Pond invert level 10 m RL
Baffles required: No

Location	Depth	Level	Width	Length	Area	Volume	Required
Base	0	10	4.0	23.9	96	0	
Dead storage	0.8	10.8	7.2	27.9	201	117	108
Primary spillway	1.7	11.7	10.8	32.4	350	362	360
Emergency spillway	2	12	12.0	33.9	407	476	
Top of pond	2.3	12.3	13.2	35.4	467	607	

Check:

Max decant operating range no more than 1.5m: OK
Live storage = 70% of storage volume: Check live storage volume and dea
Dead storage = 30% of storage volume: OK
Dead storage depth must be between 0.4 m and 0.8 OK

Decants

Number of decants: 1
Decant rate: 3 L/s per ha
Required decant flow: 3.6 L/s
Design decant flow: 3.6 L/s

Decants	RL	Holes
Decant 1	10.8	160
Decant 2	NA	NA
Decant 3	NA	NA
Decant 4	NA	NA

Total holes
160

Discharge Pipe

Spillway diameter 150 mm
Pipe gradient 1% (Pipe to be at 1-2% grade)
Pipe capacity 15 L/s
Pipe sufficient: Yes

Emergency spillway

Catchment C value 0.6
Rainfall rate 125 mm/hr 1% AEP storm event
Q_p 0.25 m^3/s

Emergency (1% AEP) spillway dimensions

Bottom width: 6 m
Side slope = 1V: 3 H
Spillway depth 0.3 m
Top width 7.8 m
Spillway capacity 1.86 m^3/s
Spillway sufficient: Yes

Forebay design

Level spreader level 12.1 m RL (100-200mm above emergency spillway level)
Forebay top width: 12.40 m
Forebay base width: 8.40 m
Forebay top length: 3 m
Forebay base length 1 m
Forebay depth 1 m
Forebay volume #N/A m^3

Client	Scarbro Environmental Ltd		Pond N1/N2	By	SF	Date	12/10/2024
Job	33250			Checked		Date	

Erosion And Sediment Control - Universal Soil Loss Equation

A = R K LS C P

Soil Loss	**A**	tonnes/hectare/year
Rainfall Erosion Index	**R**	J/hectare
Soil Erodibility Factor	**K**	tonnes/unit of R
Slope Length and Steepness Factor	**LS**	dimensionless
Vegetative Cover factor	**C**	dimensionless
Erosion Control Practice Factor	**P**	dimensionless

DESIGN FACTORS

R = 0.00828* $p^{2.2}$ *1.70

p = 6 hour 2 year rainfall figure for site (multiply 2yr 24h rainfall by 0.628)

2 yr 24h rainfall = 55 mm

= **34**

p = 34.54 mm

K = 0.4

(assumed 60% silt, 35% clay, 5% sand)

Value from Table 4.1, Triangular Nomograph, Page 2, Module 4, ARC Workshop Training Course (Brown Hard Cover Book)

Organic Content = 1 % (Prior to construction)
0 % (During construction)
1 % (During restoration)

Most topsoils have organic matter >2%
(Enter a whole no. between 0 & 4. Leave if not sure)
Almost all construction sites have negligible quantities of organic matter

		Ground cover During eworks	Ground cover Post-eworks
Corrected K, prior to Construction	**0.594** Calcs based on 1% org content.		
Corrected K, during construction	**0.528** Edit manually using table on		
Corrected K, during restoration	**0.594** right off-sheet		

Enter relevant no of zones based on areas served by different sediment removal devices and ground cover

Catchment Data

Time periods:
Earthworks 39.0 wks
Restoration - grass 13 wks
wks/ha

LS Inputs	Exist	Cfill			
Slope (%)	11.50	33.30			
Length	300.00	150.00			
m (exponent dependent on slope)	0.5	0.5			

Slope	m
<1%	0.20
1-3%	0.30
3.5-4.5%	0.40
>5%	0.50

Section	Exist	Cleanfill			
Area (ha)	2.000	2.000	0.000	0.000	0.000
Construct'n Period(yrs)	0.00	0.75			
Restoration Period(yrs)	0.00	0.25			
LS	5.32	20.93	#NUM!	#NUM!	#NUM!

Formula calculation using "LS inputs" table

Pick from table	C	P
Prior to earthworks	**0.02**	**1.0**
During earthworks	**1.0**	**0.9**
During restoration	**0.1**	**1**

Treatment	C factor	P factor
Bare soil		
- compacted and smooth	1	1.3
- track walked on contour	1	1.2
- rough irregular surface	1	0.9
- disked to 250mm depth	1	0.8
Native Vegetation (undisturbed)	0.01	1.0
Pasture(undisturbed)	0.02	1.0
Temporary grass	0.1	1.0
Temporary cover crop	0.45	1.0

	DEB	SRP Areas	Silt fence
Sediment Delivery Ratio =	0.7	0.7	0.7
Sediment Control Efficiency % =	75	95	50

			USLE Parameters					Time	Gross Sed. Yield	Sed Del. Ratio	Sed. Control Efficiency	Net Sediment Loss
Section	**E/wks period**	**Area (ha)**	**R**	**K**	**LS**	**C**	**P**	**years**	**tonnes**		**%**	**tonnes**
	Present	2	34	0.594	5.32	0.02	1	1.00	4.31			4.31
Exist	During	2.000	34	0.528	5.32	1	0.9	0.00	0.00	0.7	75	0.0000
	Restor'n	2.000	34	0.594	5.32	0.1	1	0.00	0.00	0.7	75	0.0000
	Re-establishe	2.000	34	0.594	5.32	0.02	1	0.00	0.00			0.0000
								0.00	Sub Total (constr'n/restorat'n)			0.0000
	Present	0	34	0.594	20.93	0.02	1	1.00	0.00			0.00
Fill	During	2	34	0.528	20.93	1	0.9	0.75	508.85	0.7	95	17.8097
	Restor'n	2	34	0.594	20.93	0.1	1	0.25	21.20	0.7	95	0.7421
	Re-establishe	2	34	0.594	20.93	0.02	1	0.00	0.00			0.0000
								1.00	Sub Total (constr'n/restorat'n)			18.5517

Net sediment loss = gross sed yield x sediment delivery ratio x (1 - sediment control efficiency/100)

SUMMARY

Estimated total soil loss prior to earthworks :	**4.31**	tonnes over	**1.00** year
Estimated total soil loss during earthworks / restoration :	**18.55**	tonnes over	**1.00** year

Client	Scarbro Environmental Ltd		Pond S1				
Job	33250			By	SF	Date	12/10/2024
				Checked		Date	

Erosion And Sediment Control - Universal Soil Loss Equation

A = R K LS C P

Soil Loss	**A**	tonnes/hectare/year
Rainfall Erosion Index	**R**	J/hectare
Soil Erodibility Factor	**K**	tonnes/unit of R
Slope Length and Steepness Factor	**LS**	dimensionless
Vegetative Cover factor	**C**	dimensionless
Erosion Control Practice Factor	**P**	dimensionless

DESIGN FACTORS

R = 0.00828* $p^{2.2}$ *1.70

= **34**

p = 6 hour 2 year rainfall figure for site (multiply 2yr 24h rainfall by 0.628)
2 yr 24h rainfall = 55 mm
p = 34.54 mm

K = 0.4
(assumed 60% silt, 35% clay, 5% sand)

Value from Table 4.1, Triangular Nomograph, Page 2, Module 4, ARC Workshop Training Course (Brown Hard Cover Book)

Organic Content = 1 % (Prior to construction)
0 % (During construction)
1 % (During restoration)

Most topsoils have organic matter >2%
(Enter a whole no. between 0 & 4. Leave if not sure)
Almost all construction sites have negligible quantities of organic matter

		Ground cover During eworks	Ground cover Post-eworks
Corrected K, prior to Construction	**0.594**	Calcs based on 1% org content.	
Corrected K, during construction	**0.528**	Edit manually using table on	
Corrected K, during restoration	**0.594**	right off-sheet	

Enter relevant no of zones based on areas served by different sediment removal devices and ground cover

Catchment Data

Time periods:
Earthworks 39.0 wks
Restoration - grass 13 wks
wks/ha

LS Inputs	Exist	Cfill			
Slope (%)	12.50	33.30			
Length	200.00	75.00			
m (exponent dependent on slope)	0.5	0.5			

Slope	m
<1%	0.20
1-3%	0.30
3.5-4.5%	0.40
>5%	0.50

Section	Exist	Cleanfill			
Area (ha)	2.000	2.000	0.000	0.000	0.000
Construct'n Period(yrs)	0.00	0.75			
Restoration Period(yrs)	0.00	0.25			
LS	4.92	14.80	#NUM!	#NUM!	#NUM!

Formula calculation using "LS inputs" table

Pick from table	C	P
Prior to earthworks	**0.02**	**1.0**
During earthworks	**1.0**	**0.9**
During restoration	**0.1**	**1**

Treatment	C factor	P factor
Bare soil		
- compacted and smooth	1	1.3
- track walked on contour	1	1.2
- rough irregular surface	1	0.9
- disked to 250mm depth	1	0.8
Native Vegetation (undisturbed)	0.01	1.0
Pasture(undisturbed)	0.02	1.0
Temporary grass	0.1	1.0
Temporary cover crop	0.45	1.0

	DEB	SRP Areas	Silt fence
Sediment Delivery Ratio =	0.7	0.7	0.7
Sediment Control Efficiency % =	75	95	50

			USLE Parameters					Time	Gross Sed. Yield	Sed Del. Ratio	Sed. Control Efficiency	Net Sediment Loss
Section	**E/wks period**	**Area (ha)**	**R**	**K**	**LS**	**C**	**P**	**years**	**tonnes**		**%**	**tonnes**
	Present	2	34	0.594	4.92	0.02	1	1.00	3.99			3.99
Exist	During	2.000	34	0.528	4.92	1	0.9	0.00	0.00	0.7	75	0.0000
	Restor'n	2.000	34	0.594	4.92	0.1	1	0.00	0.00	0.7	75	0.0000
	Re-establishe	2.000	34	0.594	4.92	0.02	1	0.00	0.00			0.0000
								0.00	Sub Total (constr'n/restorat'n)			0.0000
	Present	0	34	0.594	14.80	0.02	1	1.00	0.00			0.00
Fill	During	2	34	0.528	14.80	1	0.9	0.75	359.76	0.7	95	12.5917
	Restor'n	2	34	0.594	14.80	0.1	1	0.25	14.99	0.7	95	0.5247
	Re-establishe	2	34	0.594	14.80	0.02	1	0.00	0.00			0.0000
								1.00	Sub Total (constr'n/restorat'n)			13.1164

