

Appendix 7: Erosion and Sediment Control

Erosion and Sediment Control Plan

Whitehall Quarry Expansion



June 2025

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Erosion and Sediment Control Plan

1. OVERVIEW

This Erosion and Sediment Control Plan (ESCP) has been prepared for consenting purposes and provides an initial assessment of general measures for the control of erosion and sediment discharges during the ongoing operational phases of the quarry pit. The ESC's regarding the OBDA area have previously been consented (AUTH146202.01.01) and are not further discussed in this Plan.

The controls to be implemented seek to maintain the quality of the receiving water course, the Karapiro Stream. Water quality is and has been measured consistently at four points along the stream, in line with conditions of the Stormwater Discharge Consent (108118).

Earthworks proposed to be undertaken over the 2025/26 summer earthworks season (should consent be granted) consist of excavation of overburden from the upper northern quarry face as part of **Stage 1**. It is intended that Winstone Aggregates will submit Annual ESCP's to WRC for approval, to cover the upcoming ESC season and any changes to the existing controls that are proposed. This will continue as the quarry progresses into **Stage 2**.

2025/26 Earthworks season activities to be undertaken include the following:

- Establishment of an access to the upper face.
- Excavation of overburden (residual greywacke soils to highly weathered greywacke) from the face.
- Transport and placement of overburden in the Flatland OBDA.
- Excavation, transport and placement of weathered greywacke rock in quarry stockpiles.

Earthworks will be undertaken by an Earthworks Contractor proficient in the bulk excavation, transport, and placement of overburden under the supervision of a Winstone Aggregates Earthworks Project Manager.

Day to day supervision of the works will be undertaken by the Pukekawa Quarry Manager.

Emergency contact phone numbers are as follows:

- **Contracts Manager:** Israel Kopi – 027 278 0426 (israel.kopi@winstoneaggregates.co.nz)
- **Quarry Manager:** Shane Burrett – 027 836 1879 (Shane.Burrett@winstoneaggregates.co.nz)

Whitehall Quarry can be contacted by phoning 07 827 8950 during working hours.

2. AREAS OF EARTHWORKS

Earthworks and extraction activities undertaken over the years, proceed under the control of annual erosion and sediment control plans which are approved by Council. These plans outline multiple areas of earthworks that are occurring on-site and are covered by various consents (*see Fig 1. below for Whitehall's existing Water Management processes*). This ESCP covers how sediment laden run-off will generally be controlled and treated from the proposed pit expansion, prior to discharge into the receiving environment

The proposed pit expansion will be developed in two main areas/stages – the Northern Quarry Face and the Western Quarry Face. Minor works will also be undertaken along the haul roads from the extraction face to the overburden disposal area(s).

Each area/stage will have its own controls, directing stormwater to either the main pit sump or a series of sediment retention ponds. Many of these controls have been in place since the first quarry expansion and perform well in adverse weather events. The large pit sump in particular is extremely beneficial in providing a high volume, deep treatment pond, located well below the Karapiro Stream.



Fig 1. Existing site water management plan

3. EXCAVATION AND PLACEMENT METHODOLOGY

The excavation of Stage 1 in the upper Northern Quarry Face (yellow area below) will cover an area of approximately 9ha.

The works will involve forming benches at 10m intervals down to approximately RL90m. Works in this area are likely to occur over a period of approximately 15 years before moving into Stage 2. Different parts of this area will be progressively stabilised over this time, limiting the size of the disturbed catchment.

Excavation will be undertaken using bulldozers, excavators, and haul trucks. The excavation of the lower face will be undertaken as a quarry operation using drilling and blasting to loosen the rock, and excavators and haul trucks to load and cart the blasted rock to the aggregate processing plant or directly to stockpile. Portable mobile crushing and screening plant may be used to process material at the quarry face.

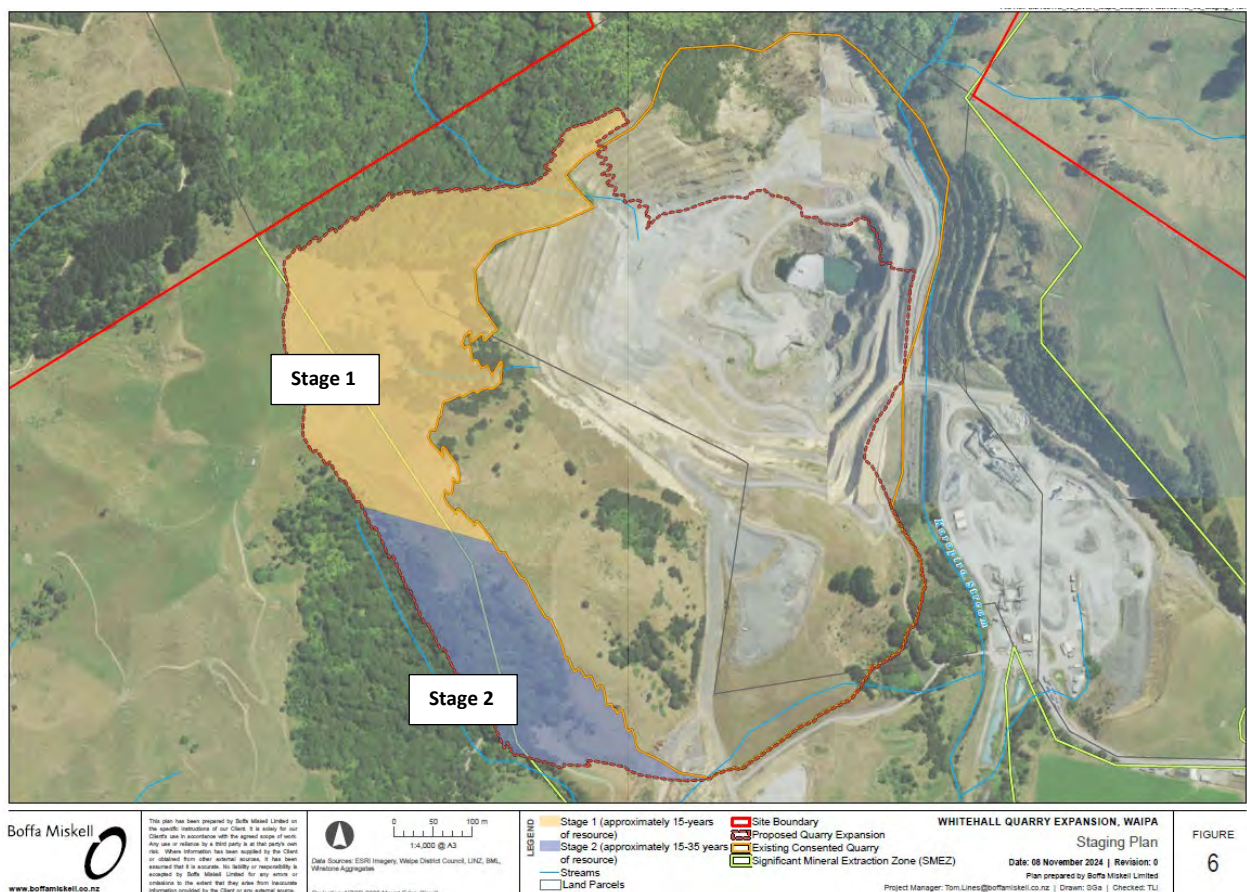


Fig 2. Proposed staging of expansion

Stage 2 will cover an area of approximately 6ha and follow a similar extraction process. By this stage, the landscape would have changed markedly with stormwater being treated inside the pit shell and via the pit sump before discharging to the Karapiro Stream.

However, the intention is to continue to minimise the size of the disturbed catchment, progressively rehabilitating and stabilising open areas as the quarry expands. Discharge quality limits will remain as currently consented.

4. SURFACE WATER MANAGEMENT

Current Status:

- Surface water from the western end of the quarry face is caught by a haul road bench. The haul road bench grades from west to east, discharging to the Southern OBDA haul road.
- Surface water discharges from this haul road report to a Sediment Retention Pond (Level 8 SRP) prior to discharging southwards to a ponding area at the northern end of the Southern OBDA.
- A Decanting Earth Bund (South DEB) is located on the former quarry access road. Discharges from here then report to the upper Polishing Pond.
- All other surface water arising on the lower quarry faces reports to the quarry pit sump where it is pumped to water storage and treatment ponds prior to use in quarry operations with excess water discharged to the Karapiro Stream.
- Dimensions of the SRP and DEB are located in Appendix A.

