WILLIAMSON
WATER & LAND ADVISORY

1618 Ararimu Road, Papakura

Fill Management Plan

SAL LAND LTD

WWLA0745 | Rev. 8

24July 2025

Fill Management Plan

Project no:	WWLA0745
Document title:	Fill Management Plan
Revision:	8
Date:	17 July2025
Client name:	SAL LAND LTD
Project manager:	Wendi Williamson
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File name:	G:\Shared drives\Projects\SB Civil Ltd\WWLA0745_Ararimu cleanfill\Deliverables\Fill Management Plan\WWLA_Ararimu FMP_Rev 2(Draft)_070923.docx

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Document history and status

Rev	Date	Description	By	Review	Approved
1	15 August 2023	Fill Management Plan	Lauren Windross	Shane Moore	Wendi Williamson
2	7 September 2023	Fill Management Plan	Lauren Windross	Wendi Williamson	Wendi Williamson
3	21 May 2024	Fill Management Plan	Lauren Windross	Shane Moore	Wendi Williamson
4	18 September 2024	Fill Management Plan	Lauren Windross	Wendi Williamson	Wendi Williamson
5	15 April 2025	Fill Management Plan	Lauren Windross	Wendi Williamson	Wendi Williamson
6	16 June 2025	Fill Management Plan	Lauren Windross	Wendi Williamson	Wendi Williamson
7	17 July 2025	Fill Management Plan	Lauren Windross	Wendi Williamson	Wendi Williamson
8	24 July 2025	Fill Management Plan	Lauren Windross	Wendi Williamson	Wendi Williamson

Distribution of copies

Rev	Date issued	Issued to	Comments
1	15 August 2023	SAL LAND Ltd	For review
2	7 September 2023	SAL LAND Ltd	Update to reflect client comments, for RC issue
3	21 May 2024	SAL LAND Ltd	Update to reflect s92 and geotechnical comments
4	18 September 2024	SAL LAND Ltd	Minor updates to reflect ESCP changes.
5	15 April 2025	SAL Land Ltd	Update to hours of operation
6	16 June 2025	SAL Land Ltd	Updated earthworks methodology and Adaptive Management Plan
7	17 July 2025	SAL Land Ltd	Updated hours of operation and noise standards and compliant monitoring.

8	24 July 2025	SAL Land Ltd, Auckland Council	Updated earthwork volumes

Front Image: Drone photograph taken by SB Civil

Contents

Appendices:

1. Introduction

Williamson Water & Land Advisory (WWLA) was commissioned by SAL Land Ltd to prepare a Fill Management Plan (FMP) for the Managed Fill (Class 3) facility proposed to be developed on a portion of the site at 1618 and 1646c Ararimu Road, Hunua (the site). The intended filling extent will cover an approximate area of approximately 9.3 ha within the southern portion of the site, refer to **Figure 1** below.

This FMP has been prepared in accordance with the WasteMINZ Technical Guidelines for Disposal to Land[1], which sets out best practice guidelines for operation of managed fill facilities.

This FMP will support resource consent, but also inform the Applicant and their contractors/ workers of their obligations during the operation of the site.

This FMP is a draft document and has been prepared to assist with the resource consent application to Auckland Council. Should resource consent be granted, then this FMP will be updated to include any specific conditions and requirements.

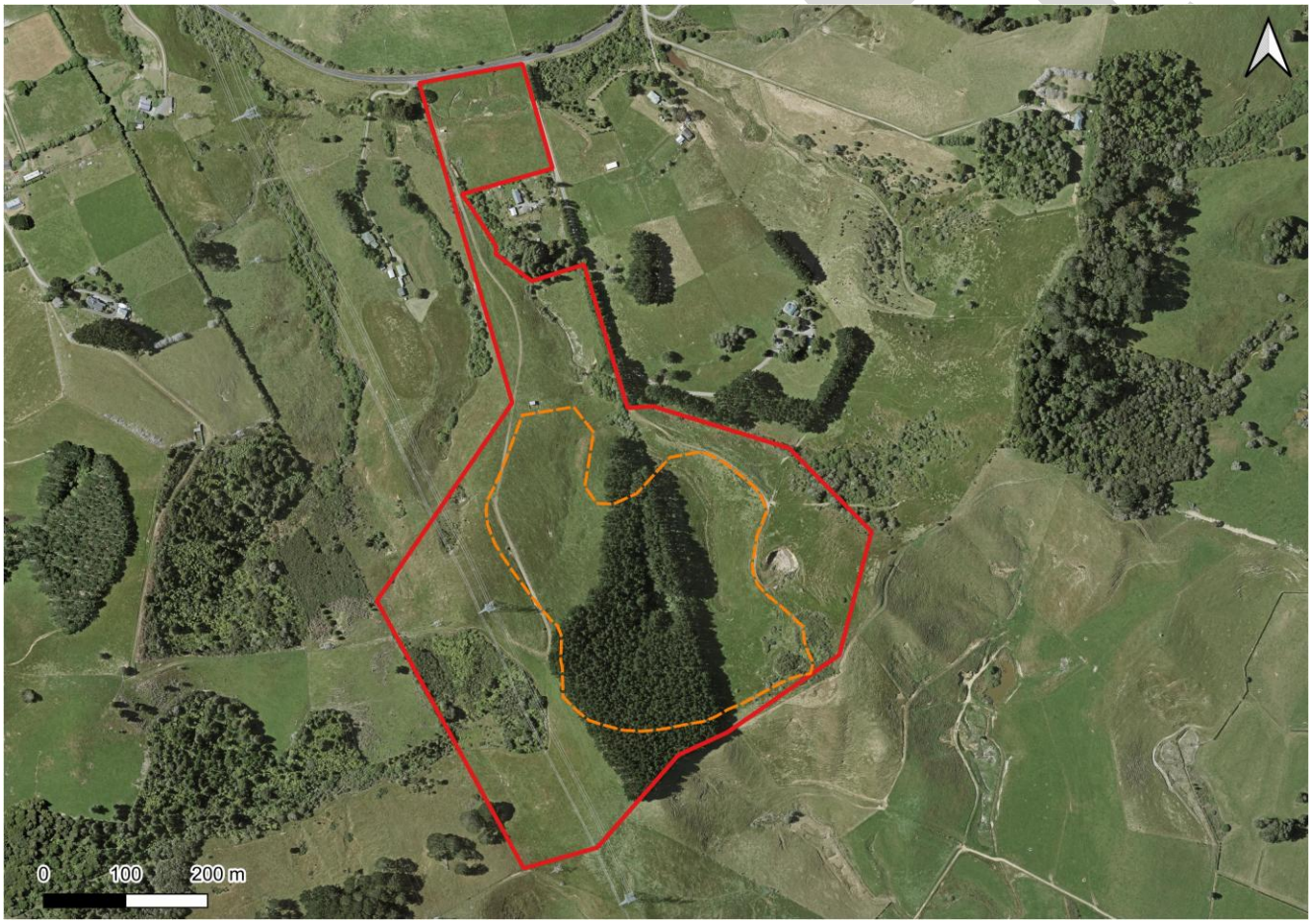


Figure 1. Site location, outlined in red, filling extent outlined in orange dash (Image source: LINZ).