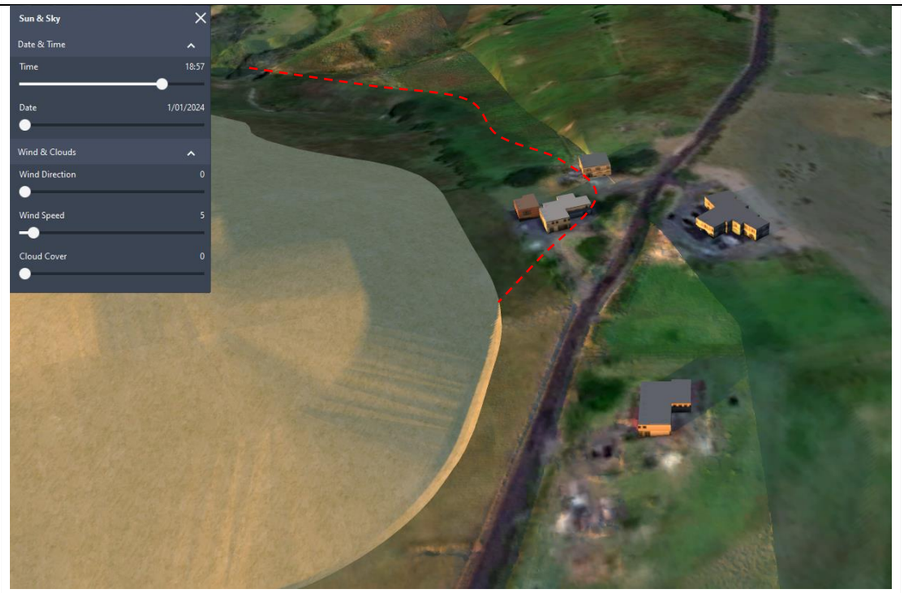
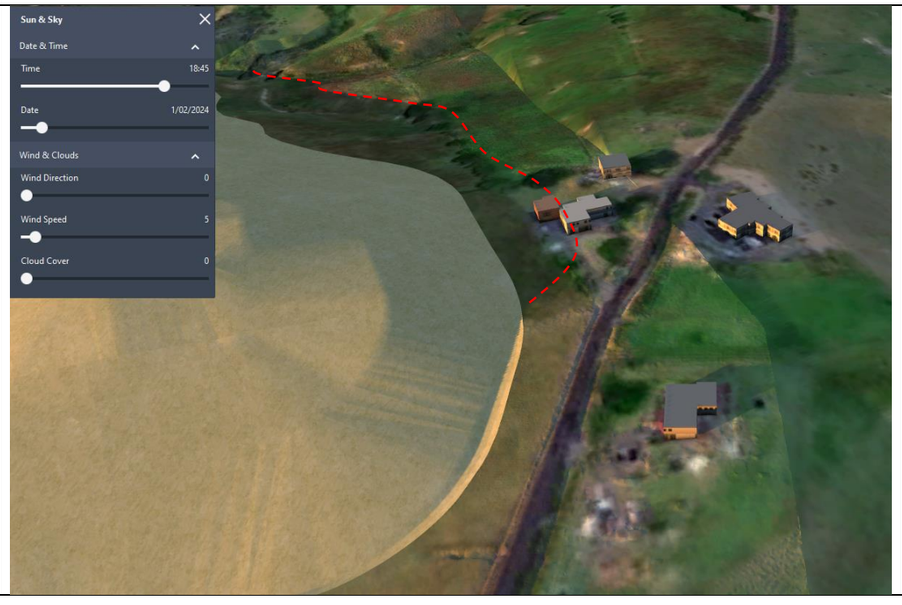
Net sediment loss = gross sed yield x sediment delivery ratio x (1 - sediment control efficiency/100)

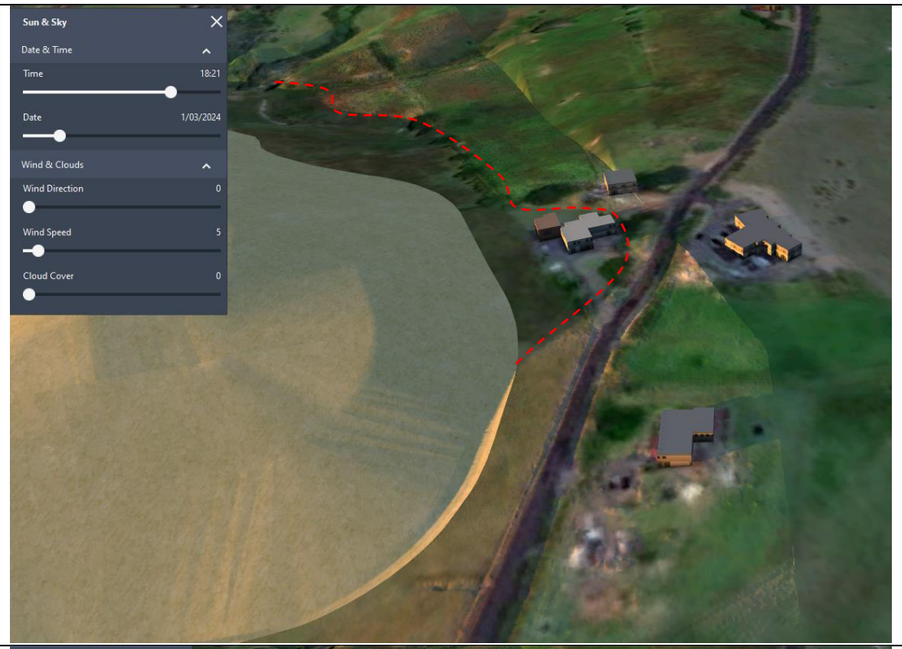
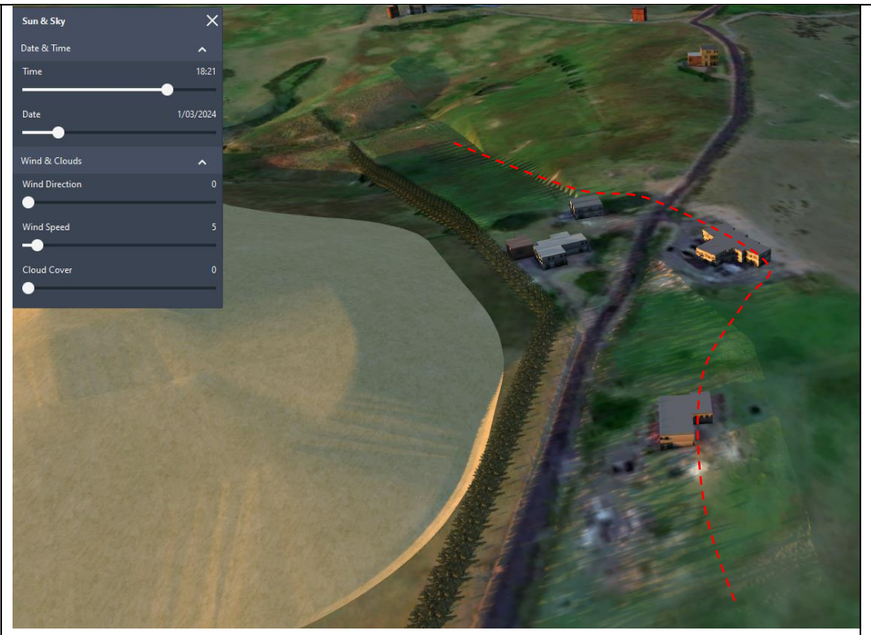
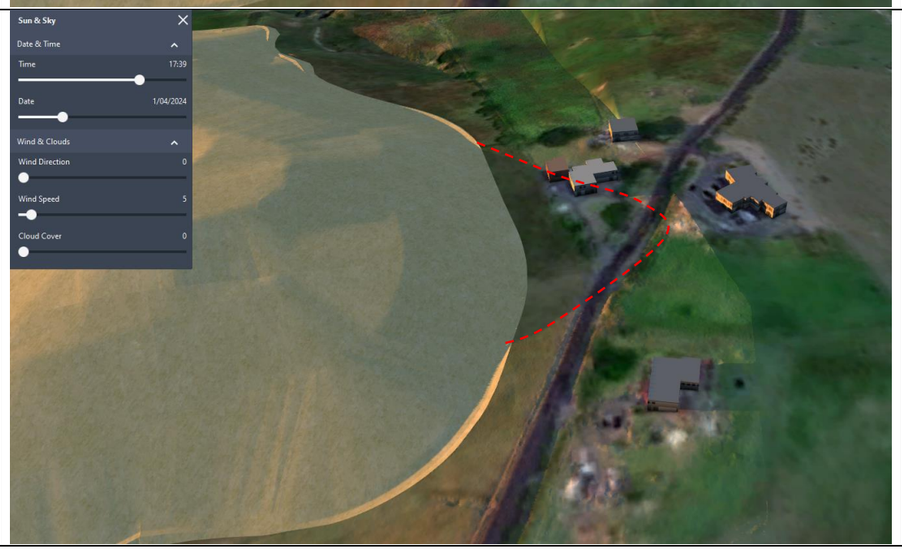
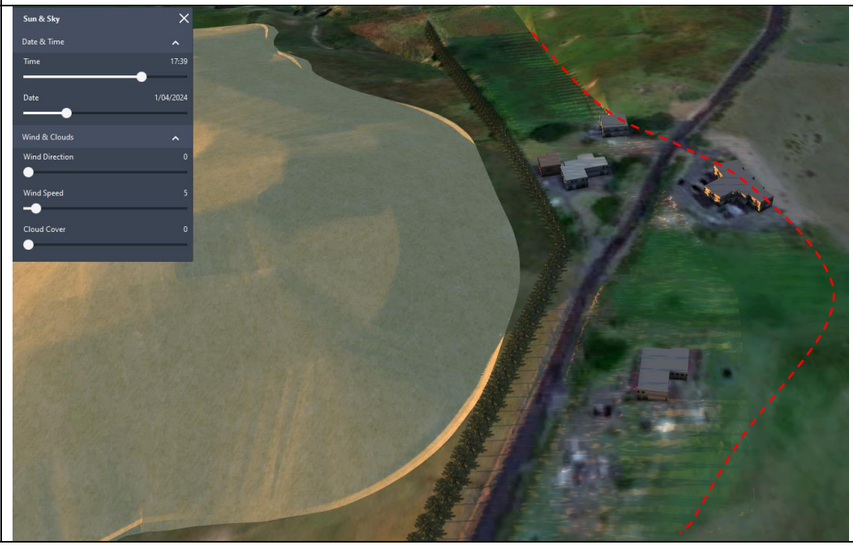
SUMMARY