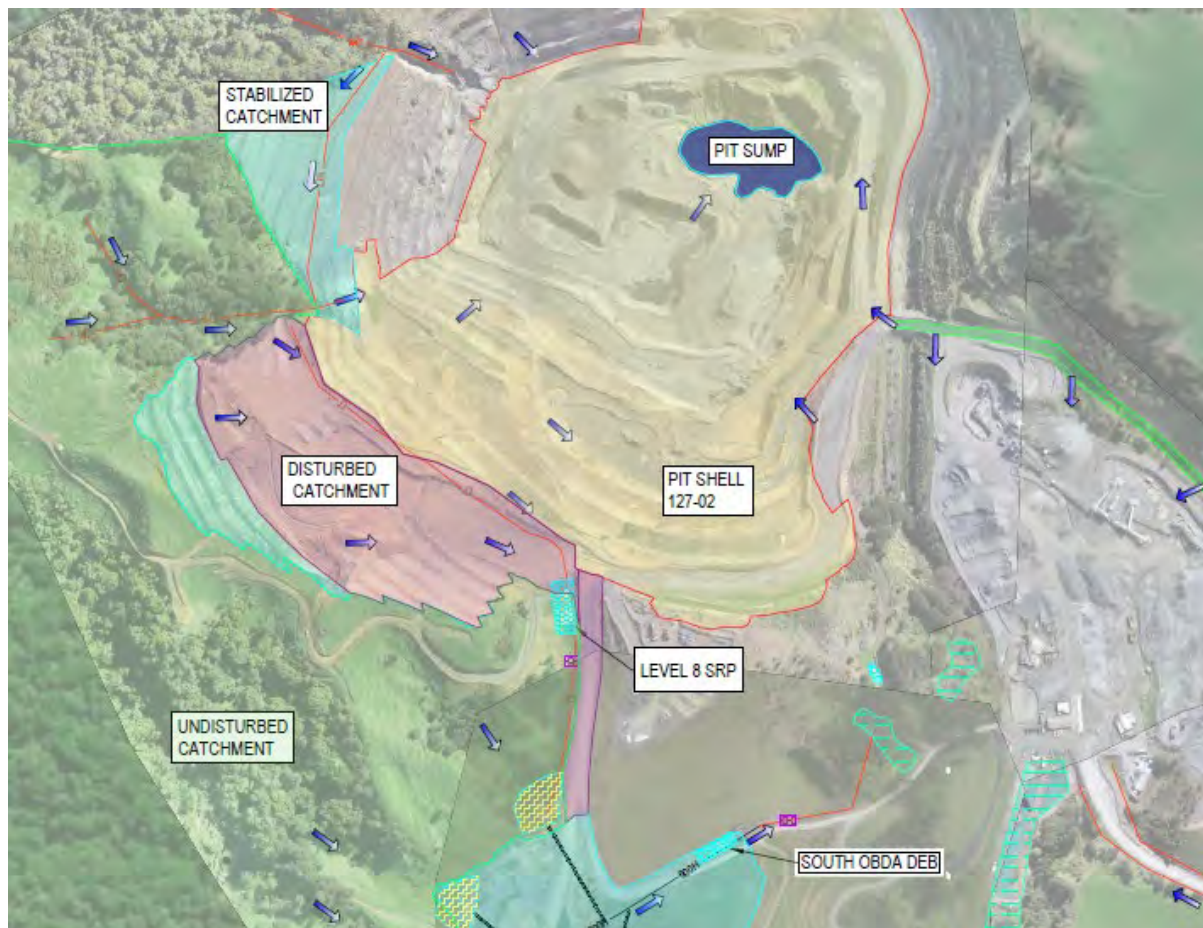


Fig 3. Current SRP and DEB locations

Future Status:

- No substantial changes are envisaged from the current arrangement with only the haul road bench migrating north and westwards as the upper quarry face is excavated.
- Benches, ramps, and haul roads will continue to direct surface water in an eastward's direction to discharge to the pit or Level 8 SRP, DEB and Polishing Pond, before discharging to the Karapiro Stream. (see Appendix A for further plans).

5. EROSION AND SEDIMENT CONTROLS

The erosion and sediment controls to be utilised on this site are simple and traditional. The site-specific erosion and sediment control plans are included in Appendix A and feature the following –

- **Diversion Bunds:** Suitable site material will be utilised to form dirty water diversion bunds to divert sediment laden water from the site to the sediment treatment devices. Where possible, bunds will be stabilised as soon as practicable.
- **Sediment Retention Pond:** Level 8 SRP will be used as the main form of retention and treatment of sediment laden runoff across the western quarry face, which does not discharge to the main quarry pit. The SRP is positioned upstream of the existing soak pits, DEB and Polishing Pond.
- **Decanting Earth Bund:** The DEB is located on the South OBDA haul road and provides further treatment of the Level 8 SRP discharge and soak pit drainage from various points to the south of the disturbed catchment.
- **Flocculation:** The Level 8 SRP has a rain activated flocculant trigger system installed (see Fig 4.) and there are several other similar systems installed and operating throughout the quarry. The details of this dosing system are included in the approved Chemical Treatment Management Plan (see Appendix B).
- **Temporary Stabilisation Techniques:** Geotextiles, polymers and hydroseeding form the majority of the site's techniques for stabilising steep batters, slopes and channel diversions.

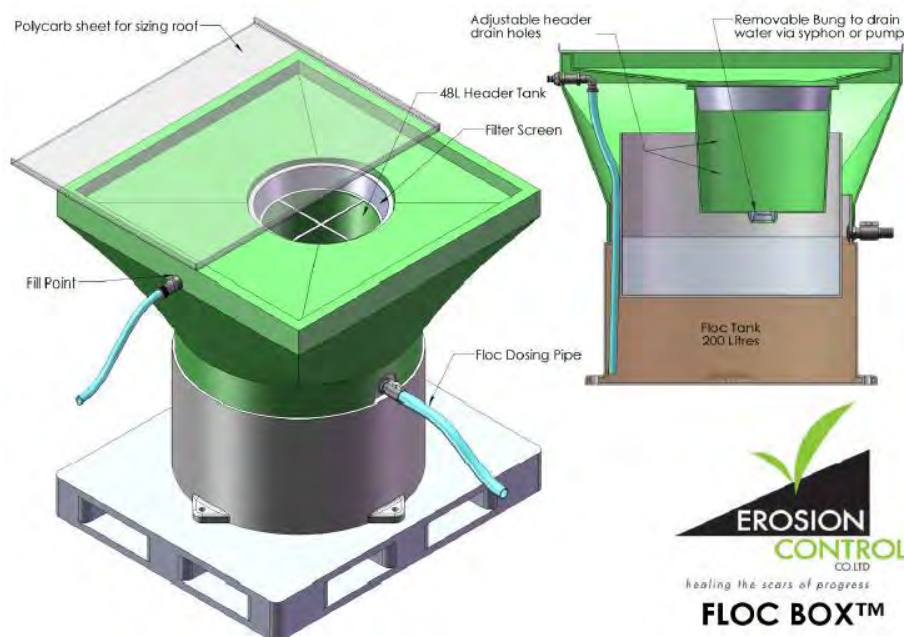


Fig 4. Floc Box

6. MAINTENANCE AND MONITORING

The quarry will maintain and monitor all sediment control measures at all times. Maintenance activities to be undertaken are summarised as –

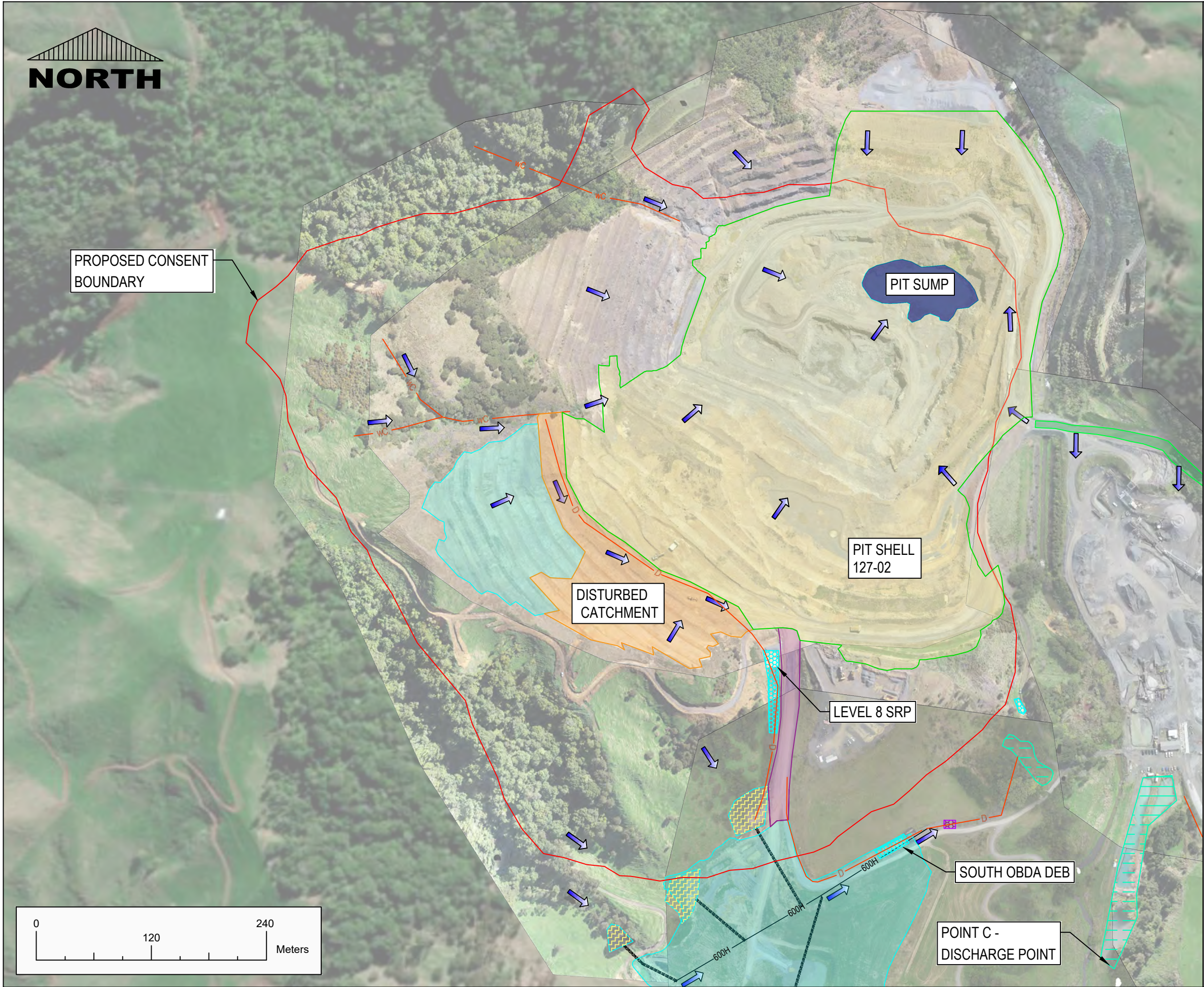
Sediment Retention Ponds:

- Inspect ponds every day, before forecasted rainfall event and after every rainfall event;
- Immediately repair any damage;
- Clean out ponds before volume of accumulated sediment reaches 20% of total pond volume;
- All sediment removed must be disposed of responsibly, such as by mixing with temporary earthworks stockpiles.

Diversion Channels and Bunds:

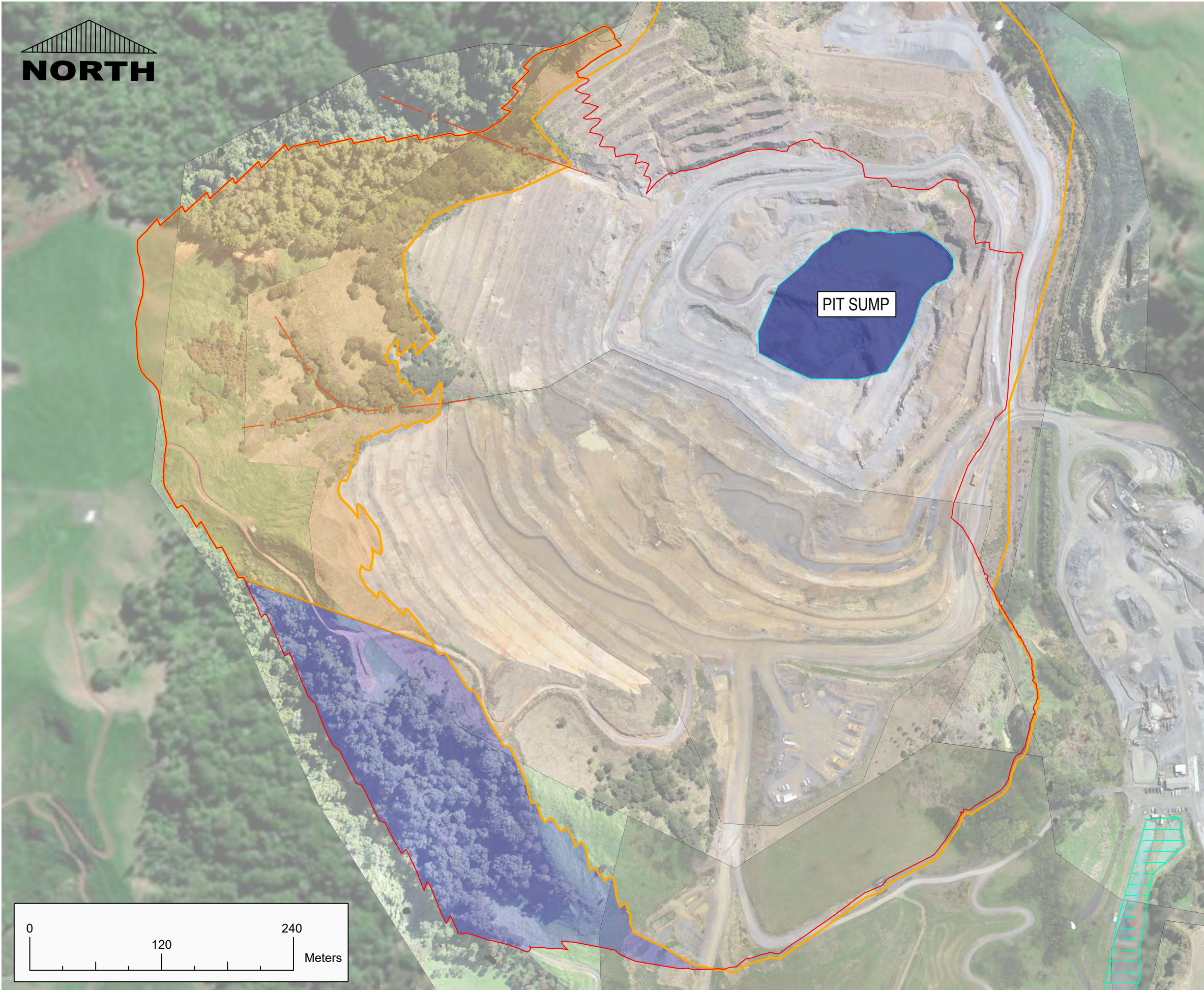
- Inspect channels and bunds regularly and after each rainfall event to check for accumulated sediment which may cause overtopping or for any signs of breaching.
- Check any discharge points for signs of scouring and install further armouring or other stabilisation if scouring is evident.
- All sediment removed must be disposed of responsibly such as mixing with temporary earthworks stockpiles.

APPENDIX A – EXISTING EARTHWORKS AND PROPOSED EXPANSION



DRAWING LEGEND	
	STORM WATER CHANNEL
	TABLE DRAIN
	DISTURBED CATCHMENT REPORTING TO PIT SUMP - 19.2ha
	DISTURBED CATCHMENT REPORTING TO LEVEL 8 SRP - 2.0ha
	STABILISED CATCHMENT AREA
	DISTURBED CATCHMENT REPORTING TO SE OBDA - 0.4ha
	HAUL ROAD - BEHIND PLANT - EXISTING 0.6ha
	PROPOSED CONSENT BOUNDARY
	SOAK-PIT TO UNDERDRAINS
	SUBSOIL DRAINAGE NETWORK
	FLOW DIRECTION
	ROCK CHECK DAM / SILT TRAP
	EXISTING POLISHING PONDS
	SEDIMENT RETENTION POND

REVISION			NOTES		DATE	SURVEY BY: WINAGGS ENG	SURVEY DATE: FEB 2025		WHITEHALL QUARRY - FY25 OVERBURDEN STRIPPING		STATUS: FOR INFORMATION	
			PROJECTION: MT EDEN 2000			DRAWN BY: I.R.KOPI			EROSION & SEDIMENT CONTROL PLAN		DATE: 09/05/2025	REVISION: A
			DESIGNED BY:								SCALE: 1:4000 (A3)	DRG No: 01