1.1 Background

SBC propose to undertake a filling operation at the site. Fill will be placed in the south of the site with the maximum fill depth proposed to reach 50-60 m in the centre of the fill area, tapering out at the edges such that a platform is created that ties in with contours to the east, south and west, sloping down at the northern margin.

[1] WasteMINZ, October 2022. Technical Guidelines for Disposal to Land. Revision 3. Waste Management Institute New Zealand.

The fill operation is proposed to take low level contaminated soils (managed fill) and cleanfill. Managed fill material does not meet the definition of cleanfill under the Auckland Unitary Plan[2] (AUP) but complies with criteria consistent with environmental and human health protection levels in relevant Ministry for the Environment (MfE) guidance and the WasteMINZ guidelines.

Fill will be sourced from SBC's operations, as well as from other earthworks contractors with surplus fill requiring disposal. Preliminary filling plans are included in **Appendix A**.

1.2 Proposed site development

The filling operation is expected to accommodate approximately 1.36 million cubic metres of material across two gullies. Filling will occur across both gullies simultaneously following formation of sediment ponds in the northern extent of the fill footprint. An approximately 50 m wide zone of topsoil will be stripped (the northern 'lobes') and stockpiled first. Fill will then be placed within the first stage. At completion of the stage, the stripped topsoil will be used to provide a growing medium across the filled area, and the next 50 m wide zone of topsoil will be stripped from above the stage. A new pond will be built on the preceding stage (now stabilised) and the process repeated. This will continue, with an estimated one stage per earthworks season, through to completion of the fill.

Development will occur almost exclusively on the southern half of the site, with the northern half only being subject to road and culvert improvements, wetland offsetting, riparian and visual screen planting. The existing entrance and first 70 m of the accessway will be disestablished, including removal of the existing culvert, and a new entrance constructed approximately 70 m east of the current crossing. The new site access road will cross the stream, via a new culvert, before veering southwest to connect with the existing accessway.

The site office, parking area and incoming truck checkpoint will be located approximately 400 m from the northern boundary of the site, immediately to the north of the fill area. Existing drainage constructed by the previous landowner will be deconstructed with improved drainage reconstructed as necessary for site operations.

A portion of the site will potentially be used for quarrying activities (subject to geotechnical confirmation of rock quality) prior to filling occurring. Any quarrying activities will be addressed by a separate management plan. This FMP addresses only filling operations.

1.3 Land use and future use

The site is currently used for 'lifestyle farming' with a small pine plantation in the south (harvesting of the pine plantation is imminent). There is no dwelling on the property.

Following filling it is expected that rural or rural residential use will continue, in keeping with the surrounding landscape. Geotechnical approval will be required prior to any construction of houses or large sheds within the filled area.

1.4 Legislative context

Filling will occur in accordance with the following legislative and guidance documents:

- The resource consent (when granted).
- Auckland Council Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (June 2016) (GD05).
- WasteMINZ, Technical Guidelines for Disposal to Land, Revision 3 (October 2022).
- Health and Safety at Work Act (2015).

[2] Cleanfill as defined in the Auckland Unitary Plan, Chapter J, page 27.

- MfE's Contaminated Land Management Guidelines (CLMG), and the background and permitted activity discharge criteria set out in Section E30 of the Auckland Unitary Plan: Operative in Part (AUP) relevant to the pre-acceptance of materials.

This plan has been prepared, reviewed and certified by Suitably Qualified and Experienced Practitioners (SQEP) as described in the NESCS[3] Users Guide and defined in CLMG5. CVs confirming the SQEP status of our specialists are available on request.

1.5 Plan management and control

Responsibilities during operation of the site, including management, distribution and implementation of this plan are as set out in **Table 1.**

Table 1. Roles and responsibilities under this plan

Organisation	Role and responsibilities
SAL Land Ltd (Landowner and operator)	PCBU as defined in the Health and Safety at Work Act 2015 (Health and Safety Regulation). Responsible for: - Distribution of this plan to sub-contractors and ensuring they understand their obligations under the plan; - Compliance with resource consent conditions; and - Implementation of this plan.
Site Manager (TBA)	Responsible for: - Liaising with the SQEP to ensure appropriate inspections are undertaken at the key times (refer **Sections 4, 5** and **6**); - Monitoring compliance with consent conditions; - Ensuring incoming material meets the appropriate fill criteria; and - Monitoring earthworks controls.
Tip Supervisors (TBA)	Responsible for: - Recording incoming loads at the incoming truck checkpoint/ gate. - Ensuring incoming material meets the appropriate fill criteria. - Selecting loads for testing and understanding when to quarantine loads. - Organising laboratory analysis where required.
Site Health and Safety Officer	Responsible for: - Ensuring adequacy of health and safety provisions during unexpected contamination encounters.
Subcontractors	Responsible for adhering to procedures and requirements of this plan.
Contaminated land specialist/ SQEP	Responsible for: - Soil and water monitoring (if required); - Advice regarding managed fill acceptance.
Auckland Council	Responsible for monitoring compliance with resource consent conditions.
Worksafe NZ	Responsible for overseeing compliance with the Health and Safety Regulations.

[3] National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations (NESCS)

2. Site Description

2.1 Site identification

The site is an irregularly shaped piece of land described in **Table 2** and shown on **Figure 1.**

Table 2. Site identification

Address	Legal description	Certificate of title	Area
1618 Ararimu Road	Lot 2 DP 77813	NA89C/580	19.22 ha
1646c Ararimu Road	Lot 1 DP 166299, Lot 8 DP 369781	369962, 283215	5.62 ha (of larger 21.28 ha parcel)

As shown in **Figure 1** above, the property is a rural/lifestyle block surrounded by similarly sized land parcels. The site has an irregular shape. The site currently gains access from Ararimu Road to the north with a formed access (metalled track) extending along the western boundary of the property crossing a culverted watercourse before rising up to the south. This formed access extends up to the ridge line in the central-south portion of the site.