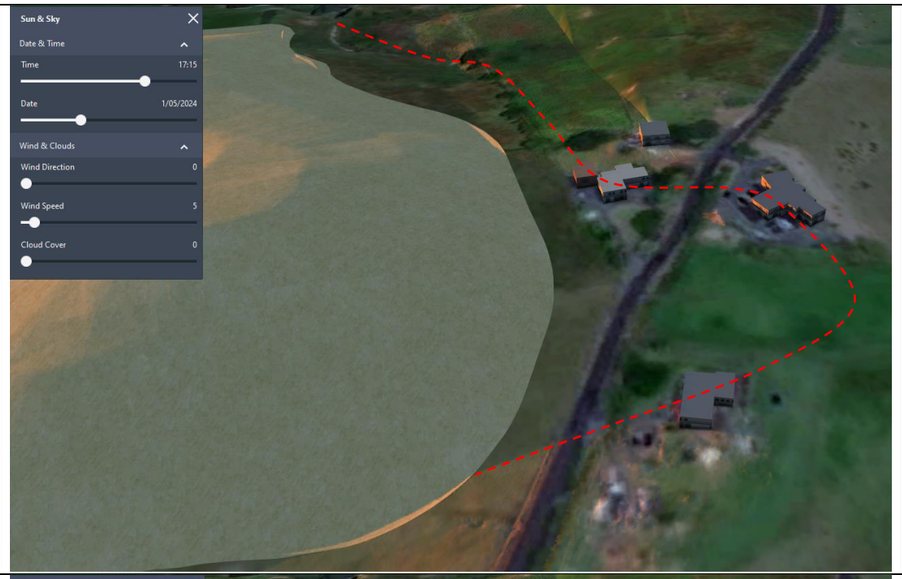
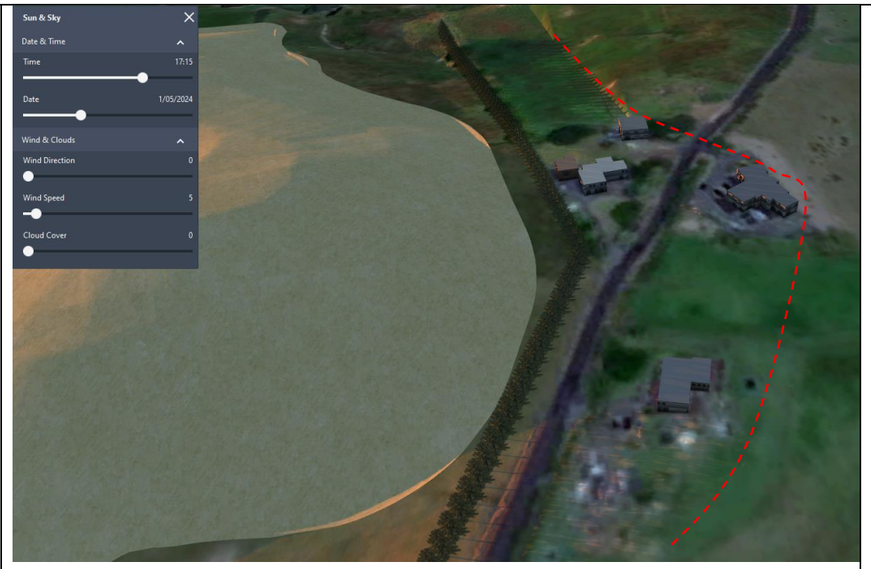
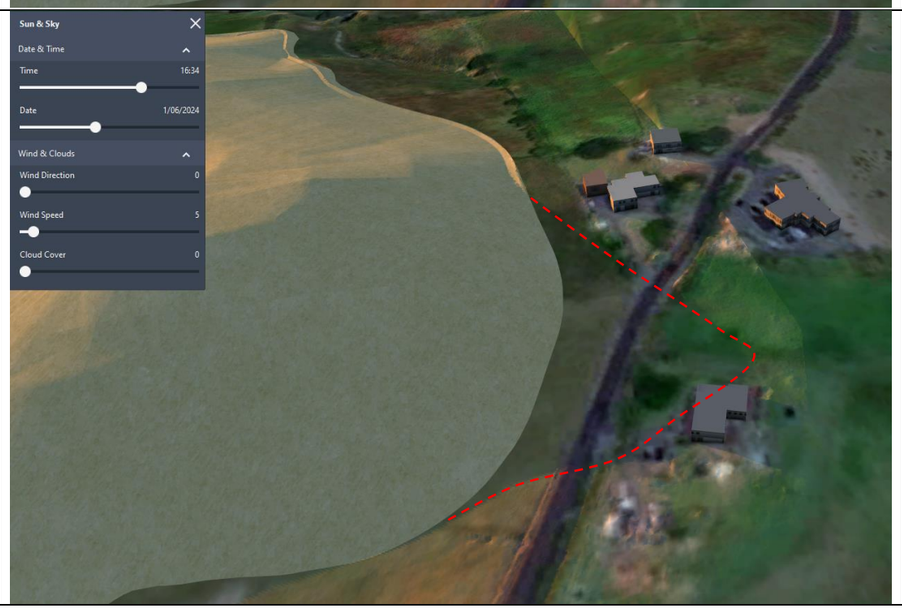
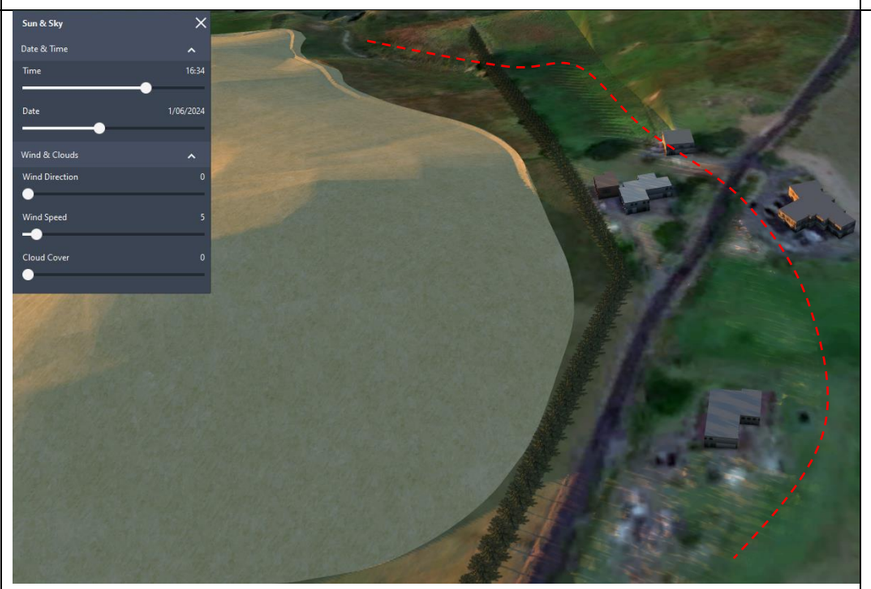
Estimated total soil loss prior to earthworks :	**3.99**	tonnes over	**1.00** year
Estimated total soil loss during earthworks / restoration :	**13.12**	tonnes over	**1.00** year

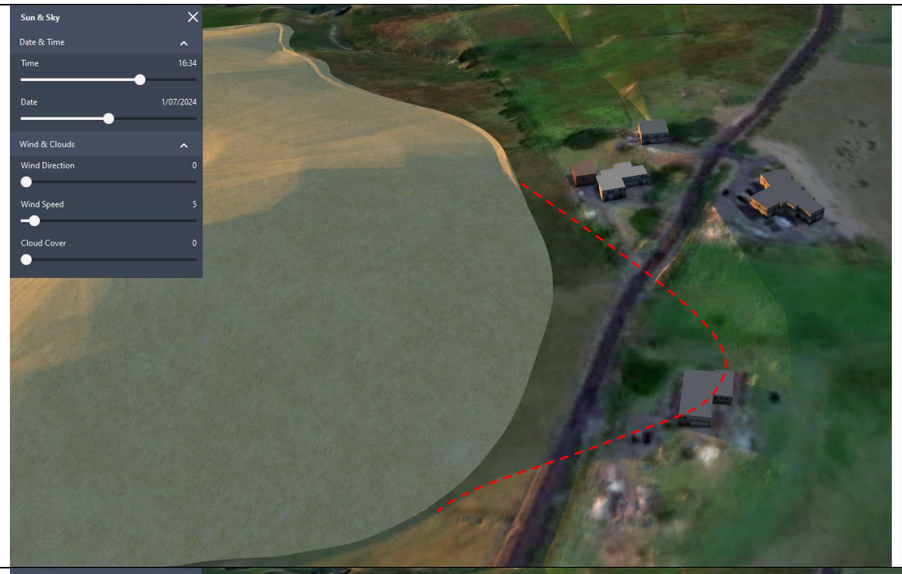
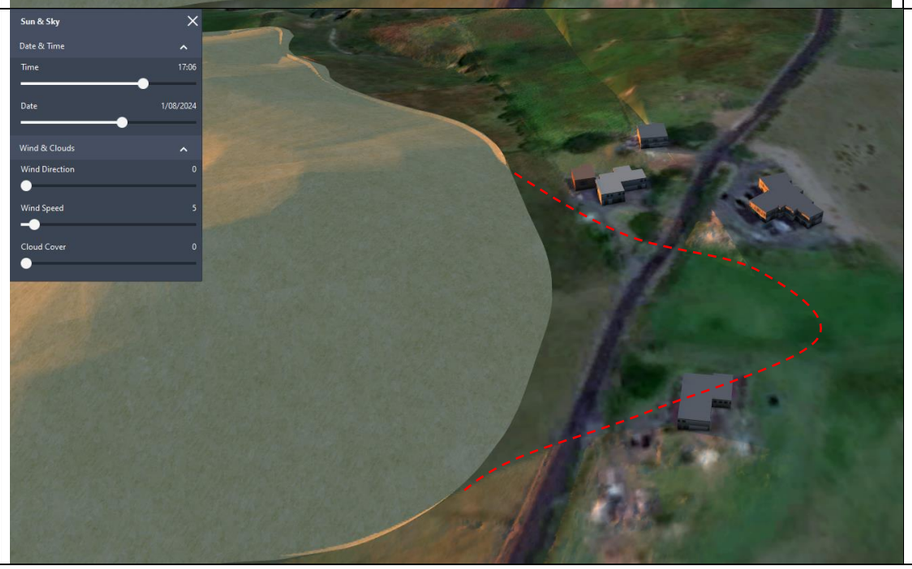
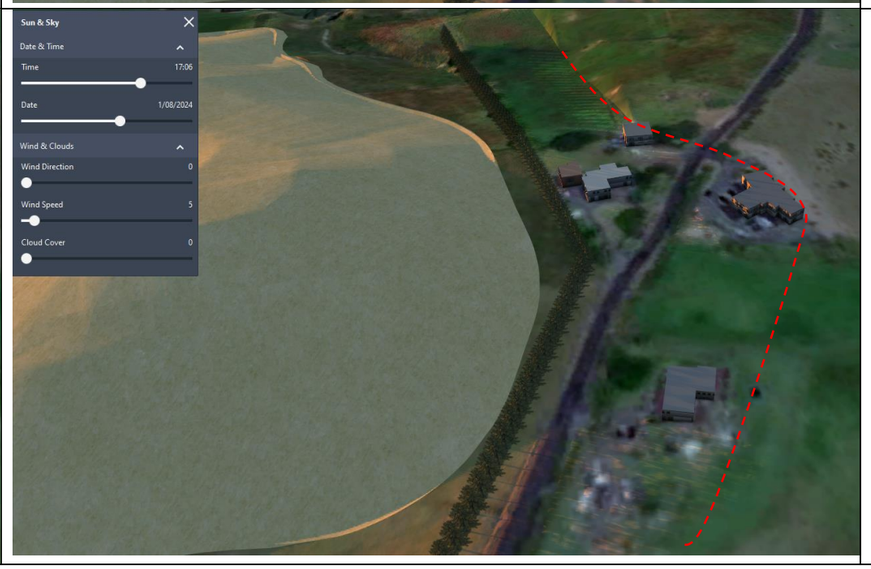
Appendix B