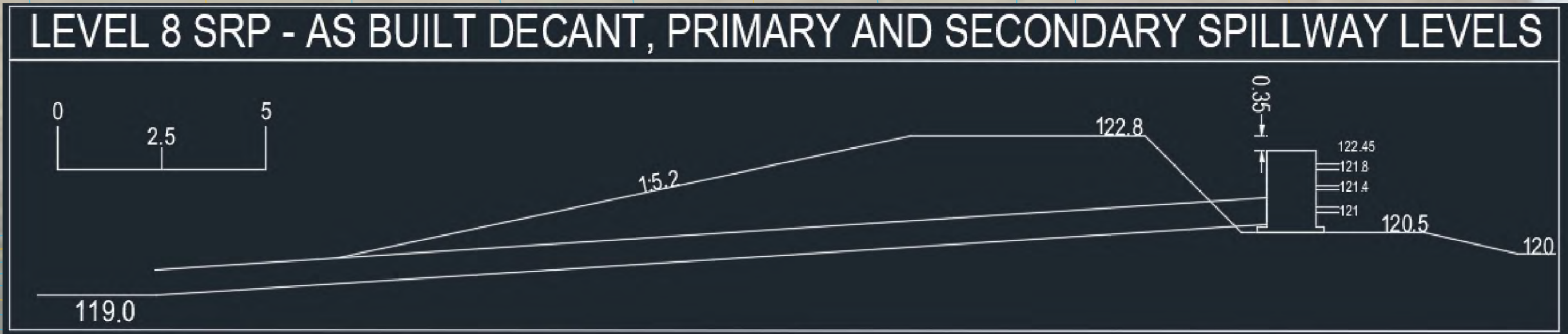
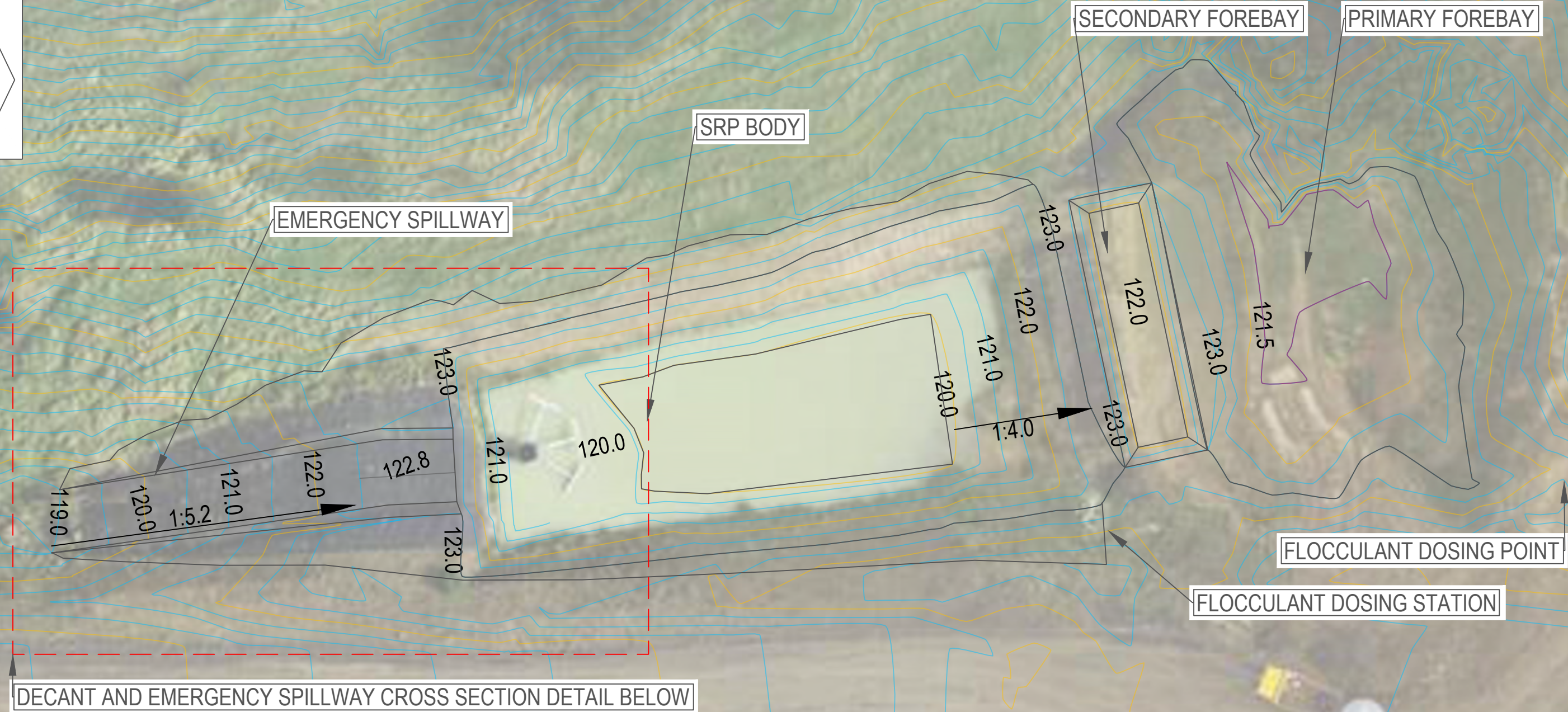


DRAWING LEGEND	
	EXISTING STORM WATER CHANNEL
	PIT EXPANSION AREA STAGE 1 - 95ha
	PIT EXPANSION AREA STAGE 2 - 48ha
	EXISTING CONSENTED QUARRY
	PROPOSED CONSENTED QUARRY

- GENERAL EROSION & SEDIMENT CONTROL NOTES:**
1. PROPOSED PIT EXPANSION AREA TO BE DEVELOPED PROGRESSIVELY IN INCREMENTAL STAGES. DETAILED EROSION & SEDIMENT CONTROL PLAN TO BE SUBMITTED TO WAIKATO REGIONAL COUNCIL FOR APPROVAL PRIOR TO COMMENCEMENT OF PHYSICAL WORKS.
 3. UNLESS OTHERWISE SPECIFIED, EXISTING EROSION & SEDIMENT CONTROL PRINCIPLES METHODS AND DEVICES WILL BE UTILIZED DURING THE DEVELOPMENT OF THE PROPOSED PIT EXPANSION.
 4. EROSION & SEDIMENT CONTROLS TO BE UPGRADED PROGRESSIVELY AS REQUIRED TO REFLECT DEVELOPMENT WITHIN THE PROPOSED PIT EXPANSION AREA & IN GENERAL ACCORDANCE WITH WAIKATO REGIONAL COUNCIL EROSION & SEDIMENT CONTROL GUIDELINES.
 5. ALL SURFACE WATER RUNOFF FROM DISTURBED CATCHMENTS TO REPORT TO THE PIT SUMP OR SEDIMENT CONTROL DEVICES FOR TREATMENT PRIOR TO BEING RELEASED INTO THE KARIPIRO STREAM (RECEIVING ENVIRONMENT)
 6. ONGOING MONITORING & MAINTENANCE TO BE UNDERTAKEN BY SITE TO ENSURE CONTROLS ARE FUNCTIONING. WATER SAMPLES TO BE TAKEN DOWNSTREAM OF THE PIT POST HEAVY RAINFALL EVENT TO MONITOR EFFETENESS OF CONTROLS.

			SURVEY BY: WINAGGS ENG	SURVEY DATE: FEB 2025		WHITEHALL QUARRY - PIT DEVELOPMENT		STATUS: FOR INFORMATION	
REVISION	NOTES	DATE	PROJECTION: MT EDEN 2000	DRAWN BY: I.R.KOPI			DATE: 02/05/2025	REVISION: A	
			DESIGNED BY:			PROPOSED PIT EXPANSION PLAN	SCALE: 1:3500 (A3)	DRG No: 01	

NORTH



REVISION			NOTES		DATE	SURVEY BY: WIN AGGS ENGINEERING	SURVEY DATE: SEPTEMBER 2023		WHITEHALL QUARRY - FY24 EARTHWORKS - ESC SRP DEVICE		STATUS: AS BUILT	
						PROJECTION: MT EDEN 2K	DRAWN BY: I.R KOPI		LEVEL 8 SEDIMENT RETENTION POND AS-BUILT		DATE: 13/02/2024	REVISION: A
						DESIGNED BY: EDMUNS					SCALE: 1:250(A3)	DRG No: 5

Sediment retention pond (SRP)

As-built Certification Sheet

SRP name/number: Level 8 SRP

Contributing catchment area: (m ²)	28,000m ²	
Dead storage volume and depth	Volume (m ³) 273m ³	Height 1m
Live storage volume and depth	Volume (m ³) 907m ³	Height 1.8m
SRP dimensions set at SRP base	Length 27m	Width 8m
SRP dimensions at primary spillway height	Length 36m	Width 12m
Primary spillway diameter	Manhole diameter 1200 mm	
Length to width ratio:	3:1	
Inlet batter 3:1	Y ☒ Y - 3:1	N ☐
Embankments adequately compacted/method of compaction	Trackrolled with excavator in 0.2m lifts	
Emergency spillway width and depth	Width 4.5m	Depth 0.2m
Emergency spillway able to pass 100 year event	Y ☒ Y	N ☐
Emergency spillway stabilisation type	Pinned Geofabric	
Discharge point stabilised?	Y ☒ Y	N ☐
Outlet pipe diameter	525mm (ID)	
Anti-seep collars installed	Y ☐	N ☒ N
Freeboard between primary & emergency spillway?	Y ☒ Y - 0.35m	N ☐
Number of floating decants	3 - T Bars	
Weighted manhole riser	Y ☒ Y	N ☐
Level spreader level?	Y ☒ Y	N ☐
Level spreader full width of srp?	Y ☒ Y	N ☐
Level spreader stabilisation type	Compacted Earth and Geofabric	
Level spreader haunched with concrete	Y ☐	N ☒ No
Waikato Regional Council approved variations to device (please list)		
Decant discharge rate	13.5	litres per second

