

Erosion and Sediment Control Plan Fill Area 2 and 4

Prepared for

Gleeson Quarries Huntly Limited

Contents

1. Scope	3
2. Location and Site Description	3
3. Description of Works	5
4. Erosion and Sediment Control Specifications	6
Access	6
Tip Heads	6
Silt Fences	6
Clean Water Diversions	6
Dirty Water Diversions	6
Sediment Retention Ponds	7
Stockpiling	8
Stabilisation	8
Chemical Treatment	8
Dust Management	8
As-Built Certification	8
Monitoring and Maintenance	8
Removal of ESC Measures	9
5. Site Personnel	9
6. ESCP Changes	9
Appendix A – Erosion and Sediment Control Drawings and Details	10
Appendix B – Chemical Treatment Management Plan	13

1. Scope

This Erosion and Sediment Control Plan (ESCP) has been prepared to support the resource consent application for the filling of Fill Area 2 and 4 for Gleeson Managed Fills, Huntly. A managed fill operation is proposed for Fill 2 and 4 to the north of Gleeson Quarries Ltd.'s Huntly Quarry on Riverview Road, Huntly.

The ESCP has been prepared in general accordance with the Waikato Regional Council Technical Report No. 2009/02 *Erosion and Sediment Control Guidelines for Soil Disturbing Activities, January 2009* (TR2009/02).

Other documents relied upon in the preparation of this ESCP are:

- AEE
- *Geotech Report*
- *Gleeson Quarries Huntly Limited – District and Regional Resource consents for new fill sites within quarry landholdings Ecological Impact Assessment*; 14 November 2019, prepared by Boffa Miskell (Ecology Report)
- *Huntly Managed Fill: Wetland Peer Review*; dated 24 December 2021, prepared by Stantec. (Wetland Peer Review)
- *Wetland review: Gleeson Managed Fill Ltd wetland areas. Prepared for: Waikato Regional Council*; dated 1 March 2022, prepared by Nicholas Singers Ecological Solution. (WRC Wetland Review)

This ESCP describes the erosion and sediment control (ESC) methodology to be implemented during the establishment and filling of Fill 2 and 4.

A separate ESCP has been prepared for Fill Area 3.

2. Location and Site Description

The proposed fill sites are located off Riverview Road, south of the Huntly township. The proposed fill sites (Fill 2 and 4) are shown on Figure 1. The two fill areas drain to two separate watercourses, termed watercourse 1 and 2, shown on Figure 1. Both watercourses drain to the Waikato River.

Access to the fill sites will be through the current Gleeson's Quarry entrance and along existing quarry roads before linking to a new/upgraded road that will lead to the separate fill sites (indicative alignment shown on Figure 1).

The sites are described in detail in both the AEE and the Ecology Reports.



Figure 1: Location map Fill 2 and 4 with indicative access from Riverview Road.

Fill Area 2

Fill 2 consists of a westerly orientated steep sided gully system. The proposed filling operation covers approximately 4.5ha and once filled to capacity will contain up to 717,000m³ of managed fill.

Indigenous vegetation is located to the west of the fill area. The indigenous vegetation is classified as a Significant Natural Area (SNA) by the Waikato District Plan. Fill 2 is located outside of the SNA.

The site is currently vegetated with gorse, weeds and areas of pasture. Pine trees were harvested from this gully area in mid-2015 and remnant slash is present.

Fill 2 contains an existing dam/farm pond that was constructed for stock watering. The Wetland Review states that the 1979 aerial image shows earthworks downstream of the pond and wetland at its upstream margin, providing evidence that this area was created sometime between 1973 and 1979. The WRC Wetland Review concludes that the upstream wetland is artificial as defined by the National Environmental Standards for Freshwater Regulations 2020 (NES: FW 2020) and has formed as a consequence of the farm pond that was constructed for stock water. The ecology report identifies that the base of the gully contains an ephemeral watercourse described as having negligible ecological value. Fill 2 drains to Watercourse 1, as shown on Figure 1, which is part of the Lake Waahi and Lake Puketirini catchment. Lake Waahi subsequently discharges into the Waikato River.

Fill Area 4

Fill 4 is a moderately sloping gully feature that drains to Watercourse 2 (Figure 1). The proposed filling operation covers approximately 5.21ha and once filled to capacity will contain up to 800,000m³ of managed fill.

The site is currently vegetated with pasture, gorse and weeds. As with Fill 2, the pine trees within Fill 4 have recently been harvested and remnant slash is present.

The Ecology Report identifies that two watercourse branches in the upper reaches that converge to form a single main stem. The western branch contains a 50m long ephemeral watercourse with no defined stream channel. The main channel has been defined as an intermittent stream. This watercourse drains to watercourse 2, as shown on Figure 1, which is located within the Waikato River catchment.

