APPENDIX E

Erosion and Sediment Control Plan

EROSION AND SEDIMENT CONTROL PLAN

Whakanui Stud Quarry

Prepared for

Shaws Quarries Limited

Prepared by

MPD Environmental Limited

Date

June 2026

Project:	**WHAKANUI STUD QUARRY**
Prepared for:	**Shaws Quarries Limited** **75 Victoria Street** **Cambridge 3493** **New Zealand**

Document Details

Document Name	Erosion and Sediment Control Plan – Whakanui Stud Quarry
Status	Draft for Review
Prepared by	Megan Dredge (MPD Environmental Limited)
Document No	

Document History and Status

Revision	Date	Author	Reviewed by	Status
A	16/06/2026	Megan Dredge CEnvP #1704 (MPD Environmental Ltd)	Jonty Taylor (Shaws)	Draft
1	23/06/2023	Megan Dredge CEnvP #1704 (MPD Environmental Ltd)	Jonty Taylor (Shaws)	Final

Revision Details

Revision	Details
A	Draft development for resource consent application
1	Final document issued for submission to Waikato Regional Council

Disclaimer

Reports produced by MPD Environmental Limited are based on a specific scope, conditions and limitations, as agreed between MPD Environmental and the Client. Information and/or report(s) prepared by MPD Environmental may not be suitable for uses other than the specific project. No parties other than the Client should use any information and/or report(s) without first conferring with MPD Environmental. The advice given herein is for erosion and sediment control purposes only. Relevant authorities and experts should be consulted with regard to compliance with regulations or requirements governing areas other than erosion and sediment control.

TABLE OF CONTENTS

1 Overview 2
1.1 Scope 2
1.2 Project Overview 3
2 Existing Site Conditions 4
2.1 Site description 4
2.2 Ground Conditions 6
2.3 Groundwater Regime 6
2.4 Receiving Environment 7
3 Basis of Assessment 8
4 Description of Works 9
4.1 Volume of Earthworks 10
4.2 Enabling Works 10
4.3 Quarrying Process 11
5 Principles and Processes of Erosion and Sediment Control 12
5.1 Principles 12
5.2 Design 12
5.3 ESCP Revision/Updates 13
6 General Erosion and Sediment Control Details 14
6.1 Clean and Dirty Water Diversions 14
6.2 Sediment Retention Ponds 15
6.3 Decanting Earth Bunds 15
6.4 Silt Fences 15
6.5 Access and Stabilised Entranceways 16
6.6 As Builts 16
6.7 Dust control 17
6.8 Timing of earthworks 17
6.9 Minimise exposed areas 17
6.10 Stabilisation and reinstatement 17
6.11 Watercourse protection 18
6.12 Dewatering 18
7 Construction Methodology 19
8 Maintenance and Monitoring 20
8.1 Monitoring and Triggers 21
9 Incident Management and Reporting 22
9.1 Corrective Actions 22
9.2 Site Contacts 22
10 Decommissioning 23
Appendix A – ESCP Drawings 24
Appendix B – ESC Design 25
Appendix C – As Built Certification Sheets 27
Appendix D – Example Inspection Sheets 28
Appendix E – Decommissioning Form 29

1 Overview

Shaws Quarries Limited (**'Shaws'**) has engaged MPD Environmental Limited to prepare an Erosion and Sediment Control Plan (**'ESCP'**) for a proposed sand quarry at Whakanui Stud located at 1466 Cambridge Road (**'the Site'**), Cambridge. Shaws is seeking a resource consent to quarry the land to enable a suitable and stable sand supply to the Waikato Region. The quarry will be backfilled with cleanfill as part of the rehabilitation of the land after sand extraction is complete in each stage.

The erosion and sediment controls to be implemented seek to maintain the quality of the receiving water course, the Waikato River. It is anticipated that the contractor appointed to undertake the works will adopt this plan into their construction programme, methodology and environmental management system. Should material changes to this plan be proposed by the contractor prior to, and during, construction these must be developed and approved by Waikato Regional Council before implementation. This report should be read together with the other technical documents prepared in support of the application for the consent.

The Site is located within both the Waipā District and Waikato District. Access to the sand quarry will be directly off Cambridge Road. There are no hazards or areas of contaminated land mapped on the Site.