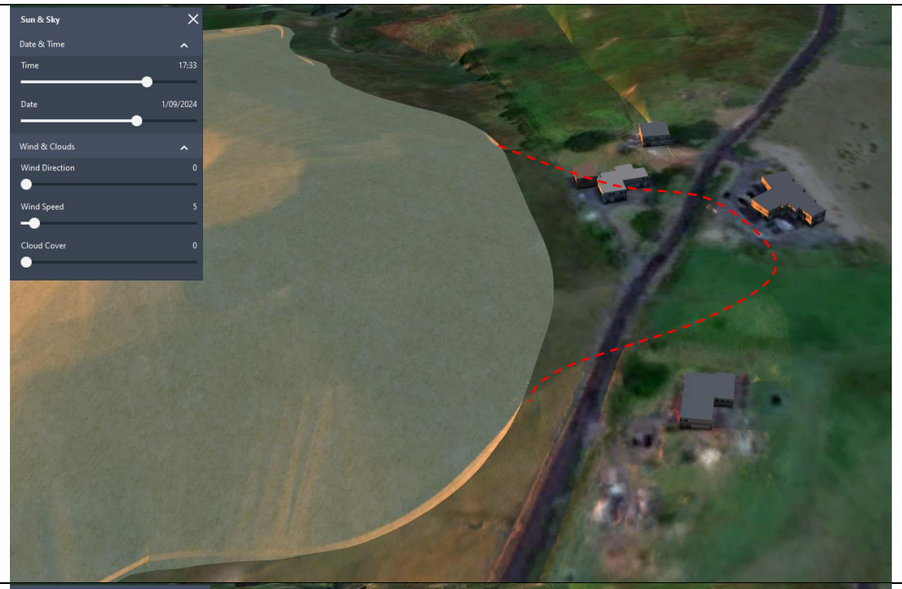
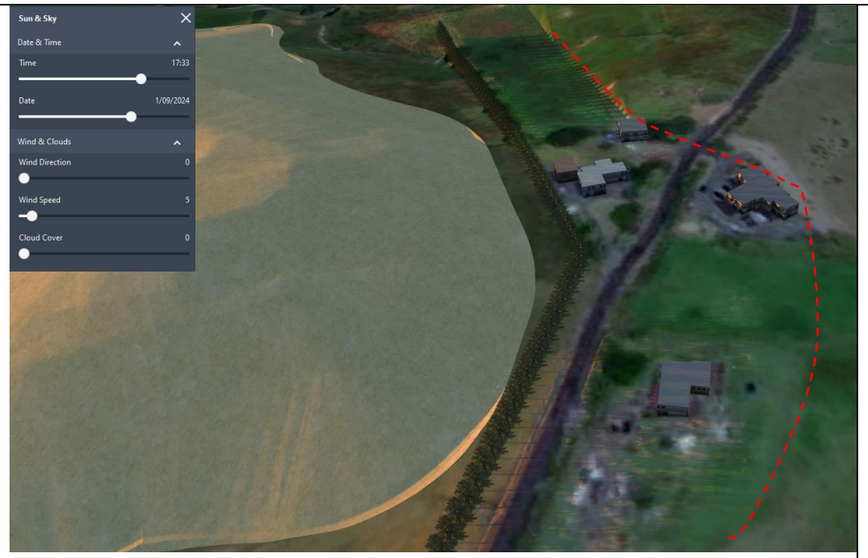
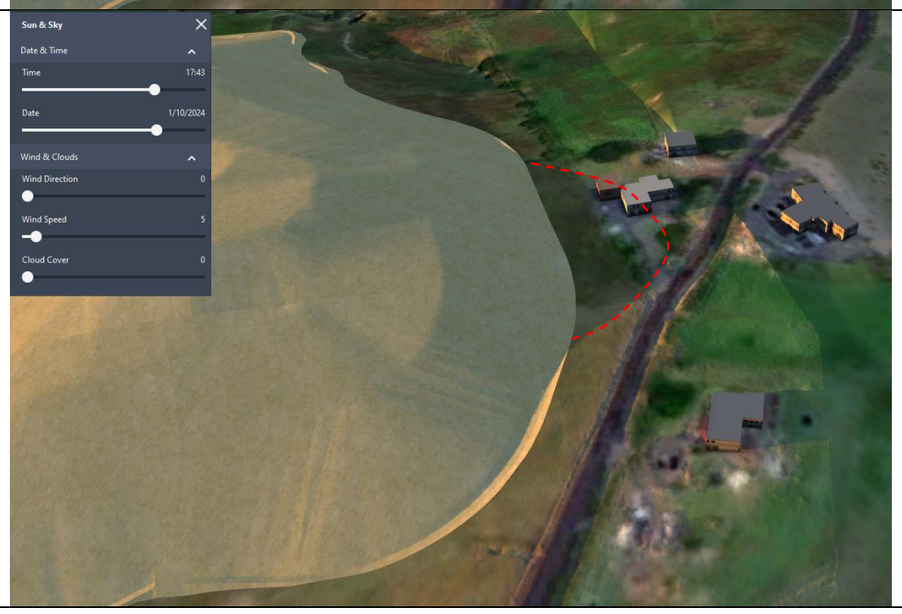
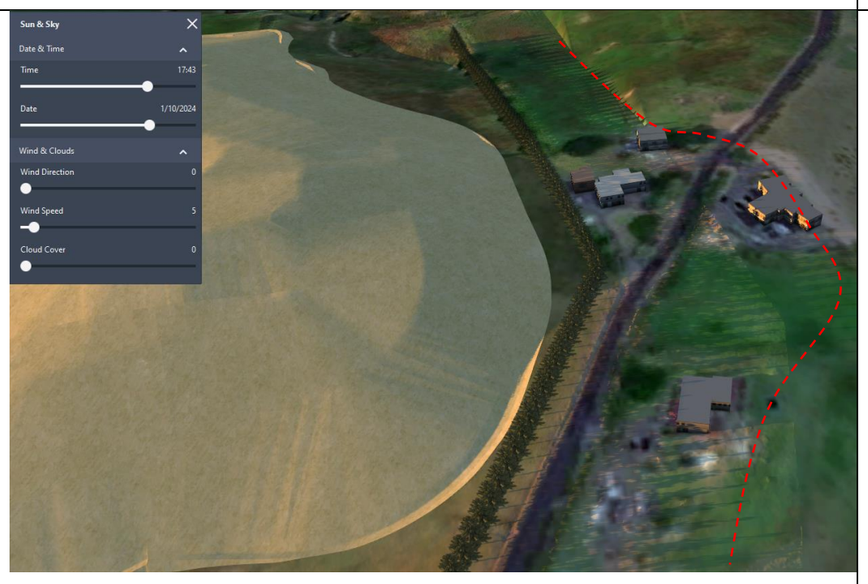
Shadow Analysis

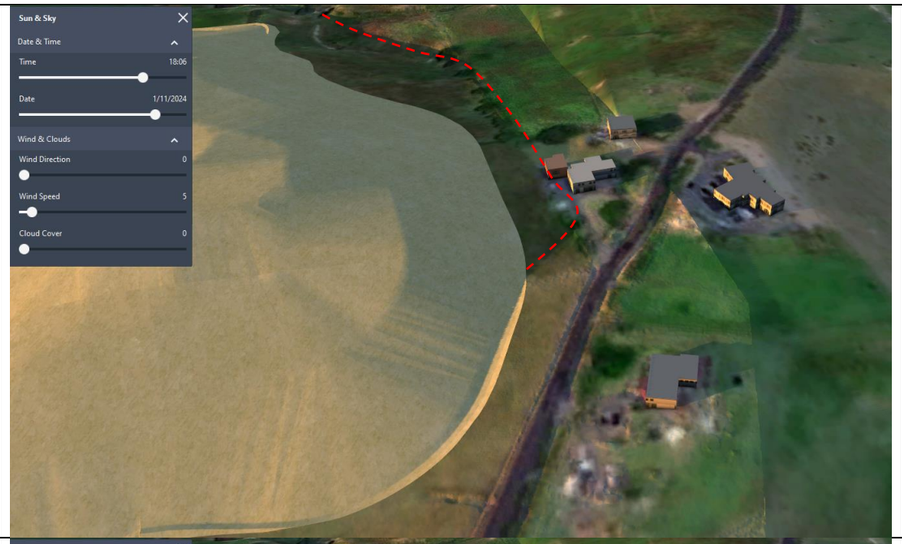
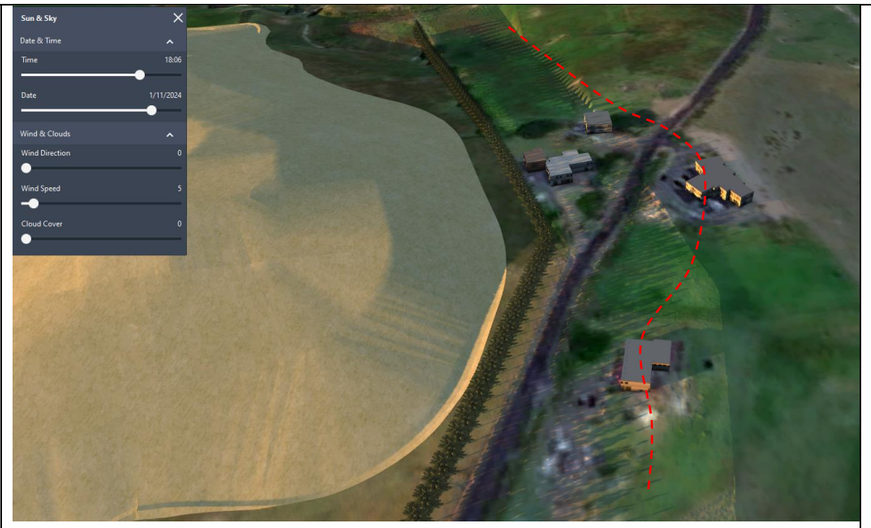
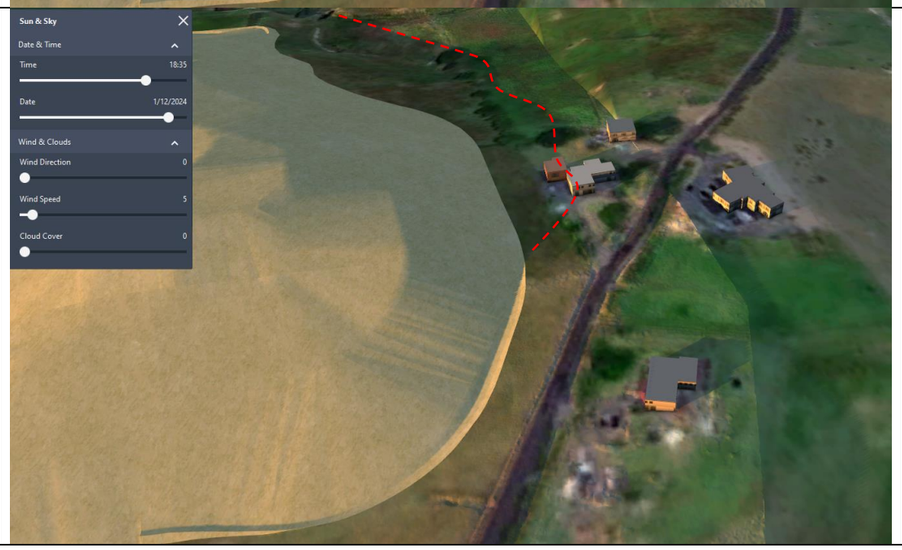
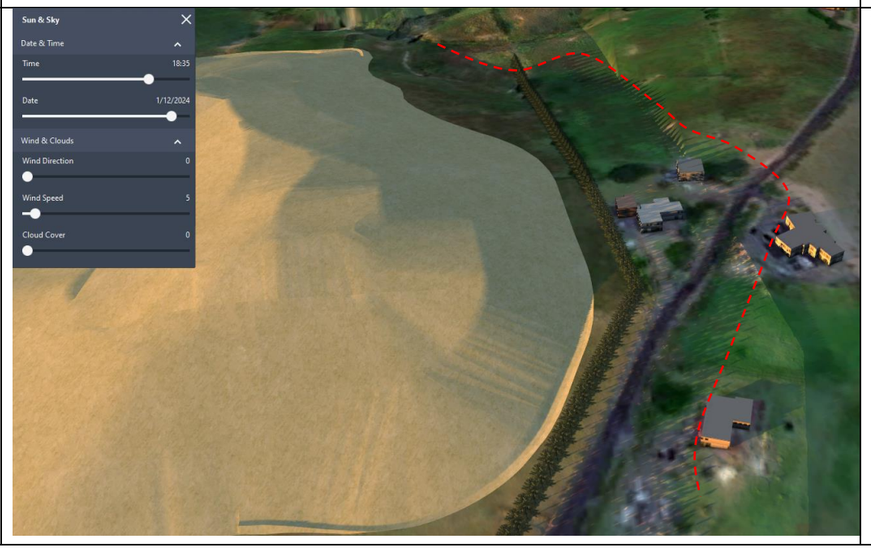
Date	No trees	With trees	No Trees Shadow Time	With trees shadow time	Sunset	No trees - Duration lighting affected (mins)	With trees - Duration lighting affected (mins)
1/1/2024			1857	1516	1944	47	268
1/2/2024			1845	1510	1931	46	261

1/3/2024			1821	1504	1902	41	238
1/4/2024			1739	1447	1814	35	207

1/5/2024			1715	1429	1734	19	185
1/6/2024			1634	1423	1710	36	167

1/7/2024			1634	1429	1712	38	163
1/8/2024			1706	1504	1733	27	149

1/9/2024			1733	1447	1758	25	191
1/10/2024			1743	1459	1822	39	203

1/11/2024			1806	1504	1851	45	227
1/12/2024			1835	1540	1922	47	222

Appendix C

Groundwater Bore and Water Take Information

Spreadsheet Notes:

1. Spreadsheets starting with OAS contain information from the old Auckland Regional Council consenting system. These include details about some of the bores drilled or takes (which are accurate up to 31 May 2017) and may also contain information such as an indication of depth drilled and with which aquifer the bore is associated.