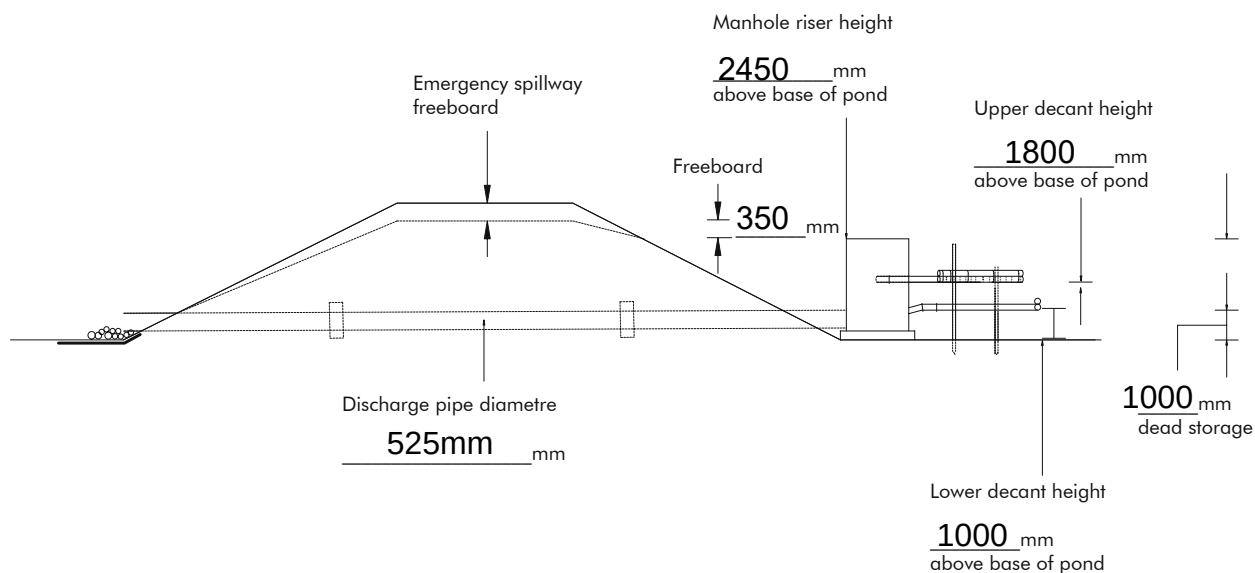
Please sign below to confirm that the as-built information in this sheet is accurate and the device identified on this sheet has been constructed in accordance with the Waikato Regional Council approved Erosion & Sediment Control Plan for the site and the "Erosion and Sediment Control Guidelines for Soil Disturbing Activities", January 2009 document or Waikato Regional Council approved variations.

Suitably qualified person (name and company): Edmund Smith - Winstone Aggregates

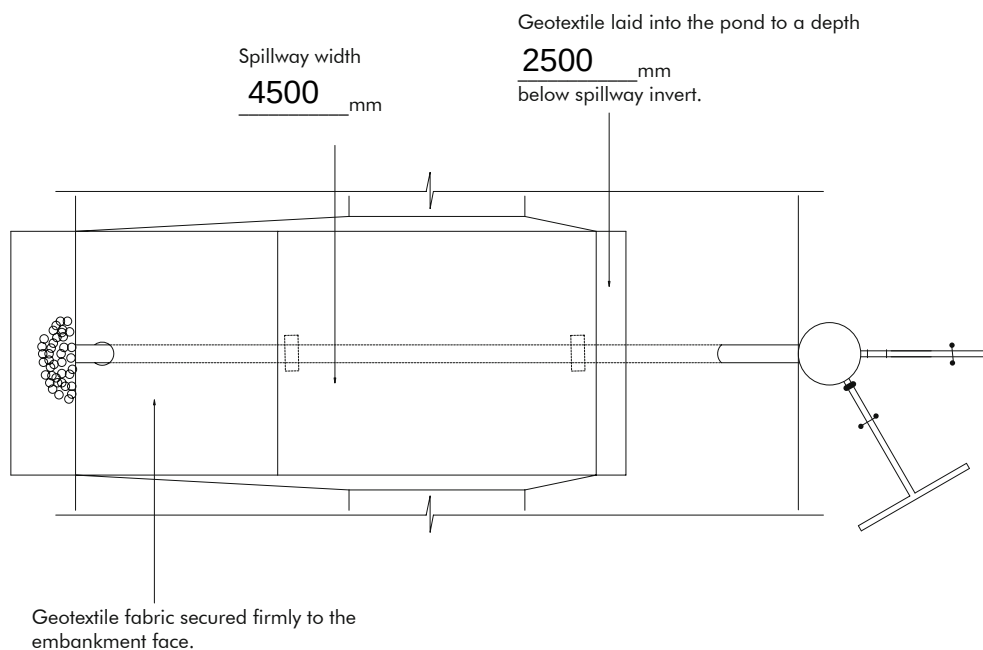
Signed and dated: Eddie Smith 06/11/2021

Please provide surveyed drawings of as-builts, which include all of the above details along with this certification sheet. An example of a suitable SRP as-built is attached.

Note: As-builts are not approved by Waikato Regional Council. Responsibility for construction of the structures and accuracy of the as-builts rests with the certifying agent. This list is not exhaustive and should be used to highlight some key "Erosion and Sediment Control Guidelines for Soil Disturbing Activities" requirements.



CROSS SECTION



PLAN

Example: Scaled drawing as built - Sediment retention pond

SRP No/Name Level 8 SRP

Catchment area 28,000m²

As built volume 1091m³

Decant rate 13.5 l/s

forebay volume Primary Forebay: 278m³, Secondary Forebay: 95m³

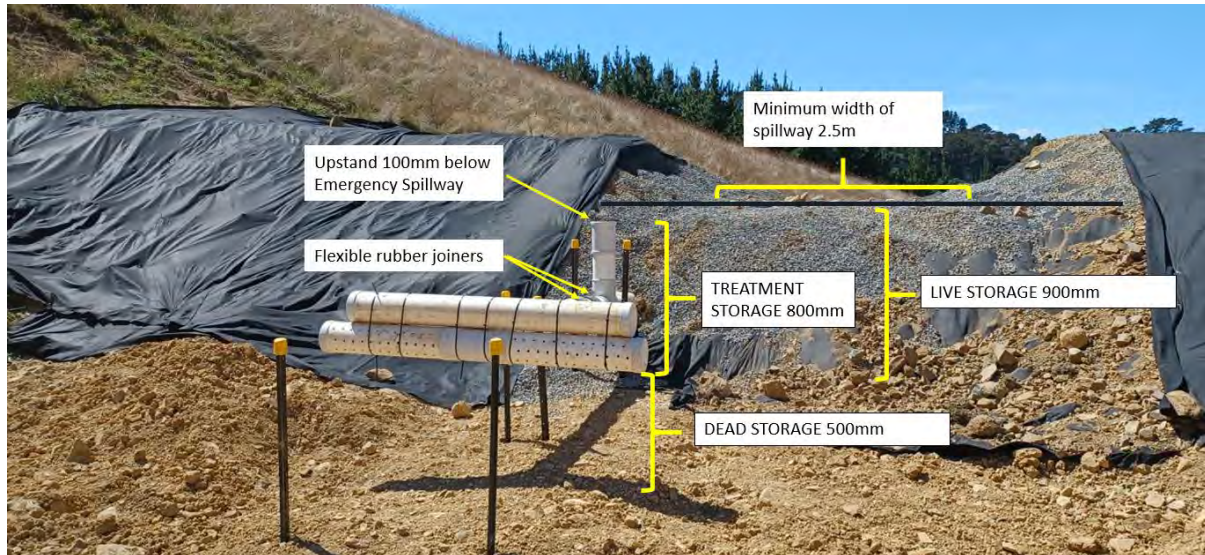
Note: where the as built information differs from the approved ESCP or Waikato Regional Council guidelines, data supporting its compliance is to be provided.

As-Built are not approved by Waikato Regional Council. Responsibility for construction of the structures and accuracy of the As-Built rests with the certifying agent. This list is not exhaustive and should only be used to highlight some of the key requirements.

Southern OBDA – DEB as-built.

E Smith – 16/03/2022

NB – Asbuilt to be updated with end of month aerial photo and topographic survey – due 30th April 2022.