The Ecology Report states that a small artificial wetland is located in the downstream section of the middle reach constructed through the bunding of the watercourse to form a forestry track.

The Wetland Review states that an image shows a constructed stock dam in the aerial image dated 1963.

The WRC Wetland Review states that the evidence presented strongly suggests that the area where wetlands occur within fill sites 2 and 4 were both formerly dryland and the aerial images support this.

The WRC Wetland Review concludes that the wetlands are artificial as defined by the NES: FW 2020.

3. Description of Works

Fill 2

Approximately 717,000m³ of managed fill is to be imported to Fill 2 over an area of 4.5ha.

Prior to the commencement of filling, a silt fence will be installed below the proposed SRP. The SRP will be constructed below the extent of filling.

The SRP has been designed with a contributing catchment area of 4.5ha to provide for any runoff from the adjacent access road and tip head as well as any additional area around the fill that cannot practically be diverted away from the SRP. The SRP is proposed to provide for a minimum of 1,350m³ of storage volume, sized at 3% of the total contributing catchment area. Design details are provided on ESCP-002-02.

All organic and unsuitable material must be removed from the footprint of the SRP. It is likely that subsoil drainage will be required to be installed below the SRP and up through the base of the gully. The section of subsoil drainage beneath the SRP (if required) will be installed before the SRP is constructed.

Once the SRP is constructed, the stock water pond will be dewatered and then the unsuitable within the gully progressively stripped and underfill drainage installed as fill progresses.

All runoff from the fill extent will be directed to the forebay of the SRP for treatment. Subsoil drainage will continue up the gully extent.

Any area that will remain undisturbed will be diverted away from the SRP using clean water diversions (perimeter bunds). All clean water diversions will be stabilised immediately upon construction.

The fill area will be progressively stripped, setup and filled following the geotechnical engineer's recommendations.

The filling operations will be appropriately staged and managed to restrict the active filling area to 3ha.

Fill 4

Approximately 800,000m³ of managed fill is to be imported to Fill 4 over an area of 5.21ha.

Prior to the commencement of filling, a silt fence will be installed below the proposed SRP. The SRP will be constructed below the extent of filling.

The SRP has been designed with a contributing catchment area of 5.21ha, providing a minimum storage volume of 1,563m³. Clean water diversions will be used to divert adjacent clean/stabilised area away from the SRP. Design details are provided on ESCP-004-02.

All organic and unsuitable material must be removed from the footprint of the SRP. It is likely that subsoil drainage will be required to be installed below the SRP and up through the base of the gully. The section of subsoil drainage beneath the SRP (if required) will be installed before the SRP is constructed.

Once the SRP is constructed, all runoff from the fill extent will be directed to the forebay of the SRP for treatment. Subsoil drainage will continue up the gully extent.

Any area that will remain undisturbed will be diverted away from the SRP using clean water diversions (perimeter bunds). All clean water diversions will be stabilised immediately upon construction.

The fill area will be progressively stripped, setup and filled following the geotechnical engineer's recommendations.

The filling operations will be appropriately staged and managed to restrict the active filling area to 3ha.

4. Erosion and Sediment Control Specifications

Erosion and sediment control will be installed and maintained in accordance with TR2009/02.

Access

Access will be constructed/upgraded from the existing quarry entrance. An access road will be constructed from the quarry to Fill 2 and 4 as indicatively indicated on Figure 1. The quarry wheel wash at the quarry entrance will be used by fill trucks to minimise sediment tracking onto Riverview Road.

Tip Heads

A stabilised tip head will be established at the uphill edge of each fill. All road going trucks accessing the site will stay on stabilised surfaces.

Silt Fences

Silt fences will be used extensively to manage runoff during the construction of the SRPs. The silt fence will remain in place at least until the outer margins of the SRPs are permanently stabilised. If the silt fence is proposed to remain in place it must be returned up either side of the SRP emergency spillway in order to allow the spillway to activate as designed.

Clean Water Diversions

Clean water diversion bunds, likely constructed using stripped topsoil, will be at least 550mm in height and will be stabilised. Any sections greater than 2% gradient that may be prone to erosion will be further protected with rock lining. The outfalls of the clean water diversions will be rock lined to prevent erosion. Clean water catchment areas are typically small, due to the location of fill sites being within a gully system.