There are three structures on the site, a small shed in the north, a corrugated iron hay shed further to the south with stockyards on the western boundary between the two sheds. There is no dwelling on the property but a smaller land parcel containing a dwelling is in the northeast of the site. The only other building on the site is a water tank at the top of the ridgeline in the south of the site. A disused quarry is present in the east of the site.

A stand of mature pines is located in the south-central portion of the site. An electricity pylon, owned and operated by Transpower, is in the south-western corner of the site with associated overhead power lines traversing the site in a north-south direction. The transmission pylon is outside of the fill area.

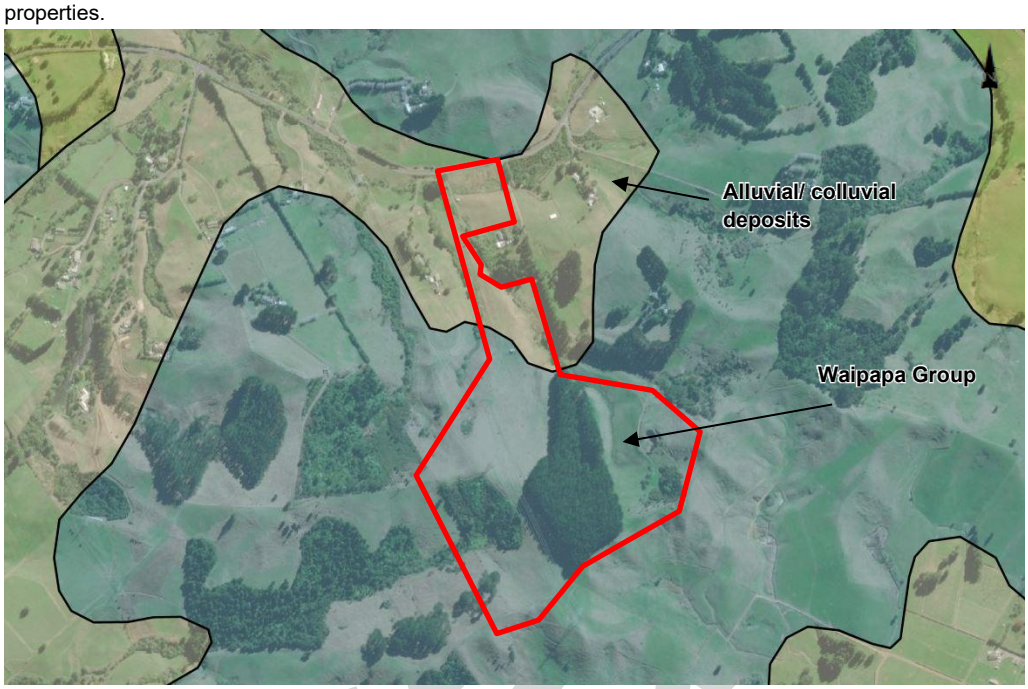
2.2 Environmental setting

Topography

The topography of the site impacts where imported material/ fill can be placed/ where filling is proposed.

The site slopes up from north to south from approximately 125m RL to 185m RL. The entrance is relatively level but the land becomes progressively steeper towards the southern boundary. A small valley separates the eastern and western sides of the site (and the two land parcel boundaries; dashed line on **Figure 2**).

Figure 2. Topography of the site (source: LINZ)

Geology	*Geological conditions are considered for adopting relevant acceptance criteria.* The published geology (**Figure 3)** describes the fill area being underlain by Waipapa Group sandstone. Alluvial/ colluvial deposits are mapped as being present across the northern portion of the site. NZ Geotechnical Database records indicate sandstone has been encountered from 7 to 34 m below ground level (BGL) near the site, with various sedimentary deposits (including peat) overlying the sandstone. Exposed sandstone is evident on adjacent properties.  **Figure 3. Published geology of the Ararimu area with the site marked red. (Source GNS Webmaps)**
Hydrogeology	*Hydrogeological conditions affect potential risk of contaminant (if present) entering and being transported in groundwater.* Based on nearby borehole log data available on the NZGD[4], regional groundwater is expected to occur at approximately 6 m below ground level (BGL) beneath the lower (northern) portions of the site. Regional groundwater is expected to flow to the north into the Hunua river catchment. Perched groundwater is expected to be encountered at shallow depth in the lower reaches of the central valley.
Surface water bodies	*Surface water features are potential receiving environments should contaminants be present on a site.* A permanent stream is indicated on Auckland Council GeoMaps to be present in the valley on the lower (northern) portion of the site. Based on our site walkover inspection observations, this has been modified to some extent (prior to current ownership) including vehicle crossings and realignment in some sections. There are several wetlands within the site; refer to ecological assessments for further detail.
Sensitive receptors	*Sensitive environmental receptors could include aquatic or terrestrial ecosystems. This is not an ecological assessment but is instead an initial review of the surrounding environment to assess where runoff on the site could migrate to and affect.* The aquatic and terrestrial ecosystems of the wetlands represent the nearest sensitive environmental receptors. An area of native bush on the southwest side of the site may also be considered a sensitive receptor.
	*Sensitive human receptors could, for example, be homeowners in close proximity or adjacent to a site. Workers on industrial land (on or adjacent to a site) would be considered less sensitive. This receptor interpretation informs noise monitoring requirements (refer to **Section 6.2**)* The site is bounded by a mixture of rural residential and rural properties. Residents may be considered sensitive receptors as they may include vulnerable populations such as children. However, as the nearest dwellings are some 200 m away from the proposed fill areas the occupants are highly unlikely to be impacted by contaminants derived from the site.

[4] New Zealand Geotechnical Database: https://www.nzgd.org.nz/ARCGISMapViewer/mapviewer.aspx

Archaeology	A review of the NZ Archaeological Association 'ArchSite' database has been undertaken and there are no known archaeological features registered on the site. Accidental Discovery Protocols will be followed in the unlikely event an archaeological site is discovered through the course of the works. There are no Statutory Acknowledgement Areas that apply to the site.

3. Imported Material Requirements

The fill acceptance process and relevant criteria is outlined below and a checklist is provided in **Appendix C**.