1.1 Scope

This ESCP has been prepared to support the application for resource consent. It incorporates the construction methodology and drawings which identify the erosion and sediment control (**'ESC'**) measures proposed to manage site runoff associated with the earthworks required for the development of the site and for the on-going operational quarrying associated activities.

This ESCP has been prepared in accordance with design principles of the Waikato Regional Council Guideline Document TR2009 – "*Erosion and sediment control: guidelines for soil disturbing activities*" (**'the Guidelines'**).

This ESCP addresses the following earthwork activities:

- Establishment of the erosion and sediment controls;
- Site establishment and enabling works; and
- General earthworks and quarry activities;

Additionally, the ESCP will address the following matters:

a) Overall staging details of all earthworks activities and expected open areas during each stage.

b) Specific erosion and sediment control measures which are to be utilised during general cut to fill earthworks for each stage (location dimensions, capacity), including works in and near streams and wetlands, in accordance with the Guidelines;

c) Supporting calculations and design drawings as necessary;

d) Catchment boundaries and contour information as necessary;

e) Details relating to the management of exposed areas (e.g. grassing, mulching, aggregate); and

f) Monitoring and maintenance requirements, including details of excavator access to the bend of the quarry pond to remove built up sediment during extraction stages.

This ESCP should be updated to reference specific ESC related consent conditions once consent has been granted.

1.2 Project Overview

Whakanui Stud is in the Waikato Region, approximately 20 kilometres (km) southeast of Hamilton and 5.6 km west of Cambridge. The proposed quarry site occupies approximately 58Ha on an existing rural property which is adjacent to the Waikato River. The location of the site is illustrated in Figure 1.



Figure 1: 1466 Cambridge Road general location. Source: Google Earth

The receiving watercourse is the Waikato River and its tributaries. There is one main farm drain on the property. This watercourse drains across the southern portion of the quarry and eventually discharges to the Waikato River. See Appendix A for the location of this stream relative to the site.

It is not proposed the whole site be used for quarrying and it is anticipated only half to three quarters will be utilized, as shown in yellow in Figure 2.



Figure 2: Quarry boundary and property boundary

The quarry is expected to be staged over a number of years with the initial stage focussing on site establishment, access roads, upgrading the entry point off Cambridge Road and the quarry processing plant. Each stage will be a maximum of 3 – 4ha at any one time.

2 Existing Site Conditions

2.1 Site description

The proposed quarry site is typical of the eastern side of the Waikato River in that location. It is comprised of three broad, gently sloping terraces with steeper slopes between each terrace before levelling out to flat pasture towards Cambridge Road. This is estimated to be less than a 2% slope.

The lowest terrace is around 20m above the Waikato River. The Waikato River level varies in depth and is controlled by the Karapiro Dam upstream. Typical river levels vary between RL16m and RL20m. The land is predominantly utilised as farmland with a few residential dwellings along the northern boundary. The general site layout can be seen in Figures 3-5 below.



Figure 3: Existing race access which runs down the middle of the proposed quarry



Figure 4: The site is generally flat, with 2 natural benches towards the southern end of the site sloping towards the Waikato River



Figure 5: Existing farm drainage at the southernmost area of the site. The proposed sediment pond will discharge into this drain.

2.2 Ground Conditions

The ground conditions within the site are geologically complex, reflecting cycles of deposition and erosion of alluvial sediments and volcanic soils and variations in the level and location of the Waikato River. From ground investigations of the close surrounding area, the upper and middle terrace are interpreted as being underlain by 15m of Hinuera Formation alluvium with Walton Subgroup below. The lower terrace comprises Walton Subgroup, overlain by a thin layer of Hamilton Ash.

The terraces are interpreted to be underlain by Taupo Formation bedded pumice sand and gravelly sand, followed by a thin layer of sandy undifferentiated Piako Subgroup and then Walton Subgroup materials. Outcrops in the riverbanks are visible and can be identified as comprising Walton Subgroup and alluvium interpreted as Taupo Formation.

This site is interpreted to have been formed by Taupo Formation infilling an old tributary basin to the Waikato River after the Taupo eruption between 2,000 and 1,800 years ago. Erosion of Taupo Formation materials followed as the Waikato River cut down in its present alignment. River bar and channel geomorphic features were identified on this terrace as likely associated with the Waikato River.

Stream gullies located toward the western extent of the site show evidence of slope instability and erosion related losses. These do not form part of the quarry footprint.