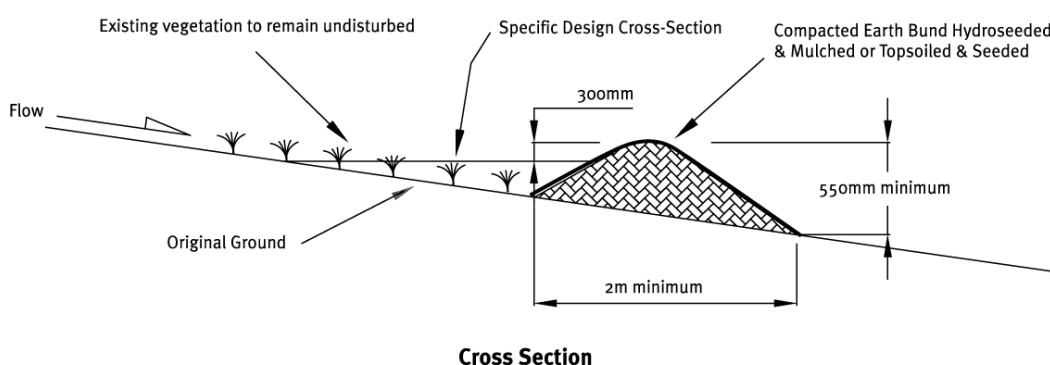


Figure 2: Cross-section of a clean water diversion bund.

Table 1: Clean water diversion sizing details.

Clean water diversions							
Area	5% AEP rainfall depth (mm)	Catchment Area (maximum)	Peak Flow (m ³ /s)	Base Width (m)	Slope (minimum)	Diversion capacity (m ³ /s)	Size (including minimum 300mm freeboard)
Fill 2	121mm	2.0ha	0.250	0.5	2%	0.36	550
Fill 4	121mm	2.0ha	0.250	0.5	2%	0.36	550

Dirty Water Diversions

Dirty water diversions will direct sediment laden runoff to the sediment control measures. The dirty water diversions have been sized to provide diversion capacity up to the 5% Annual Exceedance Probability (AEP)

storm event, plus a freeboard of 300mm. Perimeter bunds / dirty water diversions located around the fill areas will be a minimum of 650mm high. Any sections greater than 2% gradient that may be prone to erosion will be further protected with rock lining.

Calculations are provided in Table 2.

Table 2: Dirty water diversion details assuming maximum dirty water catchment area.

Perimeter Bunds (dirty water diversion)							
Area	5% AEP rainfall depth (mm)	Catchment Area (maximum)	Peak Flow (m ³ /s)	Base Width (m)	Slope (minimum)	Diversion capacity (m ³ /s)	Size (including minimum 300mm freeboard)
Fill 2	121mm	4.5ha	0.805	0.5	3%	0.91	600
Fill 4	121mm	5.21ha	0.932	0.5	3%	0.95	650

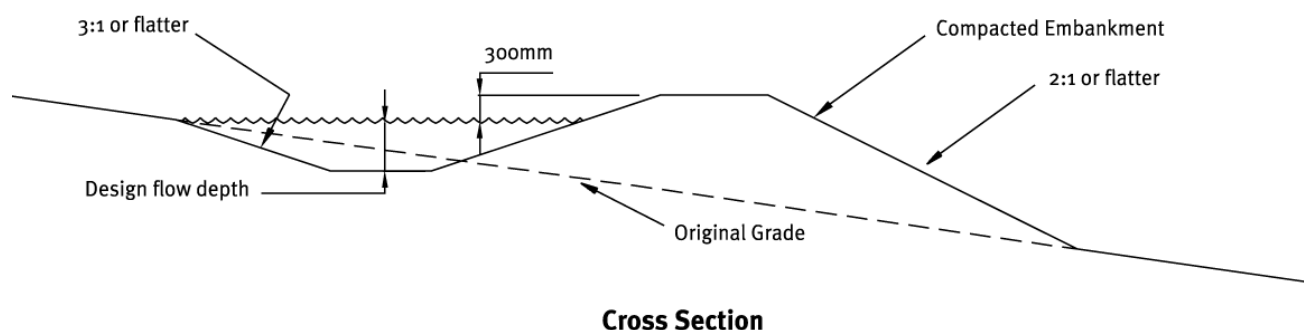


Figure 3: Cross-section of a dirty water diversion.

Sediment Retention Ponds

The SRPs will be constructed to provide a minimum storage volume of 3% of the maximum contributing catchment area. The design details for the SRPs are provided on ESCP-002-02 and ESCP-004-02.

Fill 2

Fill 2 SRP has a maximum catchment area of 4.5ha and will be constructed in accordance with TR2009/02. The fill operation will be managed and progressively stripped and stabilised such that the exposure ground with its contributing catchment will be less than 3ha at any given time. Moreover, during site establishment opportunities to further minimise the catchment within clean water diversions will be investigated and if possible, implemented.

Fill 4

Fill 4 SRP has been designed to cater for the entire fill footprint, being 5.21ha. The SRP will be sized and constructed in accordance with TR2009/02. The minimum storage volume will be 1,563m³.

The fill operation will be managed and progressively stripped and stabilised such that the exposure ground with its contributing catchment will be less than 3ha at any given time. Moreover, during site establishment opportunities to further minimise the catchment within clean water diversions will be investigated and if possible, implemented. Overall, it is anticipated that Fill 4 SRP will function in accordance with a TR2009/02 compliant pond.