1. Fill Source Characterisation	Fill will be sourced from earthworks sites in the Auckland Region and potentially the northern portion of the Waikato Region and wider afield on a case-by-case basis. **Source material is required to be characterised prior to being received at the managed fill via a Preliminary and Detailed Site Investigation (PSI and DSI) or specific testing for the purposes of informing soil disposal, carried out by a SQEP according the MfE CLMG No.1[5] and No.5[6]**. Prior to the material being accepted at the site, the results of soil sampling will be reviewed by the fill manager and assessed against the acceptance criteria. The fill manager may also give regard to the potential for emerging contaminants that are not specified in the managed fill acceptance criteria but which may be indicated in the source assessment to present a risk to human health or the environment.
2. Fill Acceptance Process	Fill will be accepted on a pre-approval basis only with established account holders, with material complying with the source characterisation and at the discretion of the fill manager. Fill acceptance criteria are set out in **Table 3**. The pre-approved fill loads will be visually inspected by a trained staff member at the incoming truck checkpoint to verify that materials are consistent with source material characterisation and contain no visual or olfactory evidence of unsuitable material. Staff members and plant operators at the tip face will also be trained to identify unacceptable material. Any suspect loads will be rejected, with this being at the sole discretion of the fill manager. The procedures for rejection of non-complying material are described further in **Section 6**.
3. Managed Fill Acceptance Criteria	**The managed fill acceptance criteria are based on a Class 3 Fill (WasteMINZ, 2022), with local geological and regulatory consideration where appropriate**. Acceptable soils are intended to have no adverse effect on people or the environment. Managed fill material includes virgin natural materials such as clay, soil and rock, and other inert materials such as concrete, brick or tile that are free of the unacceptable materials described in **Appendix E** and contain contaminant levels permitted by the criteria in **Table 3**. The acceptance criteria in **Table 3** have been derived considering requirements of the: • Class 3 Managed Fill acceptance in WasteMINZ, 2022. • Published background values Rule E30.6.1.2 of the Auckland Unitary Plan (AUP), Chapter E30, with levels for nickel and zinc changed to reflect background levels of the volcanic soils present on the site. • Permitted activity discharge criteria set in Table E30.6.1.4.1 of the AUP. • Eco-SGVs. • CLMG5 regarding use of the 95% upper confidence limit (UCL) of the mean concentration: where 10 or more samples have been analysed as part of a DSI, the 95% UCL many be used for comparison to the acceptance criteria.

[5] MfE CLMG No. 1 – Reporting on Contaminated Sites in New Zealand (revised 2021).
[6] MfE CLMG No. 5 – Site Investigation and Analysis of Soils (revised 2021).

Table 3. Proposed managed fill acceptance criteria.

Parameter		Proposed cleanfill (cover) criteria (Published background for Auckland volcanic soils [1])	Discharge values (AUP) [2]	WasteMINZ Class 3 criteria [3]	Proposed managed fill criteria
Metals	Arsenic	12	100	140	**100**
	Cadmium	0.65	7.5	10	**7.5**
	Chromium	125	400	150	**400**
	Copper	90	325	280	**325**
	Lead	65	250	460	**460**
	Mercury	0.45	0.75	3	**0.75**
	Nickel	320	105	320	**320**
	Zinc	1,160	400	1,200	**1,200**
Polycyclic aromatic hydrocarbons (PAH)	Benzo(a)pyrene eq.	<LoR	20	125	**20**
Total petroleum hydrocarbons (TPH)	C_7-C_9	<LoR	-	200	**130** [5]
	C_{10}-C_{14}	<LoR	-	600	**110** [5]
	C_{15} - C_{36}	<LoR	-	-	**2,500** [5]
Benzene, Toluene, Ethybenzene, Toluene (BTEX)	Benzene	<LoR	-	0.11	**0.11**
	Toluene	<LoR	-	19	**19**
	Ethylbenzene	<LoR	-	10	**10**
	Xylenes (total)	<LoR	-	25	**25**
Organochlorine pesticides (OCP)	Total DDT	<LoR	12	2	**12**
	Dieldrin	<LoR	-	0.1	**0.1**

Notes: all criteria in mg/kg (ppm); <LoR Limit of Reporting.

1. Auckland Regional Council, Technical Publication 153, October 2001. Background Concentrations of inorganic elements in soils from the Auckland Region.
2. Auckland Unitary Plan Chapter E30 Table E30.6.1.4.1.
3. Wasteminz, October 2022. Technical Guidelines for Disposal to Land, Revision 3. Class 3 managed fill waste acceptance criteria.

54 Manaaki Whenua – Landcare Research, 2019. Updated Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical document. Contract Report: LC2605 (updated), dated June 2019.

4. Fill Site Operation

4.1 Works overview

The Managed Fill operation will comprise:

- Construction of a gravel access road from the existing entrance on Ararimu Road up to the fill areas;
- Establishing temporary operational infrastructure such as a weigh bridge and temporary office/ amenity building.
- Bulk earthworks to construct the managed fill area located in the south of the site.
- Landscaping, restoration and closure.

Fill site preparation will commence in late 2023 (start of 2023-2024 earthworks season) with erosion and sediment control establishment, site access formation, wetland offset planting and construction of site facilities such as a portacom/ toilets. The existing overland flow will be piped to the specifications of the civil engineer so as to prevent future erosion of the overlying soils.

Before filling commences, the original topsoil will be stripped back and stockpiled on site. Once filling in each stage is complete, at least 500 mm of topsoil will be placed on top of finished areas and the surface revegetated in order to minimise the amount of exposed soil at any one time. Temporary stabilisation measures may also be employed such as mulch or geotextile placement.

It is expected that the site will be able to start receiving fill from early 2024, with initial fill to be placed in the base of both gullies, moving up toward the south as filling progresses. The expected duration of filling is 10 years. As descripted in **Section 1.1**, the maximum fill height will be between 50-60 m above current ground level, with contours designed to match the landscape in the east, west and south.

Filling is expected to occur year-round in future years, although volumes are likely to decrease in winter as earthworks sites are less active and surplus soil disposal generally decreases.

4.2 Fill sequencing

The fill sequencing is referred to in the Civix Earthworks Report (refer to Appendix G).