Pond sizing in accordance with GD05						
Site Area	0.48 ha		SOUTHERN OBDA DEB			
	4,800 m ²					
Percentage of area required as storage:	4%					
Required storage:	192 m ³					
Side slopes of pond:	3.5 :1					
			Base of pond	width	8	m
				length	34	m
				area	272	m ²
			Top of dead storage	depth	0.5	m
				width	11.5	m
				length	37.5	m
				area	431.25	m ²
Required dead storage	30%	57.6 m ³		vol	176	m ³
				vol check	ok	
			Top of pond	depth	1.4	m
				width	12.9	m
				length	38.9	m
				area	501.81	m ²
Required Total Storage	100%	192 m ³		vol	542	m ³
				Volume check	ok	
				ratio check	3.0	:1
Min length to width ratio	3 :1			ratio check	ok	
Max length to width ratio	5 :1					
			Total Pond extent	freeboard	0.1	m
				Bund top width	0	m
				bund extent	0	m
				width	12.9	m
				length	38.9	m
				area	501.81	m ²

Decanting Earth Bund (DEB) As-built Certification Sheet

Bund name/number: Southern OBDA DEB

Contributing catchment area (m²)	0.48ha	
Dead storage volume and height	Volume (m³) 156 m3	Height 0.5m
Live storage volume and height	Volume (m³) 378m3	Height 1.4m
Bunds adequately compacted	Y Yes - trackrolled	N ☐
Emergency spillway width and depth	Width 2.5m	Depth .45m
Emergency spillway stabilisation type	Type Pinned Geofabric	
Discharge point stabilised?	Y ☐ Yes - Geofabric & Rock	N ☐
Freeboard between primary and emergency spillway?	0.35m mm	
Decant discharge rate	4.5 l/s litre per second	
Flexi join attached securely sealed	Y Yes - steel strap and screwed	N ☐
Anti-seep collars installed (Pumice or sand soils only)	Y ☐	N ☐ No - not required
Waikato Regional Council approved variations to device (please list)		

Please sign below to confirm that the information in this sheet is accurate and the device identified on this sheet has been constructed in accordance with the Waikato Regional Council approved erosion and sediment control plan for the site and the "Erosion and Sediment Control Guidelines for Soil Disturbing Activities", January 2009 document or Waikato Regional Council approved variations.

Suitably qualified person (name and company): Eddie Smith - Winstone Aggregates

Signed and dated: 15/03/2022 *Eddie Smith*

Please provide surveyed drawings of as-builts, which include all of the above details along with this certification sheet. An example of a suitable DEB as-built is attached.

Note: As-builts are not approved by Waikato Regional Council. Responsibility for construction of the structures and accuracy of the as-builts rests with the certifying agent. This list is not exhaustive and should be used to highlight some key "Erosion and Sediment Control Guidelines for Soil Disturbing Activities" requirements.

APPENDIX B – CHEMICAL TREATMENT MANAGEMENT PLAN

Winstone Aggregates

Whitehall Quarry
Karapiro

Chemical Treatment Management Plan
(CTMP)

Prepared by Erosion Control Co. Ltd

28th October 2021

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Winstone Aggregates (Whitehall Quarry, Karapiro)

1. Introduction

Erosion Control Co Ltd have been engaged by Winstone Aggregates to prepare a Chemical Treatment Management Plan for the site located at Whitehall Quarry, Karapiro.

- The report outlines bench test results using water treatment chemicals including coagulants and flocculants.
- The dosing methodology and system for this particular site.
- Responsibilities for the management, monitoring, maintenance and reporting of chemical dosing.
- A spill contingency plan.

Bench testing conducted in this plan is to the standards of Auckland Council GD05 Earthwork, Erosion and Sediment Control guide and ASTM standard D2035-13.

The design and implementation of the proposed CTMP will be in accordance with the Waikato Regional Councils Erosion and Sediment Control Guidelines for Soil Disturbing Activities 2009.

While all care has been taken in the testing and preparation of this chemical treatment management plan, Erosion Control cannot guarantee that the same results will be achieved in the retention ponds. The scale up of the test results are affected by a large number of parameters that can alter the dose rate and results.

The results and plan presented above should not be replicated or changed without prior approval from Erosion Control Co.

2. Bench Testing

Bench testing has been carried out using soil samples deemed to best represent the site once the land has been stripped of topsoil. The soil samples were mixed in a 20 L bucket with rain water. The runoff sample was then added to six 1 L jars and treatment chemicals added at the following concentrations:

	Jar 1	Jar 2	Jar 3	Jar 4	Jar 5	Jar 6
CHEMICAL Chemiclear 100	BLANK	Chemiclear 100	Chemiclear 100	Chemiclear 100	Chemiclear 100	Chemiclear 100
Product Concentration (ml/m ³)	0	31	62	93	124	155

- Clarity was then recorded after 5 minutes, 10 minutes and 30 minutes to identify optimum dose rates to meet and achieve best discharge requirements.
- Final pH is also recorded to ensure council guidelines are met.

Winstone Aggregates (Whitehall Quarry, Karapiro)

3. Test Results and Discussion



CATCHMENT SAMPLE: Results of Chemiclear 100 on the Soil Sample after 60 minutes settling.

Catchment Sample Dosed with Chemiclear 100 - Water Clarity & pH

Chemical	Product Dose (ml/m ³)	Clarity (mm) 5 Mins	Clarity (mm) 30 Mins	Clarity (mm) 60 Mins	Final pH	Notes
Blank	0	<60	<60	<60	7.8	
Chemiclear 100	31	<60	<60	>100	7.8	
Chemiclear 100	62	<80	>100	>100	7.8	Recommended
Chemiclear 100	93	>100	>100	>100	7.8	
Chemiclear 100	124	>100	>100	>100	7.7	
Chemiclear 100	155	>100	>100	>100	7.7	

Chemiclear 100 (Polyaluminium Chloride) is the recommended chemical for this application based on testing of the received soil. The recommended dosage for the site is shown below.

Catchment / Pond	Chemical	Dose Rate	Volume water treated by 1 litre of chemical
Catchment 28,000 m ²	Chemiclear 100	62 ml/m ³	16.13 m ³

Winstone Aggregates (Whitehall Quarry, Karapiro)

4. Floc Box Set up Calculations

Site: Whitehall Quarry, Karapiro.

Catchment & Area	Product	Floc Box Size	Catchment Tray area	Header Tank Low Flow Hole (Ø3 mm)*	Header Tank High Flow Hole (Ø10 mm)*	Estimated rainfall before chemical refilling
SRP 1 28,000 m ² (2.8 ha)	Chemiclear 100 62 ml/m ³ (product)	400 L (x1)	2.10 m ²	<u>Volume to Hole</u> 25.2 L <u>Hole Height</u> 118 mm	<u>Volume to Hole</u> 50.4 L <u>Hole Height</u> 236 mm	190 mm

*Low and high flow heights in mm are based on the recommended Floc Box header tank.

The catchment tray area is determined by the chemical dose rate and the area of exposed earthworks within the catchment. If the area of catchment or exposed area changes then the catchment tray and header tank need to be adjusted accordingly. Stabilization processes such as hay mulching will also greatly reduce the volume of sediment laden water and should be accounted for with the variation of catchment tray and header tank.

The header tank is designed to allow for 12 mm of rain to fall before chemical dosing is initiated. This is deemed to best represent the volume of rain required to initiate overland flow and runoff tracking to the sediment pond.

In periods of high intensity rainfall, the header tank will back up to the high flow which will increase the volume of chemical being dose. This will then ultimately track down to the low flow as rainfall decreases or stops. This ensures that dosing continues after the rainfall event has ended allowing for the time lag for surface flow in the catchment to travel to the sediment pond.

The Auckland Regional Councils erosion and sediment control guidelines recommend the management of storage water in the header tank as follows:

- After 3 days without rain – remove 50%
- After 6 days without rain – remove 100%

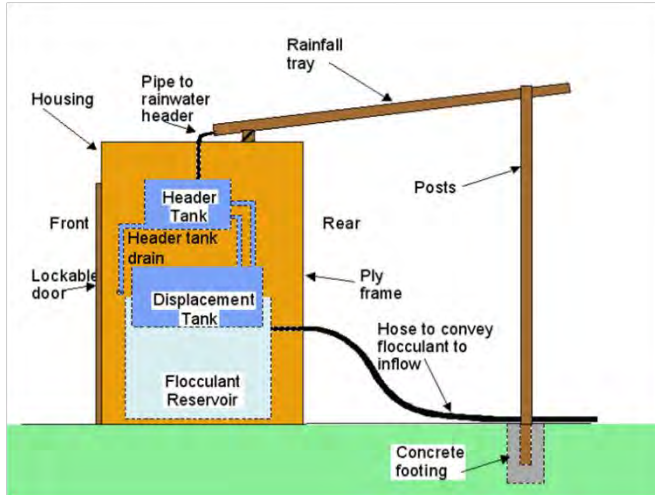
Ultimately, the volume of water stored in the sediment retention pond (SRP) and the clarity of the stored water should be considered when managing header tank volumes and further dosing requirements.

While all care has been taken in the testing and preparation of this chemical treatment management plan, Erosion Control cannot guarantee that the same results will be achieved in the sediment retention ponds. The scale up of the test results are affected by many parameters that can alter the dose rate and results.

The results and plan presented above should not be replicated or changed without prior approval from Erosion Control Co.