General

Additional weight will be placed in the manholes of the SRPs to prevent movement or displacement in the event that the SRPs fill to capacity with water.

Each SRP will be constructed with a forebay that will provide an additional 10% volume of the pond.

Filling will commence once the SRP has been commissioned and as-built certified.

The SRPs will be cleaned of sediment when no more than 20% full. That material will be disposed of back into the fill site. The SRPs will be located to allow access for removing sediment from the pond.

Stockpiling

Stockpiles will be located within the footprint of the SRP catchment. If a stockpile is required during the construction of the SRP, that will be treated by silt fence until such time as the SRP is established.

Stockpiles will be stabilised if they are not to be used for a continuous period of more than one month.

In addition to the progressive stabilisation noted above, stockpiles will be stabilised over winter.

Stabilisation

Progressive stabilisation will be undertaken as working areas are completed. Both Fill 2 and 4 will be managed appropriately to limit the amount of exposed area within each fill area to 3ha.

Stabilisation will comprise temporary mulching or permanent topsoiling and seeding to establish grass.

The access tracks and tip heads will be stabilised with aggregate.

Chemical Treatment

Chemical treated will be employed for both SRPs to enhance settlement and sediment retention. Chemical treatment will be implemented in accordance with a Chemical Treatment Management Plan (CTMP) that is to be certified prior to any earthworks associated with Fill 2 and 4 commencing. The treatment system will be monitored and maintained in accordance with the CTMP.

Dust Management

Dust management will be one of prevention. The main source of dust will likely be from trucks moving to and from the fill sites. In order to minimise dust generated by truck movements, the access tracks will be sheeted with aggregate. Vehicle speeds along the access route will be limited to a maximum of 20km/hr and a water cart is available to dampen the route if required.

The site is screened from sensitive receivers by topography and trees.

Water will be used to dampen the site if dust is identified as likely to discharge beyond the site boundary.

Progressive stabilisation of completed/filled areas will be undertaken to reduce the amount of exposed earth.

In the unlikely event that objectionable levels of dust do arise from the fill operation, the incident will be investigated, and the appropriate amendments made to site operations and/or management as required. The investigation will include an assessment of the reasons for the event, mitigation measures and of proposed and ongoing management initiatives to ensure the effect is avoided.

As-Built Certification

Prior to each fill area commencing, as-built certification of the ESCs will be provided to the Waikato Regional Council within five working days of the completion of the construction of these controls. The as-built certification will confirm that the controls have been constructed in accordance with the ESCP and TR2009/02.

Monitoring and Maintenance

Monitoring Procedures

The site will be regularly inspected during the filling operation and until the site is fully stabilised. The aim of these inspections is to ensure that all ESC devices are installed correctly and then operate effectively throughout the duration of the works. Any potential problems will be identified immediately, and remedial works will be promptly carried out.

The inspection programme that will be implemented by the delegated Gleeson Quarries staff member will consist of:

- Weekly site walkovers to inspect and determine the effectiveness of all ESC devices installed on site;

- Pre-rain event: Prior to all forecast rainfall events, additional inspections will be made of ESC devices to ensure that they are fully functioning in preparation for the forecast event.
- Rainfall Events During rainfall events inspections will be made of ESC devices, subject to health and safety restrictions, for example inspections will not be undertaken at night.
- Post-rain event: Following all rainfall events, inspections will be made of ESC measures to ensure that all controls have performed as expected and to identify any maintenance requirements.

Any remedial works will be documented during these monitoring inspections and immediately attended to.

Trigger Event Monitoring

Additional site monitoring and reporting shall be undertaken in response to the following rainfall trigger events:

- $\geq 15\text{mm}$ in one hour; or
- $\geq 25\text{mm}$ in 24 hours

Within 24 hours of the occurrence of a rainfall trigger event, investigation, response, and reporting shall be undertaken against the following sediment retention pond performance triggers:

- pH (to demonstrate it does not fall outside the range of 6 to 9);
- Total suspended solids, to demonstrate it is not greater than 100 g/m^3 or the sediment retention pond/s stormwater treatment is 90% treatment efficiency;
- Turbidity

The results of the investigations and sampling shall be reported to the Waikato Regional Council within 15 working days of the corresponding rainfall trigger event, including any contingency actions undertaken in response to exceedance of a trigger value.

Removal of ESC Measures

The removal of any erosion and sediment control measure from any area where soil has been disturbed as a result of the exercise of this consent will only occur after consultation and written approval has been obtained from the Waikato Regional Council. In this respect, the main issues that will be considered by the Waikato Regional Council include:

- The quality of the soil stabilisation and/or covering vegetation;
- The quality of the water discharged from the rehabilitated land; and
- The quality of the receiving water

5. Site Personnel

Shawn Mclean (029 285 4965), the Quarry Manager, will have overall responsibility for the works on site and will oversee that day to day implementation of the ESCP to ensure the requirements of that document are met.