4.3 Operational requirements

1. Signage	The Managed Fill shall be signposted so that it is visible from Ararimu Road. The sign shall be maintained throughout the filling operation. As a minimum the sign shall include: • Managed Fill name and operator (including contact details). • Hours of operation. • Access constraints including restriction on public access and unauthorised tipping.	
2. Access	• Account holders with pre-approved loads only will access the site from Ararimu Road during the operating hours set out in **Item 3** below. • Trucks will be directed to the weigh station and sign-in office and loads visually inspected for approval. • Clear guidance on trafficking through the site shall be provided, i.e. Trucks will be guided to the active tip face where they will unload. Exit from the site will be via the entrance.	
3. Operating hours	The hours of operation are as below. Loads will be accepted onto site from 7 am to 5 pm Monday to Friday. Outside of these hours including during weekends and public holidays there will be no outside truck movements but machinery may be employed within the site when required e.g. site maintenance and upkeep of erosion and sediment controls, for safety reasons, or following unexpected events. Signage notifying the operating hours shall be placed at the Ararimu Road entranceway.	
	Summer earthworks season (1 October to 30 April)	0700 hours to 1900 hours, Monday to Friday 0700 hours to 1200 (midday), Saturday

	Winter earthworks season (1 May to 30 September)	0700 hours to 1700 hours, Monday to Friday 0700 hours to 1200 (midday), Saturday
	Sundays/public holidays	Internal works only e.g. essential site maintenance works, or following unexpected events (i.e. slips, sediment control).
4. Security	The site will be adequately fenced and signage erected to prevent unauthorised dumping. Only account holders can access the site and there will be sign-in procedures for all site visitors and trucks.	
5. Gate monitoring	Records of all trucks entering the site will be maintained and held on file at the site office. The following information will be recorded: • Customer details: account holder name, trucking contractor and vehicle registration number. • Address where material was sourced from. • Description of material. • Verification by fill manager that load complies with source material description and visual and olfactory contamination check (as per **Section 3** and the checklist in **Appendix C**). • Weight of load accepted. • Fill area (stage) where load will be deposited.	
6. Site machinery	Machinery expected to be used in the fill operation includes: • Bulldozer. • Excavator. • Watercart. • Padfoot roller. • Truck and trailer units (delivering fill).	
7. Noise management	Truck movements and use of mobile plant and equipment will occur within the hours of operation specified in above, and regard will be given to avoiding use of noisy machinery outside of these hours unless essential works are required. As per the AUP Chapter 25 (Table E25.6.3.1), noise from the site establishment and filling activities shall not exceed: • 55 dB L_{Aeq} (0700 hours to 2200 hours, Monday to Saturday) • 55 dB LAeq (0900 hours to 1800 hours, Sundays and public holidays • 45 dB L_{Aeq} / 75 dB $_{AFmax}$ (at all other times). Noise monitoring and complaints management is described in **Section 5(10)**.	
8. High voltage transmission lines	A high voltage transmission line traverses close to the western gully. Safe distances are prescribed in relevant Transpower and Worksafe documentation, including the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP34:2001). The code requires a 4 m safe vertical and lateral safe distance with 6 m recommended for additional precaution. A 12 m setback is necessary from the pylons.	
9. Health and safety	Health and Safety procedures shall be in accordance with the Applicant's health and safety plan. The plan shall be consistent with relevant health and safety legislation requirements, including any requirements under legislation pertinent to working around electrical transmission lines.	
10. Staff training	All new site personnel and visitors to the site will be given an induction describing the fill facility, operational practices, hazards, health and safety systems, environmental requirements, and emergency procedure prior to starting work.	

4.4 Fill placement requirements

The geotechnical assessment report is in **Appendix F** and outlines the proposed method of compaction, frequency of checks by geotechnical specialists, and actions to be taken if compaction is not adequate (Section 8 of **Appendix F**). It also provides procedure for wet and organic materials management and integration. Further details are provided as follows:

1. Staging	• An area of no more than 2 hectares will be open at any one time.

<table>
<tr><td></td><td>• Areas may be reopened for additional filling and contouring if necessary.</td></tr>
<tr><td>2. Unsuitable material removal and underdrainage</td><td>• Soft, organic, wet or other unsuitable materials shall be removed from the base of the gully to enable underdrainage installation and subsequent fill placement. These materials may be stockpiled, conditioned and reused as part of growing media in riparian restoration or pasture reinstatement.
• Following undercutting the base of the gullies will be lined with underdrainage materials comprising a ~1.5 m thickness of GAP65 – 100 compacted in 400 mm layers to provide a preferential pathway for flow of groundwater and to provide a firm base for compaction of the overlying fill. Geotextile fabric or a hardfill fines blinding layer will be installed at the final surface to ensure the cohesive fill does not retard the permeability of the underdrainage materials.</td></tr>
<tr><td>3. Fill placement and compaction</td><td>Compaction control:
• Guidance on placement requirements and compaction control is set out in the table below. Refer to Section 8 of the Geotechnical Report (Version 2.1) for further details.
• We recommend using a 12-tonne pad foot roller within the bulk managed fill materials, which are expected to be largely clay rich soils.
<table>
<tr><th>Material Type</th><th>Loose Layer Thickness (max)</th><th>Max Particle Size</th><th>Placement requirements</th><th>Testing & construction observation</th></tr>
<tr><td>Undercut backfill (Granular refer Section 8.3.1 of the geotechnical report)</td><td>0.4 m</td><td>200 mm</td><td>Upper 1.5 m thickness of undercut backfill to be compacted.
Minimum of 4 passes with a 12 tonne roller.
Geofabric separation layer may be required depending on the insitu ground condition</td><td>Clegg Impact Value ≥18 average with no single value less than 15.
No excessive weaving or deformation beneath the roller.</td></tr>
<tr><td>Bulk Managed Fill (Cohesive fill refer Section 8.3.2 of the geotechnical report)</td><td>0.4 m</td><td>200 mm</td><td>Bladed out into loose lifts by Dozer.
Minimum of 4 passes with a 12 tonne padfoot roller*.</td><td>Single Test Minimum Corrected Shear Vane = 50 kPa
Average Corrected Shear Vane = 75 kPa
No warping or weaving evident under passage of laden trucks.</td></tr>
</table></td></tr>
<tr><td>4. Geotechnical inspections</td><td>We anticipate that geotechnical inspections/ assessments will be required intermittently during construction. This includes:
• Verify ground conditions, by way of geotechnical investigations, within Gully 2 following forestry clearance.
• Inspection of undercuts to verify foundation conditions in each of the three gully floors.
• Inspection of set out and first stages of sub-soil drainage construction.
• In-situ strength testing of early lifts of bulk managed fill material to verify that assumed strengths are being achieved by the placement methodology.
• Installation and monitoring of vibrating wire piezometers as per Section 4.5.</td></tr>
<tr><td>5. Cover and stabilisation</td><td>• The final layers will be cohesive soils free of inclusions to ensure a compacted layer of at least 1 m thick is established as a cover. The cover may be required to be thicker on the steeper slopes and potentially armoured, pending geotechnical requirements.
• The final slope is shown in the cross sections in Appendix A.
• Placement of topsoil (growth medium) will be additional to the compacted cover and the cover shall be grassed on completion. Riparian planting shall be in accordance with Appendix 16 of the Auckland Unitary Plan (Operative in Part). A planting plan will be included in the final version of this plan (Appendix D).</td></tr>
</table>