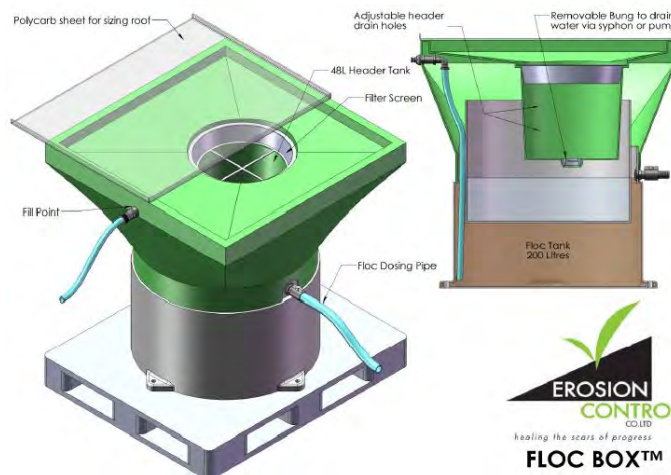
Winstone Aggregates (Whitehall Quarry, Karapiro)

5. The GD05 Rainfall Activated Dosing System



The traditional rainfall activated dosing system utilizes a catchment tray with the trays size being determined by the applicable dose rate and catchment size of the area. Rainfall is captured on the roof and is collect in a header tank. The rainwater then drains into a displacement tank which floats inside the chemical tank. Chemical displaced by the increased weight of the displacement tank is transferred via a dosing hose to the channel leading to the forebay of the sediment pond. The header tank is designed to capture and hold the first 12 mm of rainfall during dry conditions preventing dosing when no run off

is occurring and to release the water into the displacement tank at a controlled rate.



The Floc Box is a rainfall activated dosing system which has been streamlined to allow easier and more efficient installation and maintenance. The units come in 75, 200 and 400 L versions and have adjustable catchment trays allowing for rainfall capture from 0.25 – 5.0 m². Units can be supplied with catchment trays and header tanks pre-sized for site catchments and correct dose rates as outlined in the CTMP.



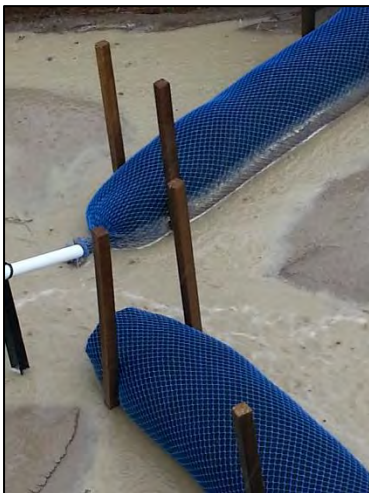
Winstone Aggregates (Whitehall Quarry, Karapiro)

6. Set Up and Installation

The rainfall activated dosing device should be set up on a level area so that the dosing point can be located 5-10 m metres up the entrance channel prior to the fore bay.



Consideration should be given to the ease of access for maintenance, storage of chemical drums and any further earthworks activity that needs to be carried out around the location. Once the unit is set up in situ the chemical storage tank should be filled until chemical visibly discharges from the dosing hose.



The positioning of “filter socks” or similar provide helps ensure a concentrated flow at the dose point to promote chemical mixing and ensures dosing into runoff during lower flows. Consideration should also be given to lining the channel at this point to avoid scouring of the channel floor. The dose point should not become submerged during heavy rainfall.

7. Batch Dosing of SRPs & Decanting Earth Bunds

Batch dosing should not be used as the primary dosing option but can be used to treat water prior to the installation of a rainfall activated system or when adequate clarity of >100 mm (see later notes on monitoring) has not been achieved. **It is important to note that pH should be measured and recorded both prior to and after batch dosing to ensure that it stays within 5.5 and 8.5 as set in the GD05 guidelines.**

To ensure optimal results from batch dosing it is necessary to ensure as even distribution as possible across the pond surface. Applying via a sprayer around the edges of the pond is the preferred methodology. Alternatively, the CHEMICLEAR 100 can be diluted in 1 L increments in a 20 L bucket and thrown onto the pond surface with an effort to achieve as much distribution as possible. Clarity should begin to improve within the first 1-2 hours after dosing with maximum effect over 24 hrs. Clarity, volume of chemical added, and pH should be recorded 24 hrs after each application.

Once clarity >100 mm has been achieved then the water can be discharged so long as pH is within the limits set above.

Recommended Batch Dosing

Number of SRPs / DEBs 1

Chemiclear 100 should be dosed at 62 ml per m³ of SRP volume.

The chemical volume should be calculated using an estimate of the actual SRP/DEB volume on the day of batch dosing. Actual SRP/DEB volume is a variable.

Chemical	CHEMICLEAR 100
Dose Rate (ml/m ³)	62

8. Monitoring and Maintenance

8.1. Monitoring and Maintenance requirements

The monitoring of the chemical dose system will be undertaken by the site foreman with regular checks being made by the site engineer to ensure compliance.

Monitoring of the system will be undertaken each day following rain and at least once per week if no rain. All monitoring results are to be recorded, with an example provided in table 2.

8.2. Routine monitoring and maintenance

Instructions for routine monitoring and maintenance of the chemical treatment system will be summarised in a table, a copy of which should be placed in the chemical treatment box inside a waterproof zip lock bag.

Routine weekly attendance should be undertaken for monitoring and recording of each pond and the rainfall activated dosing system status. This can be undertaken by Erosion Control Co.

The clarity of the water in the retention ponds will be monitored using the black disc method. This will consist of a 50-80mm diameter black painted disc attached to the bottom of a 1 m long wooden ruler with a centimetre scale starting at the end to which the disc is attached. The disc is lowered vertically into the water near the pond outlet until it disappears and is then moved towards the surface until it is just visible. The depth of reappearance in mm is recorded as the clarity of the water.

After moderate or heavy rain, the dosing points should be checked to ensure that the chemical is being delivered into the stormwater flow during low flow conditions.

8.3. Contingency Management

A plan must be put in place to manage contingent events in accordance with site environmental management plans. Contingencies could include poor performance of the treatment system, vandalism, stormwater damage or effects of other influences on stormwater quality.

If the treated water in any of the ponds is consistently very clear to depths >100 mm it could indicate overdosing and the possibility of a lowered pH which can present a risk to the receiving waters as a result of elevated free aluminium concentration in the discharge. If the treated water is consistently clear, the pH of the water in any pond should be retested.

Contingencies such as poor treatment performance or consistently very clear treated water should be dealt with by consultation with the appropriate organisation or its representative.

The header tank should be drained by half after 3 days of no rain and emptied after 6 days of no rain.

A treatment chemical spill contingency plan is provided.

8.4. Record keeping and reporting to monitoring council or its representative

A copy of the monitoring records will be available on file and updated as required.

The integrity of the treatment system will be checked weekly during both dry and wet weather. This check will include a quick check of the plumbing, a check that the header tank hoses are clear and a check of the dosing point to ensure that the chemical would drop into the stormwater flow from the site.

Erosion Control can provide the weekly monitoring visit records as well as other monitoring and these can be compiled into a monthly summary report.

8.5.Storage of chemical on site

Bulk chemical supplied by the manufacturer in 200 L polyethylene drums will be kept in secure storage if on the site. Chemical drums will be stored on end with the screw caps uppermost.

Topping up of chemical will be made weekly as part of the regular inspection regime.

Empty drums should be washed out with water, and the wash water poured onto dry soil well away from any watercourse. Drums will be properly disposed of.

8.6.Procedure for transportation of PAC or alternative flocculation chemicals

The transport of water treatment chemicals to and from the project will be undertaken by commercial carriers in accordance with current Hazardous Goods, Traffic & Transport regulation. PAC weighs about 250 kg in 200 L drums and is most easily moved within the site in a loader bucket. Drum lifting chains can be supplied by Erosion Control Co if required. The use of these or any other chemical must be done in accordance with the site Health & Safety Plan.

8.7.Chemical spill contingency plan

If there is a spill of PAC or alternative water treatment chemical onto the ground it will be immediately contained using earth bunds to prevent it from entering water. The spilt PAC should be recovered if possible and placed in polyethylene containers. If the spilt PAC cannot be recovered, it should be mixed with a volume of soil equal to at least ten times the volume of spilt PAC and buried in dry soil.

If there is a spill of PAC or alternative flocculation chemicals into pond water, discharge from the pond to natural water should be prevented. Contact the Council or its representative for advice on appropriate action.

If there is a spill of PAC or other chemical into flowing water:

1. The regional council should be advised immediately.
2. If possible, the water and the split PAC should be pumped into a bund or pond until all the split PAC has been removed from the watercourse.
3. If the PAC cannot be removed from the watercourse any downstream users should be identified and advised. Contact the Local Council or its representative qualified to advise on appropriate action.