6. ESCP Changes

This ESCP is intended to be a live document and if the earthworks, filling methodologies or ESC measures for the anticipated work changes then an update / review of the ESCP drawings will be made before the earthworks/filling commence. Any changes to the ESCP will be confirmed in writing and provided to the Council for certification, prior to the implantation of any changes proposed.

Appendix A – Erosion and Sediment Control Drawings and Details

Sediment Retention Pond Sizing

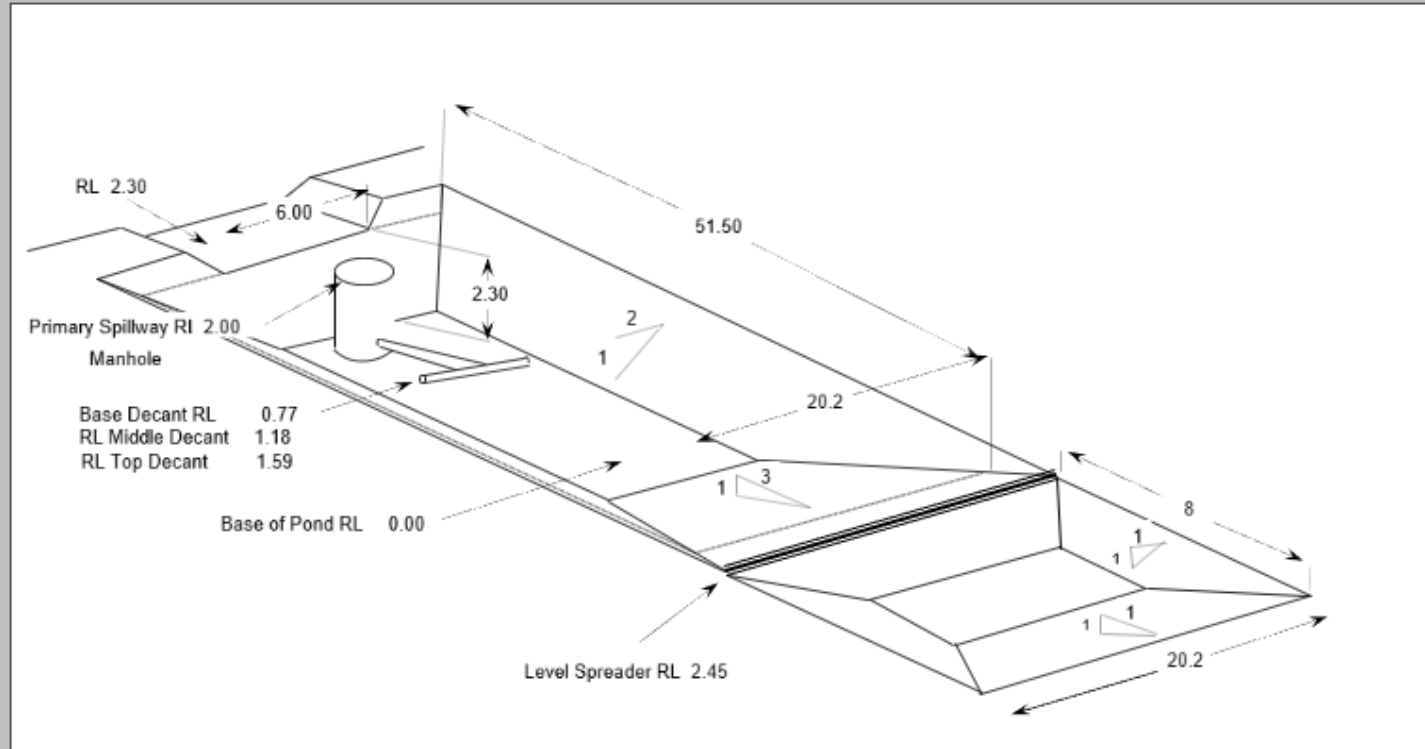
Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
Auto	3:1	2:1	2.30	0.00

SRP - Fill 2 (4.5ha)

Storage Volume Criteria	3%
Contributing Catchment (ha)	4.50
Minimum Storage Volume (m3)	1350
Dead storage (m3)	405
Live storage (m3)	945
Length at Spillway Level	51.50
Width at Spillway Level	20.20
Spillway base width (300mm deep)	6.00
Primary Spillway diameter (min)	Manhole Required
Number of decants	3
Number of holes per decant	200
Minimum outlet diameter	300mm
RL Emergency Spillway	2.30
RL Primary Spillway	2.00
RL Level Spreader (min)	2.45
RL Base Decant	0.77
RL Middle Decant	1.18
RL Top Decant	1.59
Length at Base	40.00
Width at Base	11.00

Forebay		
Volume	135 m3	min. volume
Depth	1 m	min. depth
Width	20.20 m	full width of pond
Length	8 m	min. length

Refer to TR2009/02 for cross-sections and plan views.