4.5 Groundwater Monitoring

A minimum of one vibrating wire piezometer shall be installed into the foundation soils in each of the three gullies as set out in the plan in **Figure 4**.

The purpose of the groundwater monitoring is to manage the risk of instability associated with excess pore pressures developing during fill placement.

<table>
<tr><td>1. Piezometer alert and alarm levels</td><td>• Alert Level: Equivalent groundwater level 6 m above pre-existing ground level.
• Alarm Level: Equivalent groundwater level 7.5 m above pre-existing ground level.</td></tr>
<tr><td>2. Contingency Plan</td><td>If an Alert Level is triggered for groundwater monitoring, then the following actions are to be taken:
• Where possible, shift cleanfill placement into one of the adjacent gullies.
• No placement of fill within 25 m of the front face.
Under Alarm Level conditions the following actions are to be taken:
• Cease placement of fill in the individual gully until groundwater levels drop below Alarm levels.
• Fill can be placed in an adjacent gully if groundwater monitoring (Alert and Alarm) conditions allow.
• If groundwater Alarm levels are ever recorded in all three gullies at the same time, then placement of fill is to cease for the entire site until groundwater monitoring (Alert and Alarm) conditions allow.
• Mitigation measures such as wick drains may be considered to increase the rate of pore pressure dissipation.</td></tr>
<tr><td>3. Monitoring frequency</td><td>The monitoring includes the collection of VWP data and the fill height above each VWP.
• VWP’s are installed and connected to telemetry boxes that transmit the information to an online portal where live data can be viewed via personal log in.
• The fill height above each VWP is collected in the field by means of a survey with an accuracy of <0.1 m at an interval not to exceed once monthly.
• The recommended VWP monitoring is presented in the table below.
<table>
<tr><th>Status</th><th>Monitoring by Site Foreman</th><th>Reviewed by a qualified Geotechnical Professional</th></tr>
<tr><td>Normal operations</td><td>Weekly</td><td>Quarterly</td></tr>
<tr><td>Alert Level</td><td>Daily</td><td>Weekly</td></tr>
<tr><td>Alarm Level</td><td>Daily</td><td>Daily</td></tr>
</table>
</td></tr>
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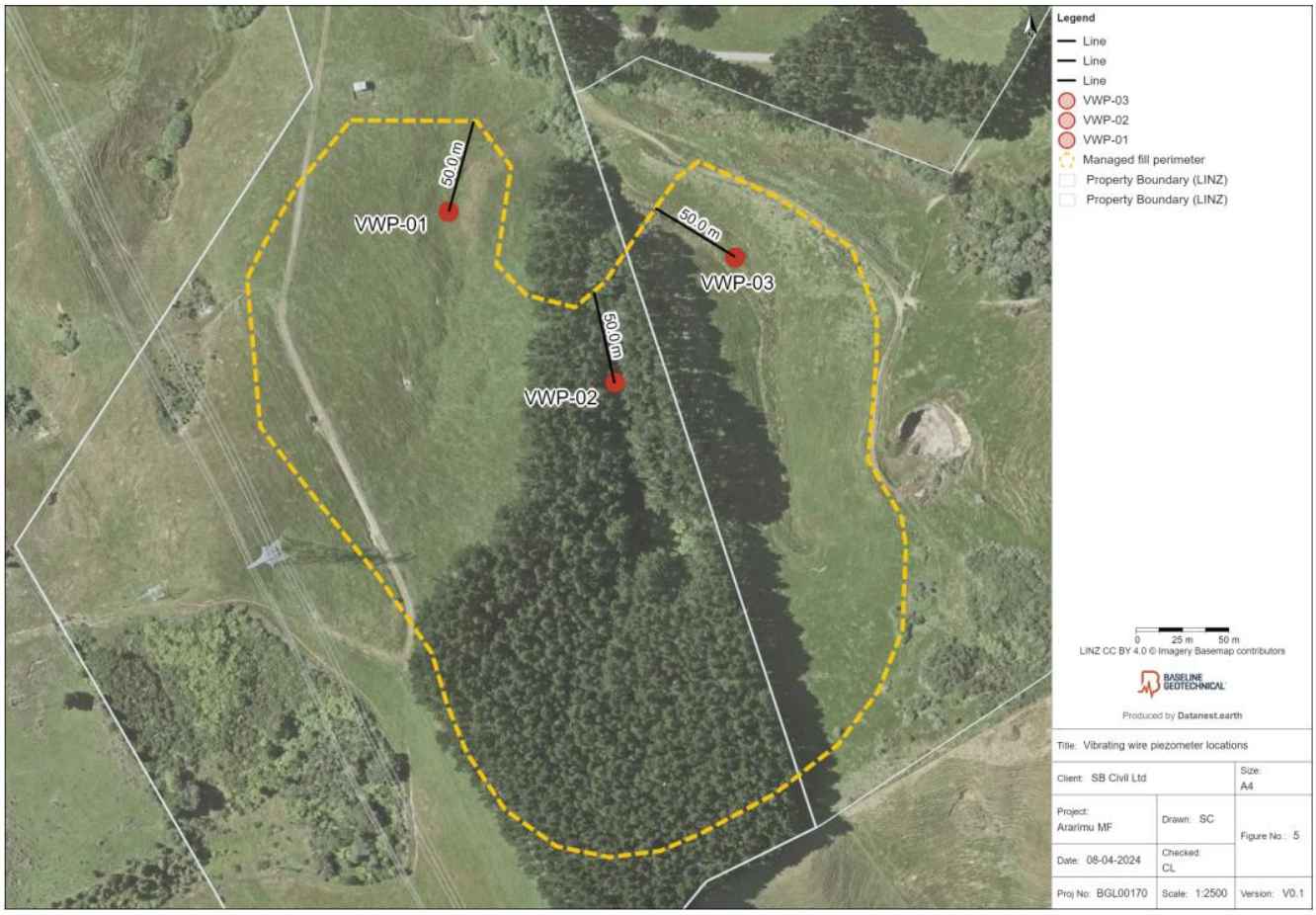