8.8.Chain of responsibility for monitoring and maintaining the chemical treatment systems on site

The earthworks contractor shall have primary responsibility for maintenance and monitoring the effectiveness of the chemical treatment system on the site.

A service may be subcontracted to Erosion Control Co to provide regular monitoring of the ponds, servicing of the Floc Boxes and assembly of the monitoring reports if required.

8.9.Training of person responsible for monitoring and maintenance of chemical treatment systems

Erosion Control Co can provide regular monitoring and servicing of the flocculation system or can undertake regular training of site personnel to carry out the routine monitoring and maintenance of the chemical treatment system, and the required record keeping.

8.10. Responsibility

While all care has been taken in preparing this CTMP, it is based on the information provided by the contractor and results may vary during the course of working this development.

Winstone Aggregates (Whitehall Quarry, Karapiro)

It is the responsibility of the contractor to ensure compliance with all aspects of the appropriate regulations pertaining to these works.

Erosion Control Co would recommend that testing be repeated every 6 months during the development to ensure dosing and Floccbox design are providing best results, as soil type may change through the development phase.

This information is not to be used for any other purpose, without prior consultation and the written consent from Erosion Control Ltd and no liability is accepted for misuse of this information.

8.11. Instructions for Maintenance of Flocculation Chemical Treatment Systems

8.11.1. Reducing the header tank volume:

The header tank is used to avoid dosing during the initial stages of rainfall when site conditions are dry and no runoff is to be expected.

After 3 days without rain – reduce volume to 50%

After 6 days without rain – reduce volume to empty (level at lowest outlet)

8.11.2. Refilling the reservoir:

The reservoir tank should be refilled when the displacement tank is half full, or sooner if heavy rain is predicted. The level of chemical in the device needs to be sufficient to treat a 100-year event should one occur. Refilling is done by first emptying the displacement tank and then refilling the reservoir tank until the chemical level is at the lower edge of the outlet.

8.11.3. Observation of water quality in pond:

The pond water quality will be observed at least weekly, and the clarity determined using a black disc and recorded on the monitoring sheet. pH shall be recorded once the pond has filled up to ensure that dosing does not have an unacceptable effect.

8.11.4. Periodic system checks:

Check the lower hose with the small tube outlet, from the header tank to the displacement tank is not blocked with leaves or other foreign debris.

8.11.5. Monitoring records:

A separate sheet is provided for monitoring records for each month. The information to be recorded is as follows:

Visual check:

Check the tray for leaks, the plumbing, and the hoses from the header tank. Record “ok” or if maintenance is required write “M” and note requirement in notes column.

% Header full:

This is the volume between the lowest and middle outlets. After rain this should be either 100% after 12mm or more rain, or between 1-100% after less than 12mm rain; in summer: 50% when lowered after 3 dry days, 0% when emptied after 6 dry days.

% Depth in Displacement Tank:

Measure depth of water in cm. Reduces to 0 when emptied.

Chemical Volume added:

Record chemical volume added. 1 drum PAC = 200L, 9cm in PAC 200l drum = 20L. Can be calculated from change in water level in displacement tank where 1cm change = 4 litres of PAC.

Pond Clarity:

Record using black disc near pond outlet. (Refer above).

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9. Floc Box setup confirmation

Contractor			
Site			
Installed by			
Chemical Recommended			
Dose rate			
Catchment	Area (ha)	Recommendation	Check
I hereby state that the above methodology has been followed and prepared in accordance with the chemical treatment management plan.			
Signature: _____ Date: _____			

Winstone Aggregates (Whitehall Quarry, Karapiro)

10. Appendix

Remainder of Bench Test Photos not in main body of report



Chemiclear 100 after 5 minutes settling



Chemiclear 100 after 30 minutes settling

APPENDIX C – RESOURCE CONSENT 108118

Resource Consent Certificate

PO Box 4010,
401 Grey Street,
HAMILTON EAST,
New Zealand

ph+64-7-856 7184
fax +64-7-856 0551

Resource Consent Number: 108118

www.ew.govt.nz

File Number: 60 62 14A

***Pursuant to the Resource Management Act 1991, the Waikato Regional Council
hereby grants consent to:***

Winstone Aggregates
Division of Fletcher Concrete & Infrastructure Ltd
P O Box 17-195 Greenlane
AUCKLAND

(hereinafter referred to as the Consent Holder)

Consent Type: Discharge permit
Consent Subtype: Discharge to water
Activity authorised: To discharge stormwater and ground water containing sediment to Karapiro Stream in relation to ongoing operation of Whitehall Quarry
Location: (Whitehall Quarry) Whitehall Rd - Cambridge
Map References: NZMS 260 T15:359-655, T15:360-646
Consent Duration: Granted for a period expiring on 30 June 2028

Subject to the conditions overleaf:

CONDITIONS

1. This consent is subject to the General Conditions listed in Schedule 1.
2. All stormwater runoff from quarrying shall be directed into storm water settling ponds for treatment prior to discharge.
3. Stormwater sediment retention ponds shall be desludged whenever required to maintain at least 50% of the pond volume, and in particular within one months notice in writing from the Waikato Regional Council to do so.
4. The consent holder shall, as a minimum and unless otherwise required to do so by the Waikato Regional Council in writing following consultation with the consent holder, monitor and report on the discharges at the sites identified below as follows:

Site	Description
A	Karapiro Stream below quarry
B	Karapiro Stream above quarry
C	Eastern Boundary diversion
E	Western boundary diversion
H	Overburden settling pond
I	Pit 1 discharge
J	Pit 2 discharge

5. The minimum suspended solids and turbidity sampling frequency shall be weekly at sample sites A and B and where 20mm of rainfall has occurred in the preceding 24 hours then additional samples will be taken at all monitoring sites where a discharge is occurring, within 4 hours of the 24 hour rainfall measurement. Once a statistically reliable relationship has been established between suspended solids and turbidity, turbidity measurements will be considered as a basis for compliance performance, at the written request of the consent holder.
6. Once a statistically reliable relationship has been established between suspended solids and turbidity, the relevant discharge points for the quarry operation need only be sampled for suspended solids should the equivalent turbidity measurement at sample site A downstream of the quarry operation indicate a suspended solids concentration greater than or equal to 25 grams per cubic metre.
7. The consent holder shall, unless otherwise required to do so by the Waikato Regional Council in writing following consultation with the consent holder measure the rainfall at approximately the same time, Monday to Friday or other days that the quarry is operating.
8. The discharge activity shall not cause the concentration of suspended solids in the Karapiro Stream to exceed 25 grams per cubic metre, after reasonable mixing. For the purposes of this condition reasonable mixing is considered to be achieved at sample site A referred to in condition 4.
9. The standard in condition 8 shall apply, except where the suspended solids concentration in the Karapiro Stream upstream of and unaffected by the quarry activity is greater than the standard specified at the time and location of undertaking the activity. When the concentration of suspended solids in the Karapiro Stream is greater than the standard specified then there shall not be any increase in the Karapiro Stream suspended solids concentration after reasonable mixing.

Note 1: Tolerances relating to sampling, testing and statistical precision of suspended solids and turbidity relationship shall be taken into account in assessing compliance with conditions 6,8 & 9.
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10. The consent holder shall notify the Waikato Regional Council as soon as practicable and as a minimum requirement within 48 hours, of the consent holder becoming aware of the limits specified in conditions 8 and 9 of this resource consent being exceeded and/or of any accidental discharge, plant breakdown, or other circumstances which are likely to result in the limits of this resource consent being exceeded. The consent holder shall, within 7 days of the incident occurring, provide a written report to the Waikato Regional Council, identifying the exceedance, possible causes, steps undertaken to remedy the effects of the incident and measures that will be undertaken to ensure future compliance.
11. The consent holder shall, at three monthly intervals following the granting of this consent, prepare and forward to the Waikato Regional Council a report setting out the results of the monitoring undertaken in accordance with conditions.
12. The consent holder shall develop a contingency plan for the prevention and removal of spills of fuels and other hazardous substances. This plan shall be lodged with the Waikato Regional Council within 6 months of the consent being granted, and shall be reviewed and annually updated as a minimum every year thereafter that the consent is current. Any changes to the plan shall be confirmed in writing by the consent holder following consultation with the Waikato Regional Council.
13. There shall be no discharge of oil, grease or other petroleum products.
14. The consent holder shall, at annual intervals following the granting of this consent, prepare and forward to the Waikato Regional Council a report including relevant details of the monitoring undertaken in accordance with conditions, and performance of the water management and treatment system as set out below:
 - (i) Any difficulty (such as breakdowns) in the operation of the system;
 - (ii) The reasons for any difficulties;
 - (iii) Any difficulties in achieving compliance with any condition attached to this permit;
 - (iv) Any maintenance works, which are necessary, proposed or have been carried out; and,
 - (v) Any trends in water quality with the potential for causing adverse effects.

Dated at Hamilton this 18 day of September 2003

*For and on behalf of the
Waikato Regional Council*