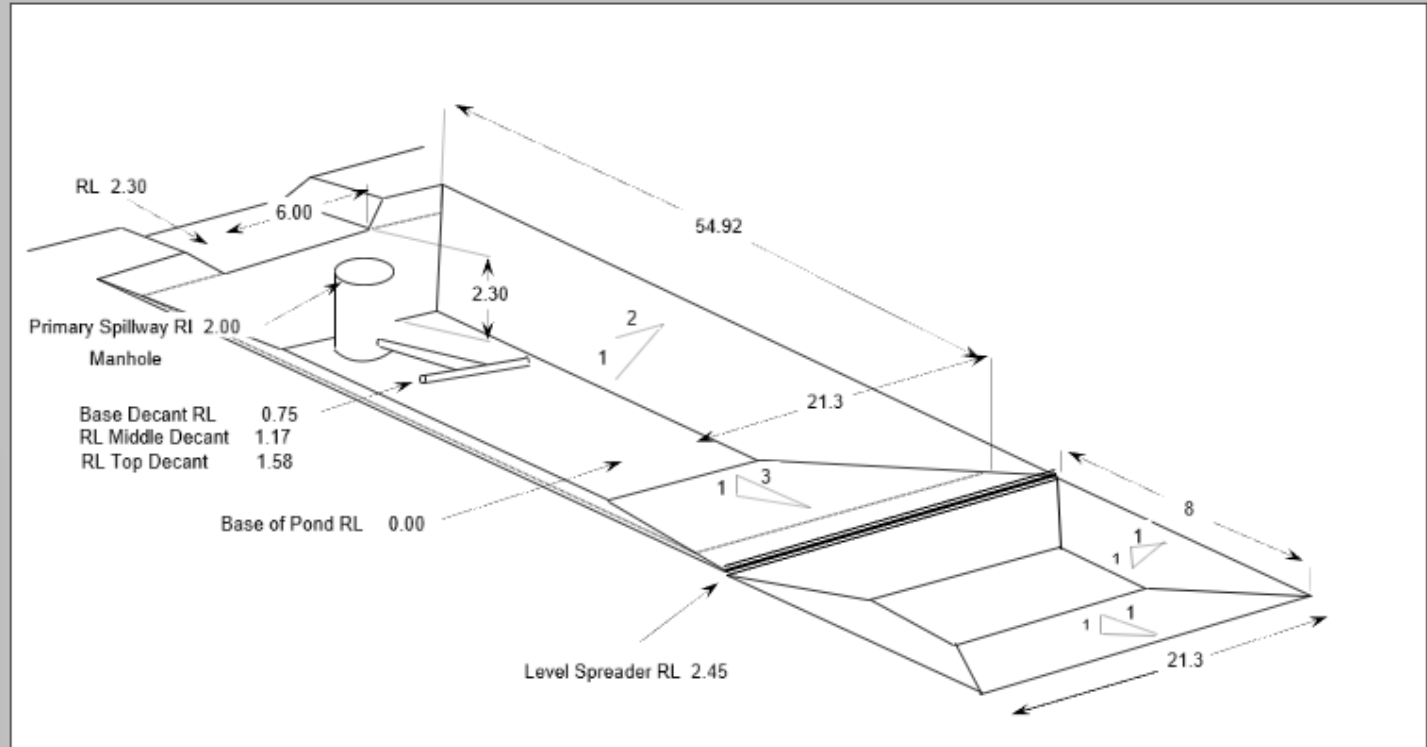


Sediment Retention Pond Sizing

Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
Auto	3:1	2:1	2.30	0.00

SRP - Fill 4 (5.21ha)

Storage Volume Criteria	3%
Contributing Catchment (ha)	5.21
Minimum Storage Volume (m3)	1563
Dead storage (m3)	468.9
Live storage (m3)	1094.1
Length at Spillway Level	54.92
Width at Spillway Level	21.34
Spillway base width (300mm deep)	6.00
Primary Spillway diameter (min)	Manhole Required
Number of decants	3
Number of holes per decant	231
Minimum outlet diameter	300mm
RL Emergency Spillway	2.30
RL Primary Spillway	2.00
RL Level Spreader (min)	2.45
RL Base Decant	0.75
RL Middle Decant	1.17
RL Top Decant	1.58
Length at Base	43.42
Width at Base	12.14