Figure 4. Vibrating wire piezometer locations (from Baseline Geotechnical)

4.6 Earthworks Controls

1. Erosion and sediment control	Earthworks will be established in accordance with Auckland Council's GD05 guidelines, as described in the draft Erosion and Sediment Control Plan (ESCP) in **Appendix B**. The ESCP includes a Chemical Treatment Plan and Emergency Spill Response Plan for managing any incidents related to water treatment chemicals. **A stage specific ESCP shall be prepared prior to each fill area commencement. The ESCP shall be prepared and signed by a SQEP**. Earthworks controls monitoring requirements are described in the Earthworks Report (Appendix G).
2. Dust control	Dust generation shall be prevented at all times, primarily via regular wetting and exposed surface rehabilitation. Dust management shall be in accordance with MfE's guidance document *Good Practice Guide for Assessing and Managing Dust* (2016). Dust will be monitored visually with daily inspection as described in **Section 5(7).** Dust mitigation measures shall include: • Using a water cart to wet areas wherever dust is being generated i.e. exposed surfaces, roads and stockpiles etc. Water will be applied at a rate that dampens the material but no runoff is produced. • Enforcing a 20 km/hr speed limit for all vehicles on site. • Checking and brushing (if needed) truck wheels at the site exit to prevent soil tracking offsite. • Limiting the amount of exposed soil by undertaking a staged filling and progressive revegetation approach.
3. Surface water treatment	Settlement ponds are expected to be sufficient for the purposes of reducing sediment load prior to discharge to the wetlands. If settlement is not being achieved within the parameters provided in the ESCP in **Appendix B**, then additional treatment in the form of additional decants, filtration devices or flocculant may be required to remove sediment. Monitoring requirements are outlined in the Adaptive Management Plan in Appendix H.

5. Environmental Monitoring

Monitoring is required to ensure the controls in place to manage effects on people and the environment are adequate and to enable changes and improvements to be implemented. The key monitoring requirements are outlined as follows. A monitoring schedule and forms in **Appendix C** have been prepared to aid in compliance and ease of reporting.

An Adaptive Management Plan (AMP) has been developed in conjunction with this report and is attached as Appendix H. The AMP outlines the ongoing procedures proposed to be implemented to ensure the monitoring of water being discharged from the sediment control devices meet the required standards and continual reporting is provided to the Council Monitoring Officer throughout the works to confirm compliance with the requirements. If any device is identified as not meeting the required standards, then alternative measures will be put in place as outlined in the AMP.

Where trigger levels included below are exceeded, contingency measures outlined in **Section 6** shall be followed. Trigger levels are included as **Table 4**.

1. Truckloads and movements	A truck recording system for all incoming loads shall be as per **Section 4.3** (5). A weighbridge may also be installed at a later date.
2. Inspection and testing of fill	• No un-tested materials shall be accepted. Soil testing must be produced for all materials entering the gate. • The fill's site manager or delegate shall inspect the materials. An inspection form is included in **Appendix D**. • Soil testing results and inspection records shall be kept and made available to Auckland Council on request.
3. Sediment pond monitoring	The stage specific sediment pond(s) shall be checked ***3-monthly*** (quarterly) for: • Field measurements of pH, temperature, dissolved oxygen and electrical conductivity. • Observations about water colour, clarity, odour and any separate phase hydrocarbons observed. The stage specific sediment pond(s) shall be sampled ***6-monthly*** (biannually, coinciding with summer and winter conditions) for: • Metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc) and total petroleum hydrocarbons (TPH) in sediment and water at an IANZ accredited laboratory. • Surface water monitoring results shall be compared to the *Australian and New Zealand Water Quality Guidelines* (NZAG) for protection of 80% of freshwater species (refer Monitoring Schedule **Appendix C**).
4. Underdrainage water sampling	Groundwater exiting from the underdrain system in the gully floors, discharging to the wetlands shall be sampled ***6-monthly*** (biannually, coinciding with summer and winter conditions) and: • Field measurements of pH, temperature, dissolved oxygen and electrical conductivity. • Laboratory testing of metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc) and TPH. • Surface water monitoring results shall be compared to the NZAG for protection of 80% of freshwater species (refer Monitoring Schedule **Appendix C**).
5. Wetland water quality monitoring	Surface water will be sampled from the exit point of the eastern wetland area ***3-monthly*** for a ***period of 2 years reducing to 6-monthly*** (if compliance is achieved) and: • Field measurements of pH, temperature, dissolved oxygen and electrical conductivity. • Laboratory testing of metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc) and TPH. • Surface water monitoring results shall be compared to the NZAG for protection of 80% of freshwater species (refer Monitoring Schedule **Appendix C**).
6. Dust monitoring	The primary air quality issue at the site is dust. All site staff will be made aware that any visual evidence of dust being generated shall require dust mitigation (dampening) to be employed. The monitoring record form in **Appendix C** shall be completed daily and held for Council compliance review if required.
7. Earthworks monitoring	Refer to the AMP in Appendix G.

8. Noise monitoring/ complaints procedure	Routine site operations are not expected to give rise to excessive noise. Where a noise complaint or any other complaint is received, staff shall: • Note in writing the nature of the complaint, request contact details from the complainant and advise them that the matter will be investigated as soon as possible. • Immediately check activities and subjective noise levels in the area near the complainant's property and, if appropriate, other parts of the site. • If activities are identified that are generating excessive noise, the project team representative shall take appropriate action (e.g., implementation of mitigation measures, change of construction methodology, etc.) to reduce noise to an acceptable level. • Contact the complainant and advise them of the outcome of the investigation and make a written note in the complaint book of the event and the outcome. If a complaint cannot be resolved through the above process, it may be necessary to arrange noise monitoring to determine the actual noise levels on the complainant's property. The complaint register shall be made available to Council if requested.
9. Monitoring staff training	• The fill site manager shall be inducted initially by the SQEP as to the fill acceptance, load checking and monitoring requirements of this plan. If there are any changes to the role of the site manager or a change in site personnel an induction of new staff shall be completed by the exiting site manager or the SQEP. • Records of staff training/ inductions shall be kept and provided to Council if required.
10. Reporting	Results will be included in the annual monitoring report (**Section 7**). Monitoring will cease when fill placement ceases.