2.3 Groundwater Regime

Available information indicates that groundwater levels are relatively deep with the central and southern parts of the site, typically near the base of the Taupo Formation materials and with potentially locally perched water

tables. Based on currently available information, groundwater levels are understood to be below the anticipated depth of quarrying. Quarry operations are expected to predominantly occur within unsaturated sand materials.

More information on groundwater / hydrology can be found in the WWLA Report_Groundwater Take (Assessment of Environmental Effects)report.

2.4 Receiving Environment

The site drains through a network of existing overland paths and farm channels into an existing farm drain which flows south and outlets directly into the Waikato River.

3 Basis of Assessment

Our assessment is based on site visits, desktop exercises, aerial surveys, operation and design information provided by the project team.

Our calculations and assessments comply with the "*Waikato Regional Council Erosion and Sediment Control: Guidelines for soil disturbing activities (TR 2009/2")* where relevant.

4 Description of Works

This plan outlines the proposed earthworks required to develop the quarry to an operational state. A simple staging design has been developed for the quarry (Figure 6). The earthworks/construction activities covered by this ESCP are generally defined as;

- **Site clearance / vegetation removal** – existing structures, fencing, services, trees and vegetation
- **Stripping and preparation** – total ground area of 14Ha for earthworks which will be staged into 3-4ha segments (See Section 7 for the detailed construction methodology). This will involve the stripping of approximately 9,000 – 12,000m^3 of topsoil material per segment (estimated at 300mm depth) to temporary stockpile for respreads..
- **Quarry operation** – excavation and extraction of approximately 3 million cubic meters across the entire site and placement of cleanfill
- **Cutting, placing, reshaping or spreading of materials** – bulk earthworks over the site required to achieve finished design levels once quarry operations cease in each staged area
- **Imported materials** – Imported materials will be required for the backfilling of each staged area. This will be class 5 material from various sources. Imported materials for the internal quarry roads and site access will also be required.
- **Disposal of unsuitable/surplus materials** – no disposal of unsuitables or surplus material is expected to be required