2. Spreadsheets starting with the title AC Consent are lists from current AC SAP consenting system. They list the number of consents in a specified area. There is one spreadsheet for bores and one for water takes (where consent was needed)

Consent Reference	Consent Description	Transaction Type Description	Form Type Description	Consent Status	Application Sub Type	Lodged Date	Decision Date	Issued Date	Consent Decision	Consent GIS Classification	inside x	inside y
LUC60271978-A	Change of reference in Conservation Covenant 8058657.11 from Area Marked Y to being Area marked V on DP 575066.	Resource Management Follow-up Appl	Change of Condition (s127)	Completed	Drill or Alter Bore	20220404	20220517		Withdrawn	RMA Consent	1781292.077	5895130.615
LUC80308532		Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore			19990310		RMA Consent	1782211.188	5895149.038
LUC60414022	The drilling, construction and development of a new bore for use on the property. The bore is planned to be cased with fully grouted steel casing to a depth of 52mtr Bgl and drilled open hole to a dep	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore		20230630	20230314	Monitoring Complete	RMA Consent	1780866.138	5894992.579
LUC80306566	Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriat e depth.	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore			19880211		RMA Consent	1780537.895	5896150.194
LUC80310130		Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore			20020122		RMA Consent	1780088.134	5896778.665
LUC60414022	The drilling, construction and development of a new bore for use on the property. The bore is planned to be cased with fully grouted steel casing to a depth of 52mtr Bgl and drilled open hole to a dep	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore	19000101	20230630	20230314	Monitoring Complete	RMA Consent	1780866.138	5894992.579
LUC60320876	Permitted Activity - To authorise a replacement bore for domestic and stock supply.	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore		20180615120000	20180615	No Monitoring Required	RMA Consent	1778680.178	5895372.937
LUC80308081	Construction of a 100mm dia. bore to approx. 60m depth, installation and full cement grouting of steel casing to approx. 40m.	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore			19900208		RMA Consent	1781849.338	5892791.276
LUC80309496	Construction of a bore for the extraction of groundwater for stock and domestic use	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore			19980213		RMA Consent	1781523.069	5893175.351
LUC60328185	Permitted Activity - To authorise two investigation bores for groundwater investigation.	Resource Management Consent	Land Use Consent	Complete	Drill or Alter Bore		20191004	20191004	No Monitoring Required	RMA Consent	1777712.867	5894367.594

OBJECT ID	CONSENT NUMBER	FILE REFERENCE	CONSENT HOLDER	BORE ID	GRANTED DATE	EXPIRY DATE	CONSENT STATUS	PROCESSING OFFICER	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY STATUS	LAND USE	LAND USE UPDATED
5212	0			4463							1781854	5892773	Drilled		
4634	0			21476							1779792	5893892	Drilled		
1995	31846	C512-12-3621*	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)	22472	20051201	20061202	Expired	_Daryl Henehan	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 3 bores with approximate depths of 85m, 135m and 60m. Installation of D Grade PVC casing and PVc Piezo screens with depth to top being 6m and depth to bottom being 12m. 2 Piezometers will be installed in each bore. 1 at the base and t	1778820	5894630	Drilled		
5198	0			4447							1780522	5893369	Drilled		
5209	0			4459							1781400	5894200	Drilled		
3821	0			23693							1780026	5892753	Drilled		
6394	10336	14/17/98	HP LEES	164	19880211	19890212	Expired	Andrew Millar	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.	1779785	5894725	Drilled		
5214	0			4465							1782339	5893872	Drilled		
6723	0			27891							1780914	5893938	Drilled		
4745	0			21486							1781029	5893423	Drilled		
7656	53002	C512-12-5235		29107	20131031		Assessment Completed	Reginald Samuel	The construction of one replacement bore for stock and domestic purposes.	The construction of a 100mm diameter bore to an approximate depth of 100-120m. Installation of steel socketed and screwed casing material to an approximate depth of 65m.	1781742	5895050	Drilled		20140109
4633	0			21475							1779349	5894192	Drilled		
5203	0			4452							1781230	5893136	Drilled		
1994	31846	C512-12-3621*	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)	22472	20051201	20061202	Expired	_Daryl Henehan	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 3 bores with approximate depths of 85m, 135m and 60m. Installation of D Grade PVC casing and PVc Piezo screens with depth to top being 6m and depth to bottom being 12m. 2 Piezometers will be installed in each bore. 1 at the base and t	1778820	5894630	Drilled		
5406	52093	C512-12-4356	Papakura District Council	23290	20081219		Assessment Completed	Reginald Samuel	To authorise the construction of one bore for geotechnical investigation and groundwater monitoring using piezometers.		1779340	5894260	Proposed		
6734	0			27902							1782110	5894481	Proposed		
1962	31846	C512-12-3621*	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)	22472	20051201	20061202	Expired	_Daryl Henehan	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 3 bores with approximate depths of 85m, 135m and 60m. Installation of D Grade PVC casing and PVc Piezo screens with depth to top being 6m and depth to bottom being 12m. 2 Piezometers will be installed in each bore. 1 at the base and t	1778820	5894630	Drilled		
6393	10335	14/17/97	HP LEES	163	19880211	19890212	Expired	Andrew Millar	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.	1780044	5896508	Drilled		
3004	21075	C512-12-2140	MR B ORUM MR F BASSETT MRS C ORUM MRS G BASSETT	20116	19980213	19990216	Expired	_Gillian Crowcroft	Authorise the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm diameter bore to a depth of approximately 100m and installation of PVC casing to approximately 40m depth.	1781506	5893225	Drilled		

LAND USE NOTE	BORE USE	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	MAIN AQUIFER	AQUIFER	SUB AQUIFER1	SUB AQUIFER2	ENVIRONMENT REPORTING AREA	ALW PLAN ZONES	TLA	HYDSYS NUMBER	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION
		Drilled pre-1987 for BATKIN BW by DRILLING SPECIALTIES LTD.			Waitemata	Hunua Waitemata							19750225	51	203
		Owner: Mrs Middleton, farmed by son Richard. Details from Hunua Quarry survey of adjacent bores. Reportedly drilled around 1940s	Middleton	Middleton Rd, Hunua	Greywacke	Hunua West Greywacke					Franklin		19110101	40	216
	Observation / Piezo	To authorise the construction of 3 bores for monitoring purposes.	Winstone Aggregates HUN 05/2	Hunua Road East bore, Drury	Greywacke	Hunua West Greywacke			Auckland Central		Papakura		20060127	143.5	142.16
		Drilled pre-1987 for TAYLOR CR by HUTCHINSONS WELLDRILLING LTD.			Waitemata	Hunua Waitemata							19621031	67	221
		Drilled pre-1987 for MARTIN J by *** DRILLER UNKNOWN ***.											20000101		173
	Other	Drilled pre 1987 by driller unknown. Bore N2 location from Winstones Hunua bore survey 2010.	Costello, Raymond Peter & Judith Leonie		Greywacke	Hunua West Greywacke					Papakura				223
	Domestic/Stock	Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.		1108 Hunua Road, ,	Greywacke	Hunua West Greywacke					Franklin		19880322	123	221
		Same as Bore ID 619 Permit no. 10791 file 14/17/553	Batkin	Heald Rd, Hunua									19901116	64.33	119
	Stock		Sharon A & LM Kelly								Franklin				193
		Data from Wairoa River Catchment Survey, 1995-97	B & G Mahony	Batkin Rd, Pt Allot 1 DP 69197. (Postal, Ponga Rd, RD4, Drury)	Greywacke	Hunua Greywacke					Franklin		19110101		214
	Domestic/Stock	The construction of one replacement bore for stock and domestic purposes.	S M & S C Murray		Waitemata	Hunua Waitemata					Franklin		20131204	104	65.4
	Shed Watering	Owner: SR & JR Forrest, drill date unknown. Details from Hunua Quarry survey of adjacent bores	forrest	hunua rd	Greywacke	Hunua West Greywacke					Franklin		19110101	96	201
		Drilled pre-1987 for ANGLE MC by DRILLING SPECIALTIES LTD.			Waitemata	Hunua Waitemata							19750206	55	208
	Observation / Piezo	To authorise the construction of 3 bores for monitoring purposes.	Winstone Aggregates HUN 05/2	Hunua Road East bore, Drury	Greywacke	Hunua West Greywacke			Auckland Central		Papakura		20060127	143.5	142.16
	Observation / Piezo	To authorise the construction of one bore for geotechnical investigation and groundwater monitoring using piezometers.	Papkura District Council								Papakura				
	Domestic/Stock		Chris J & Susan E Marshall								Franklin				124
	Observation / Piezo	To authorise the construction of 3 bores for monitoring purposes.	Winstone Aggregates HUN 05/2	Hunua Road East bore, Drury	Greywacke	Hunua West Greywacke			Auckland Central		Papakura		20060127	143.5	142.16
		Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.		2 Jones Road, ,	Greywacke	Hunua West Greywacke					Manukau		19880222	114	162
	Domestic/Stock			16 McMurray Rd Hunua	Greywacke	Hunua Greywacke					Franklin		19980223	76	192

STATIC WATER LEVEL	STATIC WATER DATE	BORE LOG	AQUIFER TEST	DIAMETER FROM	DIAMETER TO	DIAMETER	CASING FROM	CASING TO	CASING TYPE	CASING DIAMETER	SCREEN FROM	SCREEN TO	SCREEN TYPE	CONTRACTOR	CONSULTANT	DATE CREATED	PROPERTY ADDRESS	LOC TYP	created user
21.5				0	51	100	0	30.78		100						20170601		Point	MASTER
							0									20170601		Point	MASTER
8.2	20060216			103	143.5	130	0	16	Steel	152						20170601	Hunua Road Drury Papakura	Point	MASTER
43.2				0	67	76	0	49.1		76						20170601		Point	MASTER
							0									20170601		Point	MASTER
				0		35										20170601		Point	MASTER
37		Y		0	123	100	0	63	Steel	100						20170601	1500 Hunua Road Drury Papakura	Point	MASTER
0.67				0	64	100	0	46.51		100						20170601		Point	MASTER
																20170601		Point	MASTER
				0		100										20170601		Point	MASTER
25.3		Y					0	65.4		100						20170601	173 Jones Rd R D 3 Papakura Franklin	Point	MASTER
							0									20170601		Point	MASTER
39				0	55	80	0	33.52		80						20170601		Point	MASTER
8.2	20060216			16	103	133	0	16	Steel	152						20170601	Hunua Road Drury Papakura	Point	MASTER
																20170601	Hunua Road Drury Papakura	Point	MASTER
2.4																20170601		Point	MASTER
8.2	20060216			0	16	203	0	16	Steel	152						20170601	Hunua Road Drury Papakura	Point	MASTER
20				0	114	100	0	65	Steel	100	64.5	114				20170601		Point	MASTER
25.2	19980223			0	76	100	0	36	PVC/ABS	100						20170601	Batkin Road Papakura Franklin	Point	MASTER

last edited user	last edited date	created date	VALIDATIONSTATE	inside x	inside y
MASTER	20170601095548	20170601095548	3	1781854	5892773
MASTER	20170601095548	20170601095548	3	1779792	5893892
MASTER	20170601095548	20170601095548	3	1778820	5894630
MASTER	20170601095548	20170601095548	3	1780522	5893369
MASTER	20170601095548	20170601095548	3	1781400	5894200
MASTER	20170601095548	20170601095548	3	1780026	5892753
MASTER	20170601095548	20170601095548	3	1779785	5894725
MASTER	20170601095548	20170601095548	3	1782339	5893872
MASTER	20170601095548	20170601095548	3	1780914	5893938
MASTER	20170601095548	20170601095548	3	1781029	5893423
MASTER	20170601095548	20170601095548	3	1781742	5895050
MASTER	20170601095548	20170601095548	3	1779349	5894192
MASTER	20170601095548	20170601095548	3	1781230	5893136
MASTER	20170601095548	20170601095548	3	1778820	5894630
MASTER	20170601095548	20170601095548	3	1779340	5894260
MASTER	20170601095548	20170601095548	3	1782110	5894481
MASTER	20170601095548	20170601095548	3	1778820	5894630
MASTER	20170601095548	20170601095548	3	1780044	5896508
MASTER	20170601095548	20170601095548	3	1781506	5893225