Table 4. Trigger levels for environmental monitoring

Sediment ponds, surface water and wetland water quality	pH	6 – 10[1]
	Arsenic	0.361[1]
	Cadmium	0.0008[1]
	Chromium	0.04[1]
	Copper	0.0025[1]
	Lead	0.0094[1]
	Zinc	0.031[1]
	Total Petroleum Hydrocarbons (TPH)	15[2]

Notes.

1. ANZG 80% freshwater criteria

2. MfE (1998) Petroleum Guidelines

For sediment refer to soil criteria (Table 3, Section 3)

6. Contingency and Emergency Procedures

1.	**Unauthorised waste (rejected materials)**	If a pre-approved load is assigned by a gate staff to be non-compliant, the material shall be either: 1. Rejected at the arrival check point and the truck returned with its load to the source; or 2. At the site manages sole discretion, quarantined by placing the material in a separate bunded area until further investigation and confirmation of suitability is achieved, typically via testing at an IANZ-accredited laboratory. Where quarantined material is confirmed to be unsuitable for disposal at the site, alternative disposal to an appropriate disposal site shall be arranged, i.e. Licensed Landfill. No further soil will be accepted from the source of the non-complying material unless independent laboratory testing proves it is suitable and the applicability of the testing signed off by a SQEP. Procedures for managing unexpected materials during fill placement are described below, with visual indicators of unexpected contamination are provided in **Appendix C**.
2.	**Unexpected discovery procedures**	The following actions shall be taken if unexpected contamination (refer examples in **Appendix C**) is encountered during placement of fill: 1. Cease works in the immediate vicinity of the suspected contamination and tape off. 2. Notify fill site manager. 3. Fill site manager shall inspect the materials and determine if additional advice is required from the SQEP. 4. Implement any additional contaminated land-related health and safety procedures and PPE as deemed necessary by the fill site manager and/or SQEP. 5. Fill site manger shall brief site personnel and update the Hazard Board should continued exclusion of the area be required. 6. Maintain any additional controls required by the fill site manager and/or SQEP until the contamination is assessed and either removed or otherwise managed. It is expected that removal will be the predominant method of addressing unexpected contamination. The SQEP should be contacted for advice on: - Validation testing if the material is being removed; and - Other management options if removal is not possible. 7. The fill site manager is to record details of the discovery (including location, photographs etc.) and actions undertaken for inclusion in the annual monitoring report (**Section 7**). If unexpected asbestos is identified the requirements of the Health and Safety at Work (Asbestos) Regulations must be adhered to. The SQEP shall provide direction and if required, a Licensed Asbestos Removal Supervisor shall be engaged.
3.	**Surface water monitoring trigger levels exceeded**	Refer to the AMP (Appendix G).
4.	**Spill contingency procedures**	In the event that oil, fuel, etc is spilt from a truck or earthworks machinery at the site, spill kits will be available in the site office and staff trained in how to use it. If a spill occurs into a sediment pond the outflow of the pond will be stopped and absorbent booms used until all separate phase product has been removed from the pond. Records of any spill incidents shall be kept for inclusion in the annual monitoring report (**Section 7**).
5.	**Unexpected discharge**	If an unexpected discharge occurs (i.e. breach of erosion and sediment controls), works shall cease in the vicinity of the discharge and immediate preventative actions taken to minimise the effects of the discharge. This may involve, for example, erecting additional silt control downgradient of the discharge, diverting water into holding tanks, or similar. The SQEP is to be called if the discharge has the potential to contain contamination above managed fill levels (i.e. associated with a quarantined load). Records of any unexpected discharges shall be kept for inclusion in the annual monitoring report (**Section 7**).
6.	**Slope failure**	Geotechnical design to ensure long term stability of fill has been undertaken. However, if a slope failure did occur, the gully walls will contain the fill. In the event of a failure with one of the gullies the following shall be implemented: • Works shall cease. • The site manager shall notify the geotechnical engineer to inspect and advise of remedial measures.

	• Additional erosion and sediment control measures may be required to prevent discharge of sediment and sediment laden water offsite. • Any sediment laden water arising from any failure shall be treated within the staged sediment pond or any new ponds installed as part of failure response measures. • A record of failures and the actions taken to address this and prevent future failures shall be maintained and provided to Council if requested.

7. Document Management

Annual Reporting	A compliance report will be prepared annually for submission to Auckland Council, beginning from one year after filling commences. The final monitoring report shall be supplied three months after the cessation of filling. The report shall document: • The quantities of material deposited at the fill in the preceding year. • Location of deposition. • Compaction and rehabilitation undertaken. • Source site details including contamination testing information. • Environmental monitoring and fill inspection records. • Any incidents or complaints, and how these were responded to including detail on mitigation measures enacted. • Any breaches of resource consent conditions and the actions taken to correct them.
Record keeping	Records of key aspects of this SMP will be kept in the site office. This includes all testing data (environmental and geotechnical), records of environmental incidents, records of Council visits, records of public complaints and actions taken, daily loads accepted and any other works undertaken on the site.
Updates to the FMP	This FMP may need to be updated from time to time, for example to address changes in regulatory requirement or site-specific factors. All updates to the FMP shall be provided to Council for approval prior to implementation.

Appendix A. Fill placement specifications

A.1 Fill placement plan

A.2 Cut to fill plans

Appendix B. Erosion and Sediment Control

B.1 General controls

B.2 Draft erosion and sediment control drawing Stage 1

B.3 Daily erosion and sediment control check sheet

Appendix C. Monitoring Forms

C.1 Fill acceptance checklist

C.2 Unexpected materials identification

C.3 Monitoring schedule

Appendix D. Riparian Areas

D.1 Planting requirements

D.2 Monitoring and maintenance

Appendix E. Prohibited Materials

(Source WasteMinz, October 2022. Technical Guidelines for Disposal to Land. Revision 3)

Appendix F. Geotechnical Assessment Report (Baseline Geotechnical, V2.1)

Appendix G. Earthworks Report (Civix)

Appendix H. Adaptive Management Plan (Civix)