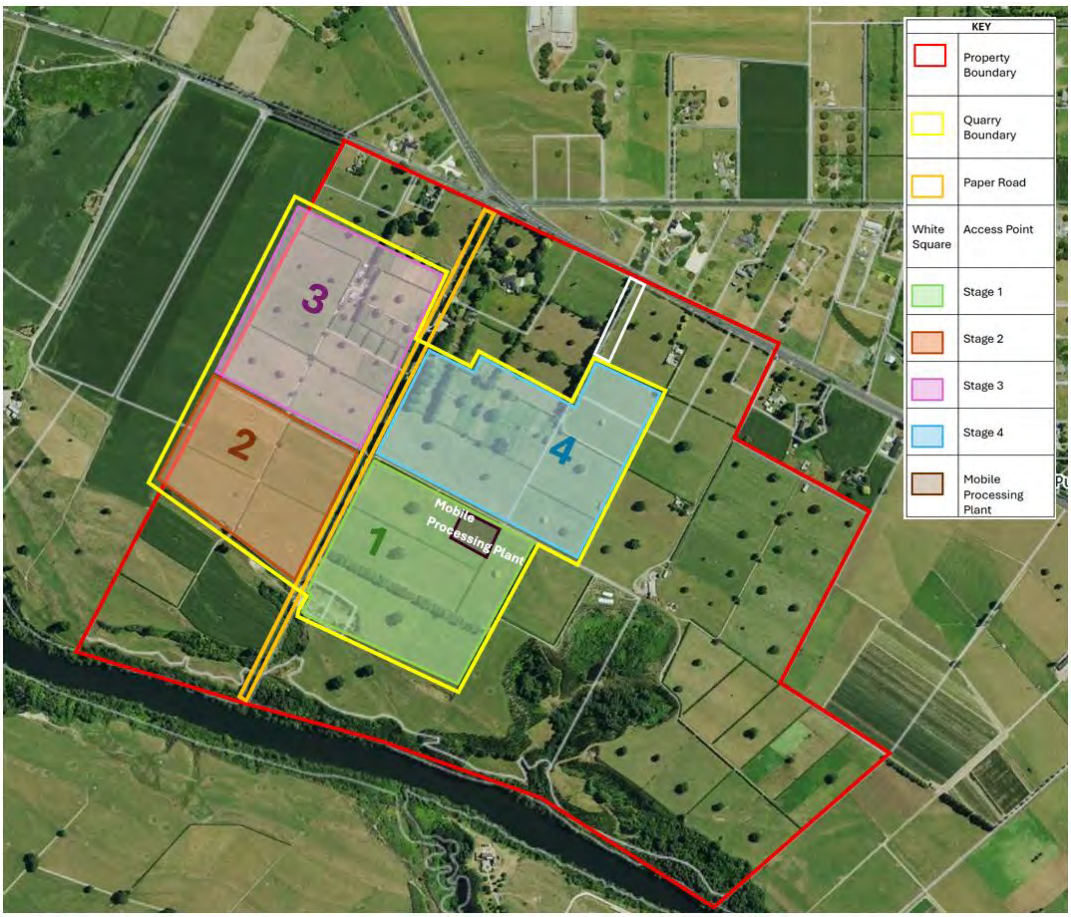


Figure 6: Staging design

4.1 Volume of Earthworks

Earthworks will be undertaken in 3-4ha segments of the site with only one segment open at any one time. Earthworks planned to be undertaken once consent is granted will focus on site establishment, with up to 12,000m^3 of topsoil stripped across a maximum of 4ha which will be stored locally. Sand extraction will then commence at differing rates dependant on demand, but it is estimated that 190,000m^3 of sand is available across each 4ha segment of the site.

Backfilling with other material will commence after each segment has been quarried, and this will match the volume of sand extracted for that 4ha segment.

4.2 Enabling Works

Following vegetation clearance, enabling works will include the establishment of:

- Site access of Cambridge Road, including a stabilised entranceway and / or wheel wash facility
- Potential widening of Cambridge Road at the site entrance to allow for safer access
- Establishment of all erosion and sediment controls required for each segment of the site to be quarried
- Access road construction to allow for heavy vehicle movements throughout the site
- Site fencing and security to allow for controlled entry points
- Temporary and permanent site facilities including offices, laydown areas, fuel storage and amenities
- Power and water supply setup
- Establishment of sand extraction machinery and processing equipment
- Topsoil stripping, stockpiling and stabilisation of exposed surfaces which may be outside of sediment controls during enabling works

Delineation of area of original ground to be retained for sediment laden water retention purposes New sediment controls to be installed:

- Silt fencing around each stage (< 2% slope)

4.3 Quarrying Process

The process of extracting sand resource involves using heavy machinery for the following processes:

Removing Existing Vegetation

Any existing vegetation within the extent of works will be removed using excavators and trucks. Note, the removal of vegetation, topsoil etc., will be progressive over the life of the quarrying operations as and when required.

Topsoil Stripping and Stockpiling

Topsoil and organic materials will be stripped, transported, and removed using excavators and trucks. The initial topsoil stripping will be used to form the erosion and sediment control clean water diversion bunds. The remaining topsoil will be stockpiled and stabilised.

Stockpiles of sand (for sale) will be stored within the quarry extraction area and will be covered by the established ESC's.

Stockpiles are subject to the stabilisation requirements for the quarry.

Removal of overburden

Overburden will be stripped using excavators and transported to areas outside of the working zone for stockpiling. This material will be used for backfilling at a later stage. It is not expected that large amounts of overburden will be encountered on this project.

Processing

Sand is processed by machinery within the quarry footprint. The products are moved by trucks, loaders or conveyor to storage bins or stockpiles.

Discharges to water

The proposed methodology (Section 7) has been developed to ensure that no discharges to water occur via overland flow paths and instead there will be a reliance on retention of sediment laden water on site, and soakage to ground during the quarry operation. It is expected that soakage rates will be high due to the nature of the sand. There are no constructed discharge points, and no sediment laden runoff will be directed beyond the limits of the work area.

An 8-metre wide buffer of original ground will be retained along the downslope extent of the site. This undisturbed ground will provide a containment feature that prevents the mobilisation of overland flow beyond the earthworks footprint. Within this contained area, stormwater will be managed through soakage to ground. This buffer will be in place for each segment (3-4ha).

A silt fence will be installed around the footprint of the quarry segment to ensure the initial topsoil stripping and enabling activity works are controlled, prior to enough sand being excavated to allow for the retention of a 1% AEP event (or larger). The estimated maximum excavation depth will be 8-9m (and above the groundwater table).