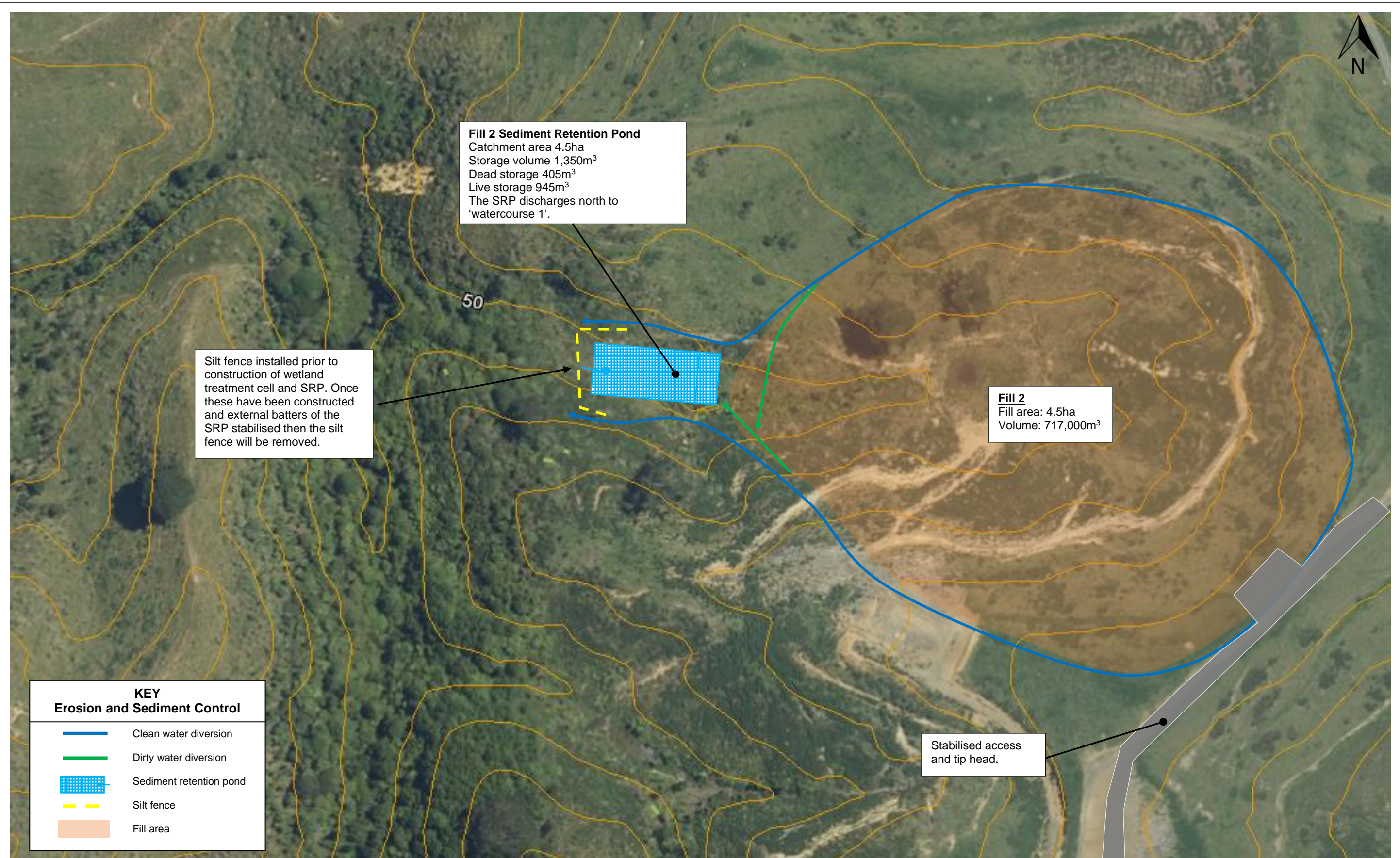


Forebay		
Volume	156.3 m3	min. volume
Depth	1 m	min. depth
Width	21.34 m	full width of pond
Length	8 m	min. length

Refer to TR2009/02 for cross-sections and plan views.

Appendix B – Chemical Treatment Management Plan

TBC



Fill 2 Sediment Retention Pond
 Catchment area 4.5ha
 Storage volume 1,350m³
 Dead storage 405m³
 Live storage 945m³
 The SRP discharges north to 'watercourse 1'.

Silt fence installed prior to construction of wetland treatment cell and SRP. Once these have been constructed and external batters of the SRP stabilised then the silt fence will be removed.

Fill 2
 Fill area: 4.5ha
 Volume: 717,000m³

Stabilised access and tip head.

KEY	
Erosion and Sediment Control	
	Clean water diversion
	Dirty water diversion
	Sediment retention pond
	Silt fence
	Fill area

- NOTES**
- All erosion and sediment controls will be installed and maintained in accordance with Waikato Regional Council Technical Report 2009/02 'Erosion and Sediment Control Guidelines for Soil Disturbing Activities' (TR09/02).
 - All erosion and sediment control measures will be inspected weekly by the site foreman.
 - Clean out SRP before accumulated sediment reaches 20% of total volume.
 - Site monitoring will be undertaken before and immediately after rain as well as during heavy rainfall events. Any required maintenance or improvements to control measures will be undertaken immediately.