OBJECT ID	CONSENT NUMBER	FILE REFERENCE	CONSENT HOLDER	BORE ID	GRANTED DATE	EXPIRY DATE	CONSENT STATUS	PROCESSING OFFICER	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY STATUS	LAND USE	LAND USE UPDATED
5211	0			4461							1781477	5892976	Drilled		
5408	52095	C512-12-4358	Papakura District Council	23292	20081219		Assessment Completed	Reginald Samuel	To authorise the construction of one bore for geotechnical investigation and groundwater monitoring using piezometers.		1779400	5894330	Proposed		
4632	0			21474							1779245	5894407	Drilled		
5204	0			4453							1781200	5893300	Drilled		
5674	44186	C512-12-5553	Bethany V & Darren K Cantwell	29802	20150317	20160321	Expired	Reginald Samuel	To authorise the construction of one bore for domestic & stock supply.		1779818	5894849	Proposed		
6730	0			27898							1781743	5895045	Drilled		
9329	10679	14/17/441	Ross Batkin & Helen Edith Batkin	507	19900208	19910208	Expired	Andrew Millar	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 60m depth, installation and full cement grouting of steel casing to approx. 40m.	1781762	5892647	Drilled		
6724	0			27892							1781113	5895542	Drilled		
8041	53084	C512-12-5365*		29293	20140508		Assessment Completed	Reginald Samuel	The construction of three bores for Groundwater investigation purposes.	The construction of three 100mm diameter bores to a maximum depth of 40, 50, 60m. Installation of PVC casing material to an approximate depth of 40, 50, 60m.	1779162	5894946	Proposed		
6962	10252	14/17/14	MR IJ DONOVAN	80	19871015	19881021	Expired	Andrew Millar	Authorize the construction of a water bore for extraction of groundwater for stock, domestic and chicken farm requirements.	Construction of a 80mm dia. bore to approx. 90m depth, and installation of steel casing to approx. 40m.	1781846	5895199	Drilled		
9129	10791	14/17/553	Ross Batkin & Helen Edith Batkin	619	19901025	19911025	Expired	Andrew Millar	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 70m depth and installation of steel casing to approx. 30m.	1782339	5893872	Drilled		
9394	11026	14/17/788	Rodney Mitchell Taylor & Carolyn Alice Taylor	854	19920512	19930513	Expired	Andrew Millar	Authorize the construction of a bore for the extraction of groundwater for stock requirements.	Construction of a 100mm dia. bore to approx. 150m depth and installation of steel casing to approx. 66m.	1780518	5893364	Drilled		
9947	37806	C512-12-4602	High Hope Two Trust (Trustees Ian Henry Armstrong & Michael George Cantrick Stephens)	23573	20100323	20110331	Expired	Reginald Samuel	To authorise construction of a bore for domestic supply.	To construct a 100mm diameter bore to a depth of 110m. Installation of steel casing to 60m. Proposed grout full annular.	1781108	5896149	Drilled		
8620	27814	C512-12-3089	The Micaela Murray Trust (Suzanne Claire Murray, Stuart Marshall Campbell Murray & Micaela Murray)	21873	20030401	20040402	Expired	_Michelle Ip	Authorise the construction of a bore for stockwatering purposes.	Construction of a 100mm diameter bore to a depth of approximately 120m. Installation of steel socketed and screwed casing.	1781813	5894798	Drilled		
9354	11017	14/17/779	RG DAVIS	845	19920423	19920424	Expired	Andrew Millar	Authorize sealing of an abandoned bore.	Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.	1780550	5893360	Drilled		
9211	10811	14/17/573	Ross Batkin & Helen Edith Batkin	639	19901119	19911119	Expired	Andrew Millar	Authorize sealing an abandoned bore.	Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.	1782360	5893850	Drilled		
4929	0			4370							1778852	5896063	Drilled		
3286	22464	C512-12-2356	GEORGE HERBET EXTON	20578	19990310	20000311	Expired	_Gillian Crowcroft	Authorise the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm diameter bore to a depth of approximately120m and installation of steel casing to a depth of approximately 58.6m.	1782208	5895192	Drilled		

LAND USE NOTE	BORE USE	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	MAIN AQUIFER	AQUIFER	SUB AQUIFER1	SUB AQUIFER2	ENVIRONMENT REPORTING AREA	ALW PLAN ZONES	TLA	HYDSYS NUMBER	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION
		Drilled pre-1987 for BATKIN BW by DRILLING SPECIALTIES LTD.											20000101	61	205
	Observation / Piezo	To authorise the construction of one bore for geotechnical investigation and groundwater monitoring using piezometers.	Papakura District Council								Papakura				
		Drilled pre-1987 for JA Glasgow, details from Hunua Quarry survey of adjacent bores	JA Glasgow	1040 Hunua Rd, Papakura	Greywacke	Hunua West Greywacke					Franklin		19870713	101.4	195
		Drilled pre-1987 for MURRAY C & ANGLE EJ by DRILLING SPECIALTIES LTD.			Waitemata	Hunua Waitemata							19760206	55	206
	Domestic/Stock	To authorise the construction of one bore for domestic & stock supply.	1500 Hunua Road, Drury								Franklin				
	Domestic/Stock		Suzanne Claire & Stuart Marshall Campbell Murray								Franklin			71.88	165
		Construction of a 100mm dia. bore to approx. 60m depth, installation and full cement grouting of steel casing to approx. 40m.		BATKIN ROAD, HUNUA.	Greywacke	Hunua Greywacke					Franklin		19900207	89	188
	Stock		Robin F & H R Lees								Papakura				254
	Observation / Piezo	The construction of three bores for Groundwater investigation purposes.	James Talbot on behalf of Watercare Services								Papakura				
		Construction of a 80mm dia. bore to approx. 90m depth, and installation of steel casing to approx. 40m.		Garvies Rd,, Hunua,	Greywacke	Hunua Greywacke					Franklin			90	165
		Construction of a 100mm dia. bore to approx. 70m depth and installation of steel casing to approx. 30m.	R Batkin	Heald Road, Hunua,	Greywacke	Hunua Greywacke					Franklin		19910228	64.33	119
		Construction of a 100mm dia. bore to approx. 150m depth and installation of steel casing to approx. 66m.		Gillespie Road,, Hunua,	Waitemata	Franklin Waitemata	Papakura East Waitemata				Franklin		19920605	77.5	220
	Domestic	To authorise construction of a bore for domestic supply.	High Hope Two Trust		Greywacke	Hunua West Greywacke					Manukau		20100423	183	236
	Shed Watering	150 cattle, 15 horses, 200 goats, 100 ewes + lambs			Greywacke	Hunua Greywacke					Franklin		20030416	90.3	163
		Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.		SH 18,, Coatesville,	Waitemata	Hunua Waitemata					Rodney		19920615	78	
		Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.		Heald Road, Hunua,	Greywacke	Hunua Greywacke					Franklin				
	Domestic/Stock	Drilled pre-1987 for LIFEGATE TRUST by ROBERTSON P.	Lifegate Trust	896 Hunua Rd, Papakura	Greywacke	Hunua West Greywacke					Papakura		19820413	119.8	253
	Domestic/Stock		George Exton	63 Garvie Rd, Hunua	Greywacke	Hunua Greywacke					Franklin		19990430	74.2	132

STATIC WATER LEVEL	STATIC WATER DATE	BORE LOG	AQUIFER TEST	DIAMETER FROM	DIAMETER TO	DIAMETER	CASING FROM	CASING TO	CASING TYPE	CASING DIAMETER	SCREEN FROM	SCREEN TO	SCREEN TYPE	CONTRACTOR	CONSULTANT	DATE CREATED	PROPERTY ADDRESS	LOC TYP	created user
				0	61	101	0			101						20170601		Point	MASTER
																20170601	1040 Hunua Road Drury Papakura	Point	MASTER
35.5	19870713	Y	Y	0	101.4	100	0	71.2		100						20170601		Point	MASTER
				0	55	76	0			76						20170601		Point	MASTER
																20170601	1500 HUnua Road Drury Franklin	Point	MASTER
38																20170601		Point	MASTER
45.8				0	89	100	0	51.36	Steel	100						20170601	Batkin Road Papakura Franklin	Point	MASTER
																20170601		Point	MASTER
															Soil & Rock Consultants	20170601	120 Hays Creek Road Drury Papakura	Point	MASTER
55.8				0	90	80	0	50	Steel	80						20170601		Point	MASTER
0.67	19901113			0	64.3	100	0	46.51	Steel	100						20170601	Heald Rd R D 3 Papakura Franklin	Point	MASTER
44.5				0	77.5	100	0	58.68	Steel	100						20170601		Point	MASTER
52.3	20100423	Y	Y	0	183	100	0	91	Steel	100						20170601	68 Jones Road Clevedon Manukau	Point	MASTER
45		Y		0	90.3	100	0	65	Steel	100						20170601	Garvies Road Papakura Franklin	Point	MASTER
				0	78	100	0	59								20170601	STATE HIGHWAY 18 COATESVILLE Rodney District	Point	MASTER
							0									20170601		Point	MASTER
61.4	19860108	Y		0	119.8	100	0	52.3		100						20170601		Point	MASTER
19.5	19990504		Y	0	74.2	100	0	65.4	PVC/ABS	100						20170601	63 Garvies Road Papakura Franklin	Point	MASTER

last edited user	last edited date	created date	VALIDATIONSTATE	inside x	inside y
MASTER	20170601095548	20170601095548	3	1781477	5892976
MASTER	20170601095548	20170601095548	3	1779400	5894330
MASTER	20170601095548	20170601095548	3	1779245	5894407
MASTER	20170601095548	20170601095548	3	1781200	5893300
MASTER	20170601095548	20170601095548	3	1779818	5894849
MASTER	20170601095548	20170601095548	3	1781743	5895045
MASTER	20170601095548	20170601095548	3	1781762	5892647
MASTER	20170601095548	20170601095548	3	1781113	5895542
MASTER	20170601095548	20170601095548	3	1779162	5894946
MASTER	20170601095548	20170601095548	3	1781846	5895199
MASTER	20170601095548	20170601095548	3	1782339	5893872
MASTER	20170601095548	20170601095548	3	1780518	5893364
MASTER	20170601095548	20170601095548	3	1781108	5896149
MASTER	20170601095548	20170601095548	3	1781813	5894798
MASTER	20170601095548	20170601095548	3	1780550	5893360
MASTER	20170601095548	20170601095548	3	1782360	5893850
MASTER	20170601095548	20170601095548	3	1778852	5896063
MASTER	20170601095548	20170601095548	3	1782208	5895192

OBJECTID	CONSENT NUMBER	FILE REFERENCE	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	BORE ID	ACTIVITY STATUS	BORE USE
3097	21075	C512-12-2140	MR B ORUM MR F BASSETT MRS C ORUM MRS G BASSETT	Expired	19980213	19990216	Authorise the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm diameter bore to a depth of approximately 100m and installation of PVC casing to approximately 40m depth.	1781506	5893225	20116	Drilled	Domestic/Stock
4411	37806	C512-12-4602	High Hope Two Trust (Trustees Ian Henry Armstrong & Michael George Cantrick Stephens)	Expired	20100323	20110331	To authorise construction of a bore for domestic supply.	To construct a 100mm diameter bore to a depth of 110m. Installation of steel casing to 60m. Proposed grout full annular.	1781108	5896149	23573	Drilled	Domestic
3174	10252	14/17/14	MR IJ DONOVAN	Expired	19871015	19881021	Authorize the construction of a water bore for extraction of groundwater for stock, domestic and chicken farm requirements.	Construction of a 80mm dia. bore to approx. 90m depth, and installation of steel casing to approx. 40m.	1781846	5895199	80	Drilled	
3370	11017	14/17/779	RG DAVIS	Expired	19920423	19920424	Authorize sealing of an abandoned bore.	Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.	1780550	5893360	845	Drilled	
1640	31846	C512-12-3621*	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)	Expired	20051201	20061202	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 3 bores with approximate depths of 85m, 135m and 60m. Installation of D Grade PVC casing and PVc Piezo screens with depth to top being 6m and depth to bottom being 12m. 2 Piezometers will be installed in each bore. 1 at the base and t	1778820	5894630	22472	Drilled	Observation / Piezo
246	10336	14/17/98	HP LEES	Expired	19880211	19890212	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.	1779785	5894725	164	Drilled	Domestic/Stock
245	10335	14/17/97	HP LEES	Expired	19880211	19890212	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.	1780044	5896508	163	Drilled	
1642	31846	C512-12-3621*	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)	Expired	20051201	20061202	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 3 bores with approximate depths of 85m, 135m and 60m. Installation of D Grade PVC casing and PVc Piezo screens with depth to top being 6m and depth to bottom being 12m. 2 Piezometers will be installed in each bore. 1 at the base and t	1778820	5894630	22472	Drilled	Observation / Piezo
168	10679	14/17/441	Ross Batkin & Helen Edith Batkin	Expired	19900208	19910208	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 60m depth, installation and full cement grouting of steel casing to approx. 40m.	1781762	5892647	507	Drilled	
253	10791	14/17/553	Ross Batkin & Helen Edith Batkin	Expired	19901025	19911025	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm dia. bore to approx. 70m depth and installation of steel casing to approx. 30m.	1782339	5893872	619	Drilled	
1026	44186	C512-12-5553	Bethany V & Darren K Cantwell	Expired	20150317	20160321	To authorise the construction of one bore for domestic & stock supply.		1779818	5894849	29802	Proposed	Domestic/Stock
1641	31846	C512-12-3621*	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)	Expired	20051201	20061202	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 3 bores with approximate depths of 85m, 135m and 60m. Installation of D Grade PVC casing and PVc Piezo screens with depth to top being 6m and depth to bottom being 12m. 2 Piezometers will be installed in each bore. 1 at the base and t	1778820	5894630	22472	Drilled	Observation / Piezo
676	10811	14/17/573	Ross Batkin & Helen Edith Batkin	Expired	19901119	19911119	Authorize sealing an abandoned bore.	Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.	1782360	5893850	639	Drilled	
72	11026	14/17/788	Rodney Mitchell Taylor & Carolyn Alice Taylor	Expired	19920512	19930513	Authorize the construction of a bore for the extraction of groundwater for stock requirements.	Construction of a 100mm dia. bore to approx. 150m depth and installation of steel casing to approx. 66m.	1780518	5893364	854	Drilled	
2365	22464	C512-12-2356	GEORGE HERBET EXTON	Expired	19990310	20000311	Authorise the construction of a bore for the extraction of groundwater for stock and domestic supply.	Construction of a 100mm diameter bore to a depth of approximately120m and installation of steel casing to a depth of approximately 58.6m.	1782208	5895192	20578	Drilled	Domestic/Stock
2173	27814	C512-12-3089	The Micaela Murray Trust (Suzanne Claire Murray, Stuart Marshall Campbell Murray & Micaela Murray)	Expired	20030401	20040402	Authorise the construction of a bore for stockwatering purposes.	Construction of a 100mm diameter bore to a depth of approximately 120m. Installation of steel socketed and screwed casing.	1781813	5894798	21873	Drilled	Shed Watering

ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	MAIN AQUIFER	AQUIFER	SUB AQUIFER1	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	STATIC WATER DATE	BORE LOG	AQUIFER TEST	DIAMETER FROM	DIAMETER TO	DIAMETER	CASING FROM
		16 McMurray Rd Hunua	Greywacke	Hunua Greywacke		19980223	76	192	25.2	19980223			0	76	100	0
To authorise construction of a bore for domestic supply.	High Hope Two Trust		Greywacke	Hunua West Greywacke		20100423	183	236	52.3	20100423	Y	Y	0	183	100	0
Construction of a 80mm dia. bore to approx. 90m depth, and installation of steel casing to approx. 40m.		Garvies Rd,, Hunua,	Greywacke	Hunua Greywacke			90	165	55.8				0	90	80	0
Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.		SH 18,, Coatesville,	Waitemata	Hunua Waitemata		19920615	78						0	78	100	0
To authorise the construction of 3 bores for monitoring purposes.	Winstone Aggregates HUN 05/2	Hunua Road East bore, Drury	Greywacke	Hunua West Greywacke		20060127	143.5	142.16	8.2	20060216			0	16	203	0
Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.		1108 Hunua Road, ,	Greywacke	Hunua West Greywacke		19880322	123	221	37		Y		0	123	100	0
Construction of a 100mm dia. bore to approx. 80m depth, installation of steel casing to approx. 60m and P.V.C. screens to appropriate depth.		2 Jones Road, ,	Greywacke	Hunua West Greywacke		19880222	114	162	20				0	114	100	0
To authorise the construction of 3 bores for monitoring purposes.	Winstone Aggregates HUN 05/2	Hunua Road East bore, Drury	Greywacke	Hunua West Greywacke		20060127	143.5	142.16	8.2	20060216			103	143.5	130	0
Construction of a 100mm dia. bore to approx. 60m depth, installation and full cement grouting of steel casing to approx. 40m.		BATKIN ROAD, HUNUA.	Greywacke	Hunua Greywacke		19900207	89	188	45.8				0	89	100	0
Construction of a 100mm dia. bore to approx. 70m depth and installation of steel casing to approx. 30m.	R Batkin	Heald Road, Hunua,	Greywacke	Hunua Greywacke		19910228	64.33	119	0.67	19901113			0	64.3	100	0
To authorise the construction of one bore for domestic & stock supply.	1500 Hunua Road, Drury															
To authorise the construction of 3 bores for monitoring purposes.	Winstone Aggregates HUN 05/2	Hunua Road East bore, Drury	Greywacke	Hunua West Greywacke		20060127	143.5	142.16	8.2	20060216			16	103	133	0
Backfilling of an abandoned bore with cement grout from the bottom of the bore to ground level.		Heald Road, Hunua,	Greywacke	Hunua Greywacke												0
Construction of a 100mm dia. bore to approx. 150m depth and installation of steel casing to approx. 66m.		Gillespie Road,, Hunua,	Waitemata	Franklin Waitemata	Papakura East Waitemata	19920605	77.5	220	44.5				0	77.5	100	0
	George Exton	63 Garvie Rd, Hunua	Greywacke	Hunua Greywacke		19990430	74.2	132	19.5	19990504		Y	0	74.2	100	0
150 cattle, 15 horses, 200 goats, 100 ewes + lambs			Greywacke	Hunua Greywacke		20030416	90.3	163	45		Y		0	90.3	100	0

CASING TO	CASING TYPE	CASING DIAMETER	SCREEN FROM	SCREEN TO	DATE CREATED	PROPERTY ADDRESS	LOC TYP	created user	last edited user	last edited date	created date	VALIDATIONSTATE	inside_x	inside_y	PROCESSING OFFICER	ENVIRONMENT REPORTING AREA	TLA
36	PVC/ABS	100			20170601	Batkin Road Papakura Franklin	Point	MASTER	MASTER	20170601094303	20170601094303	3	1781506	5893225	_Gillian Crowcroft		Franklin
91	Steel	100			20170601	68 Jones Road Clevedon Manukau	Point	MASTER	MASTER	20170601094303	20170601094303	3	1781108	5896149	Reginald Samuel		Manukau
50	Steel	80			20170601		Point	MASTER	MASTER	20170601094303	20170601094303	3	1781846	5895199	Andrew Millar		Franklin
59					20170601	STATE HIGHWAY 18 COATESVILLE Rodney District	Point	MASTER	MASTER	20170601094303	20170601094303	3	1780550	5893360	Andrew Millar		Rodney
16	Steel	152			20170601	Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601094303	20170601094303	3	1778820	5894630	_Daryl Henehan	Auckland Central	Papakura
63	Steel	100			20170601	1500 Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601094303	20170601094303	3	1779785	5894725	Andrew Millar		Franklin
65	Steel	100	64.5	114	20170601		Point	MASTER	MASTER	20170601094303	20170601094303	3	1780044	5896508	Andrew Millar		Manukau
16	Steel	152			20170601	Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601094303	20170601094303	3	1778820	5894630	_Daryl Henehan	Auckland Central	Papakura
51.36	Steel	100			20170601	Batkin Road Papakura Franklin	Point	MASTER	MASTER	20170601094303	20170601094303	3	1781762	5892647	Andrew Millar		Franklin
46.51	Steel	100			20170601	Heald Rd R D 3 Papakura Franklin	Point	MASTER	MASTER	20170601094303	20170601094303	3	1782339	5893872	Andrew Millar		Franklin
					20170601	1500 HUnua Road Drury Franklin	Point	MASTER	MASTER	20170601094303	20170601094303	3	1779818	5894849	Reginald Samuel		Franklin
16	Steel	152			20170601	Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601094303	20170601094303	3	1778820	5894630	_Daryl Henehan	Auckland Central	Papakura
					20170601		Point	MASTER	MASTER	20170601094303	20170601094303	3	1782360	5893850	Andrew Millar		Franklin
58.68	Steel	100			20170601		Point	MASTER	MASTER	20170601094303	20170601094303	3	1780518	5893364	Andrew Millar		Franklin
65.4	PVC/ABS	100			20170601	63 Garvies Road Papakura Franklin	Point	MASTER	MASTER	20170601094303	20170601094303	3	1782208	5895192	_Gillian Crowcroft		Franklin
65	Steel	100			20170601	Garvies Road Papakura Franklin	Point	MASTER	MASTER	20170601094303	20170601094303	3	1781813	5894798	_Michelle Ip		Franklin

OBJECT ID	PERMITTED ACTIVITY ID	FILE REFERENCE	PERMITTED ACTIVITY HOLDER	BORE ID	TAKE ID	SITE ADDRESS	PURPOSE	EASTING	NORTHING	DATE CREATED	LOC TYP	created user	last edited user	last edited date	created date	VALIDATIONSTATE	inside x	inside y
446	53002	C512-12-5235		29107	0	173 Jones Rd R D 3 Papakura Franklin	The construction of one replacement bore for stock and domestic purposes.	1781742	5895050	20170601172309	Point	MASTER	MASTER	20170601093612	20170601	3	1781742	5895050
139	52093	C512-12-4356	Papakura District Council	23290	0	Hunua Road Drury Papakura	To authorise the construction of one bore for geotechnical investigation and groundwater monitoring using piezometers.	1779340	5894260	20170601172309	Point	MASTER	MASTER	20170601093612	20170601	3	1779340	5894260
322	53084	C512-12-5365*		29293	0	120 Hays Creek Road Drury Papakura	The construction of three bores for Groundwater investigation purposes.	1779162	5894946	20170601172309	Point	MASTER	MASTER	20170601093612	20170601	3	1779162	5894946
146	52095	C512-12-4358	Papakura District Council	23292	0	1040 Hunua Road Drury Papakura	To authorise the construction of one bore for geotechnical investigation and groundwater monitoring using piezometers.	1779400	5894330	20170601172309	Point	MASTER	MASTER	20170601093612	20170601	3	1779400	5894330

Consent Reference	Consent Description	Transaction Type Description	Form Type Description	Consent Status	Application Sub Type	Lodged Date	Decision Date	Issued Date	Consent Decision	Consent GIS Classification	inside x	inside y
WAT80323117	To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.	Resource Management Consent	Water Consent	Complete	Take			19860502	Superseded	RMA Consent	1778680.178	5895372.937
WAT80316391	To take and use surface water from a dam on an unnamed tributary of Hays Stream for water supply to Papakura District and surrounding districts.	Resource Management Consent	Water Consent	Ongoing Monitoring	Take			19980527		RMA Consent	1779528.991	5895854.217
WAT60353295	Permitted Activity - To take groundwater (Bore ID 29005) for the purposed of operation and wash down of training facilities.	Resource Management Consent	Water Consent	Complete	Take	19000101	20200409	20200409	No Monitoring Required	RMA Consent	1778066.161	5896451.772
WAT80322485	Application for change to conditions of consent to take water from a dam at Hay Creek municipal water supply dams. Conditions relate to scour valve discharges, installation of a flow measuring weir,	Resource Management Consent	Water Consent	Complete	Take			19890706	Superseded	RMA Consent	1779528.991	5895854.217
WAT80316391-B	To cancel the daily abstraction limit on consent 37316 that currently restricts the take of raw water from the Hays Creek Storage Lake on an unnamed tributary of Hays Creek for municipal supply to no	Resource Management Follow-up Appl	Change of Condition (s127)	Completed	Take	20200626	20201013	20201013	Granted	RMA Consent	1779528.991	5895854.217
WAT80318340	To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.	Resource Management Consent	Water Consent	Complete	Take			20030528		RMA Consent	1778680.178	5895372.937
WAT80323942	To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.	Resource Management Consent	Water Consent	Complete	Take			19930205	Superseded	RMA Consent	1778680.178	5895372.937
WAT60412731	Replacement application to renew existing resource consent (WAT60400593) for the taking and use of groundwater for quarrying operations at Hunua Quarry, 489 Hunua Road 255 Middleton Road, and part of	Resource Management Application	Water Consent application	Processing	Take	20221201				RMA Consent	1777712.867	5894367.594
WAT60353295	Permitted Activity - To take groundwater (Bore ID 29005) for the purposed of operation and wash down of training facilities.	Resource Management Application	Water Consent application	Complete	Take	20200219	20200409	20200409	Granted	RMA Consent	1778066.161	5896451.772
WAT60353295	Permitted Activity - To take groundwater (Bore ID 29005) for the purposed of operation and wash down of training facilities.	Resource Management Consent	Water Consent	Complete	Take		20200409	20200409	No Monitoring Required	RMA Consent	1778066.161	5896451.772
WAT60400593	To authorise the short term taking of groundwater from the Hunua West Greywacke Aquifer Zone, Hunua Wairoa Greywacke Aquifer and the Waitemata Aquifer and the use of this groundwater for quarrying act	Resource Management Consent	Water Consent	Construction Monitoring	Take			20220718		RMA Consent	1777712.867	5894367.594
WAT60400593	To authorise the short term taking of groundwater from the Hunua West Greywacke Aquifer Zone, Hunua Wairoa Greywacke Aquifer and the Waitemata Aquifer and the use of this groundwater for quarrying act	Resource Management Consent	Water Consent	Construction Monitoring	Take	19000101		20220718		RMA Consent	1777712.867	5894367.594
WAT60400593	To authorise the short term taking of groundwater from the Hunua West Greywacke Aquifer Zone, Hunua Wairoa Greywacke Aquifer and the Waitemata Aquifer and the use of this groundwater for quarrying act	Resource Management Application	Water Consent application	Complete	Take	20220413	20220718	20220718	Granted	RMA Consent	1777712.867	5894367.594