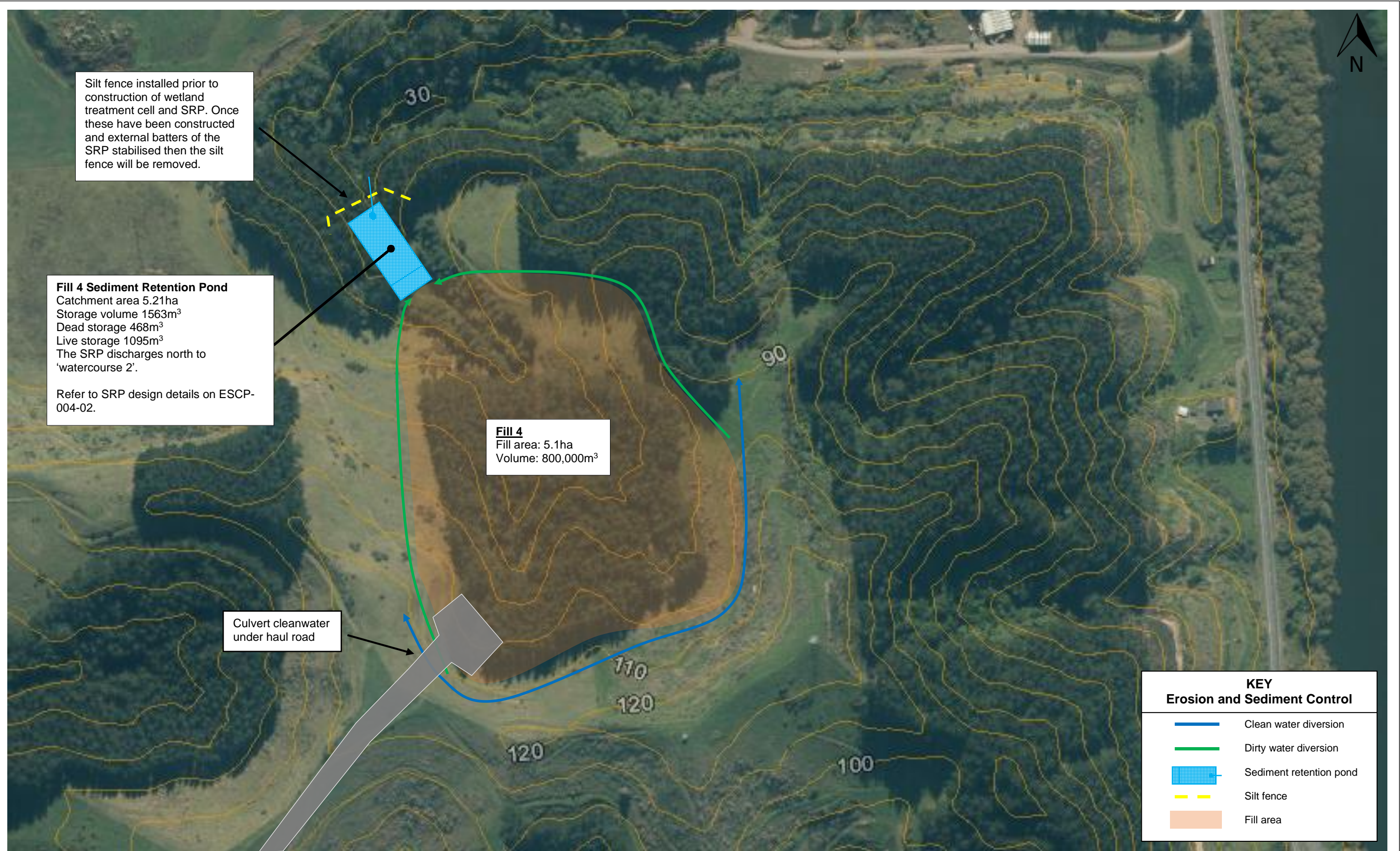
REV	DATE	REVISION DETAILS	APPROVED
A	07.03.22	Draft for review.	
B	16.06.22	For consent	



Drawn
ZW

Checked
MP

Project	HUNTLY MANAGED FILLS
Title	Erosion & Sediment Control Plan Fill 2
Drawing No.	ESCP-002-01
Sheet No.	1



NOTES

- All erosion and sediment controls will be installed and maintained in accordance with Waikato Regional Council Technical Report 2009/02 'Erosion and Sediment Control Guidelines for Soil Disturbing Activities' (TR09/02).
- All erosion and sediment control measures will be inspected weekly by the site foreman.
- Clean out SRP before accumulated sediment reaches 20% of total volume.
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A	07.03.22	Draft for review.	
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Project	HUNTLY MANAGED FILLS
Title	Erosion & Sediment Control Plan Fill 4
Drawing No.	ESCP-004-01
Sheet No.	1