OBJECT ID	CONSENT NUMBER	FILE REFERENCE	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	REVIEW DATE	PROCESSING OFFICER	PURPOSE	WORKS DESCRIPTION	PROJECT TITLE	EASTING	NORTHING	ANNUAL ALLOCATION
151	5157	AG854938	Lifegate Trust	Replaced	19860502	19911231			To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.			1778850	5896055	
6380	5573	AR865375	M B HENWOOD & J R HENWOOD	Expired	19880128	19931231			To take from a River/lake up to 50 cmpd for - Pastoral			1781300	5894300	
4925	8175	AG928190	Lifegate Trust	Replaced	19930205	20030531	19980201	Stephen Crane	TO TAKE GROUNDWATER FOR DOMESTIC POTABLE WATER SUPPLY FOR PRIVATE VILLAGE	A 100 MM DIAMETER BORE		1778850	5896055	7300
3858	2971	AR802449	W R & J M Harvey	Replaced	19810218	19931231			To take from a River/lake up to 25 cmpd for - Pastoral			1781400	5895000	
2514	27906	8190	Lifegate Trust	Expired	20030527	20161231	20080531	Stephen Crane	To authorise the taking of groundwater for domestic potable supply for a private village and seven lot subdivision in accordance with Section 14 of the Resource Management Act 1991.	A 100 millimetre diameter, 120 metre deep greywacke aquifer bore located approximately 1400 metres north of Hunua Road.		1778850	5896055	5000
5808	5773	AK875580	Watercare Services Limited	Replaced	19890706	19951231			TO TAKE WATER FROM A DAM OF AN UNNAMED TRIBUTARY OF~HAYS STREAM FOR MUNICIPAL WATER SUPPLY FOR PAPAKURA~CITY~~			1779220	5895020	2400000
1961	37316	5580	Watercare Services Limited	Issued	20121220	20311231	20141231	Stephen Crane	To take and use surface water from a dam on an unnamed tributary of Hays Stream for water supply to Papakura District and surrounding districts.		Watercare Hunua Dams Change 2008	1779220	5895020	
1191	14011	AK955580	Watercare Services Limited	Superseded	19980527	20311231	20040531	_Mace Ward	Under section 14 of the RMA to take and use surface water from a dam on an unnamed tributary of Hays Stream for water supply to Papakura District and surrounding districts.			1779220	5895020	0
3888	71	AR660071	R BIRRY	Cancelled	19700602				To take up to 2.99 cmpd from a River/lake			1782500	5894500	
4097	655	AG660665	RT AVERY LN AVERY	Cancelled	19690326				DOMESTIC, STOCK, SHED, FIRE, GENERAL FARM USE,~~~~			1782100	5894900	
3873	48	AR660048	Ross Batkin & Helen Edith Batkin	Surrendered	19700320	20011001			To take surface water from an unnamed tributary of Mangawheau Stream for shed washing, milk cooling, stock drinking water.			1781400	5892500	1820

DAILY ALLOCATION	TAKE ID	ACTIVITY STATUS	PURPOSE CLASS	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	MONITORING PRIORITY	AQUIFER	MANAGEMENT AREA	TLA	SOURCE	HYDSYS NUMBER	USE TYPE	RIVER LAKE ID	CATCHMENT
20	3669	Occurring	Other	To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.	Lifegate Trust		Not known	Greywacke	Franklin Groundwater	Papakura	Bore	W8190A	Community Supply	238	
50	3839			To take from a River/lake up to 50 cmpd for - Pastoral			Not known		Wairoa, Taitaia, Aroaro		River/lake		Pastoral	669	
20	3669	Occurring	Other	To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.	Lifegate Trust		Not known	Greywacke	Franklin Groundwater	Papakura	Bore	W8190A	Community Supply	238	
25	3845			To take from a River/lake up to 25 cmpd for - Pastoral		HUNUA ROAD, HUNUA	Not known		Wairoa, Taitaia, Aroaro	Franklin	River/lake		Pastoral	676	
20	3669	Occurring	Other	To take no more than 20m3/day & no more than 5000m3/year of water for residential and lifestyle farm use.	Lifegate Trust		Not known	Greywacke	Franklin Groundwater	Papakura	Bore	W8190A	Community Supply	238	
11500	3677	Occurring		Application for change to conditions of consent to take water from a dam at Hay Creek municipal water supply dams. Conditions relate to scour valve discharges, installation of a flow measuring weir, provision of a fish pass (replaced with trap & haul), ri	Hays Creek	Hays Creek dam, Hays Creek Rd, Hunua	Not known		Upper Manukau Surface Water	Papakura	Dam	W5580A	Municipal Supply	240	
	3677	Occurring		Application for change to conditions of consent to take water from a dam at Hay Creek municipal water supply dams. Conditions relate to scour valve discharges, installation of a flow measuring weir, provision of a fish pass (replaced with trap & haul), ri	Hays Creek	Hays Creek dam, Hays Creek Rd, Hunua	Not known		Upper Manukau Surface Water	Papakura	Dam	W5580A	Municipal Supply	240	
13500	3677	Occurring		Application for change to conditions of consent to take water from a dam at Hay Creek municipal water supply dams. Conditions relate to scour valve discharges, installation of a flow measuring weir, provision of a fish pass (replaced with trap & haul), ri	Hays Creek	Hays Creek dam, Hays Creek Rd, Hunua	Not known		Upper Manukau Surface Water	Papakura	Dam	W5580A	Municipal Supply	240	
3	3856			To take up to 2.99 cmpd from a River/lake			Not known		Wairoa, Taitaia, Aroaro		River/lake			666	
3	3852						Not known		Hunua Groundwater		Bore		Pastoral	666	
5	3849	Occurring	StockWatering	Shed washing, milk cooling, drinking water			Not known		Wairoa, Taitaia, Aroaro	Papakura	River/lake		Domestic and/or Stock Watering	683	

BORE ID	BORE STATUS	DATE CREATED	PROPERTY ADDRESS	LOC TYP	created user	last edited user	last edited date	created date	VALIDATIONSTATE	inside x	inside y
4370	Drilled	20170601172242	896 Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601095302	20170601095302	3	1778850	5896055
		20170601172242	HUNUA RD HUNUA Franklin District	Point	MASTER	MASTER	20170601095302	20170601095302	3	1781300	5894300
4370	Drilled	20170601172242	896 Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601095302	20170601095302	3	1778850	5896055
		20170601172242	HUNUA RD HUNUA Franklin District	Point	MASTER	MASTER	20170601095302	20170601095302	3	1781400	5895000
4370	Drilled	20170601172242	896 Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601095302	20170601095302	3	1778850	5896055
		20170601172242	120 Hays Creek Road Drury Papakura	Point	MASTER	MASTER	20170601095302	20170601095302	3	1779220	5895020
		20170601172242	120 Hays Creek Road Drury Papakura	Point	MASTER	MASTER	20170601095302	20170601095302	3	1779220	5895020
		20170601172242	120 Hays Creek Road Drury Papakura	Point	MASTER	MASTER	20170601095302	20170601095302	3	1779220	5895020
		20170601172242	No Address Franklin District	Point	MASTER	MASTER	20170601095302	20170601095302	3	1782500	5894500
		20170601172242	MAIN RD RD 3, HUNUA, PAPAKURA Franklin District	Point	MASTER	MASTER	20170601095302	20170601095302	3	1782100	5894900
		20170601172242	76 BATKIN ROAD HUNUA Papakura District	Point	MASTER	MASTER	20170601095302	20170601095302	3	1781400	5892500

OBJECT ID	APPLICATION NUMBER	FILE REFERENCE	APPLICANT	APPLICATION STATUS	LODGED DATE	PROCESSING OFFICER	PURPOSE	WORKS DESCRIPTION	PROJECT TITLE	EASTING	NORTHING	ANNUAL ALLOCATION	DAILY ALLOCATION	TAKE ID
222	24805	15329	John Alistair Glasgow & Marlene Joyce Glasgow	Withdrawn	20010103	Stephen Crane				1779245	5894407			20294

ACTIVITY STATUS	PURPOSE CLASS	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	MONITORING PRIORITY	AQUIFER	MANAGEMENT AREA	TLA	SOURCE	HYDSYS NUMBER	USE TYPE	RIVER LAKE ID	CATCHMENT	BORE ID
Proposed		To take water from a Bore for - Pigs	JA & MJ Glasgow	1040 Hunua Road, Papakura	Not known	Greywacke	Auckland - Manukau Groundwater	Papakura	Bore		Pigs	293		21474

BORE STATUS	DATE CREATED	PROPERTY ADDRESS	LOC TYP	created user	last edited user	last edited date	created date	VALIDATIONSTATE	inside x	inside y
Drilled	20170601172200	1040 Hunua Road Drury Papakura	Point	MASTER	MASTER	20170601093351	20170601093351	3	1779245	5894407

OBJECT ID	PERMITTED ACTIVITY ID	FILE REFERENCE	PERMITTED ACTIVITY HO	TAKE ID	RIVER LAKE ID	RIVER NAME	SITE ADDRESS	PURPOSE	EASTING
311	53413	AG-928190		3669	238	HAYS CREEK	896 Hunua Road Drury P	To take no more than 20r	1778850
247	51256	15329		20294	293	HAYS CREEK	1040 Hunua Road Drury	A permitted activity to tak	1779245

NORTHING	DATE CREATED	LOC TYP	created user	last edited user	last edited date	created date	VALIDATIONSTATE	inside x	inside y
5896055	20170601172312	Point	MASTER	MASTER	20170601094254	20170601094254	3	1778850	5896055
5894407	20170601172312	Point	MASTER	MASTER	20170601094254	20170601094254	3	1779245	5894407

SC

164-10336

BARHAM-UNITED Welldrillers Ltd.

Telephone 07 871 5897 Fax 07 871 6513 Date 1/7/93
Mobile 025 925 036

BORE INFORMATION

Bore Log:

0-6 Topsoil & surface clays.

6-36 Brown yellow clays & silts.

36.-42 Brown clays.

42-60 Brown clay and rotten rock.

60-123. Hard greywacky rock. fractured bottom 10m.

Owners Name: Mr. Lees.
Address: Hukuna Rd.
Permit No: 98.
Date drilled: 22/3/88.
Purpose of Bore: Water

WELL CONSTRUCTION:
Bore Hole Depth: 123. m
Casing Depth: 63 m
Diameter of casing: 100 mm dia
Type of casing: Steel
Screens:
Type:
Depth Top: m
Depth Bottom: m
Cement grouted: 63-30 m
STATIC WATER: + top of casing
Static Water Level: 37 m
Flow Rate: 1.5. m3p/hr
Pumped with: Deepwell pump
WATER QUALITY: Good.

Pumping level 73 metres 1.5 m^3/h.

REMARKS:

GROUNDWATER A.R.W.B.
W.R. No 164/10336 H.A. Lees
NAME
TECHNICAL FILES 14/1/98
ACTIONED
BORE LOG
PUMP TEST
COMPUTER
WATER QUAL