5 Principles and Processes of Erosion and Sediment Control

5.1 Principles

The key principles to be employed for an ESCP are to undertake land disturbing activities in a manner that reduces the potential for erosion of bare soils to occur (erosion control) and to employ treatment devices to treat sediment laden water prior to discharging runoff from the site (sediment controls). These principles have been incorporated into the ESCP. The 10 basic principles of erosion and sediment control taken from the Waikato ESC Guidelines will be applied to each of the defined scenarios (as applicable) and outlined for completeness as follows;

- **Minimise disturbance:** only work areas required for construction to take place.
- **Stage construction:** carefully plan works to minimise the area of disturbance at any one time.
- **Protect steep slopes:** where steep slopes existing within the works area, ensure that these are protected as steep slopes are prone to erosion.
- **Protect watercourses:** Map all water bodies before works commence.
- **Stabilise exposed areas rapidly** by sowing new seed or mulch cover, or as appropriate to achieve stabilisation where possible.
- **Install perimeter controls:** divert clean water away from areas of disturbance and divert runoff from areas disturbed to sediment control devices.
- **Employ detention devices:** treat runoff by methods that allow sediment to settle out.
- **Use trained and experienced operators** and ensure site staff are aware of the requirements of the ESCP and the relevant resource consent conditions.
- **Make sure the ESCP evolves** as construction progresses and the nature of land disturbing activities change, the ESCP needs to be modified to reflect the changing conditions on the site.
- **Assess and adjust** inspect, monitor and maintain control measures.

5.2 Design

Erosion and sediment control devices for the enabling and establishment works have been designed in accordance with the design principles of the Waikato Regional Council (WRC) Erosion and Sediment Control Guidelines, as a minimum standard. These guidelines outline a best-management-practice approach for managing land-disturbing activities and form the basis for the controls adopted for the quarry.

The ESCP has been developed to support quarry operations over the expected life of the site or provide guidance for future revisions of this ESCP as a baseline. This provides operational flexibility to respond to fluctuations in sand demand while ensuring environmental performance is maintained. Any updates to the ESCP will be prepared and submitted to Waikato Regional Council for certification prior to implementation on site.

ESC drawings are provided in Appendices A and B. Actual timing and staging of quarry development will be determined by overall quarry management and sand demand.

Once quarry operations commence, cleanwater from the upper catchment will be diverted around the work area (max 4ha), while all sediment laden water will be directed to the pit floor and retained for soakage. The original ground retained at the southern end of the site will act as a large retention bund to allow for the water to be held on site[1].

As-built documentation and a regular audit programme will ensure ongoing compliance with design requirements and guideline standards. Catchment boundaries (both cleanwater and dirty water) will shift during the life of the quarry, and routine audits and as-built updates will be undertaken to reflect these changes.

5.3 ESCP Revision/Updates

It is anticipated that the ESCP will evolve over time, as erosion and sediment control methodologies develop alongside legislation and consent requirements. The ESCP will be a working document and will be updated as required.

Reasons for making changes to the ESCP will be documented. Any new/updated version of the ESCP documentation will be issued with an updated version number and date. A copy of the current ESCP document and subsequent versions will be kept for the Project records. Superseded versions will be marked as obsolete.

Any relevant revisions to the ESCP will be submitted to the Waikato Regional Council for review and certification at least 10 days before becoming operational.

[1] It is recommended that geotechnical advice be sought on the stability and integrity of this section of original ground as the quarry pit deepens.

6 General Erosion and Sediment Control Details

Generally, erosion and sediment controls for the development site will be simple and traditional. Works will be accessed from the existing quarry site, so no additional entrance points from outside the quarry area are required. As new works areas are reached, this general methodology will be followed:

1. Set out the location of the silt fence around the segment of works
2. Install a silt fence and ensure it meets the Guideline specifications for construction
3. If required, install dirty water diversion bunds, formed from stripped topsoil/overburden to direct runoff to the sediment retention device.
4. Commence earthworks within the catchment of the specific sediment retention device. Surplus material disposed of in the bunding / stockpile.
5. As each quarry segment is completed, backfill material will be brought in, shaped appropriately, topsoiled and stabilised with hydraulically applied mulch or hay mulch with seed and fertilizer.
6. The erosion and sediment controls on site are to remain until all surfaces within the contributing catchments are stabilised by grass (strike > 80%), aggregate or are deemed to be non-erodible material (e.g. rock).

6.1 Clean and Dirty Water Diversions

There is no current proposal to use clean or water diversions, however they may be used at some point during the project should the need arise. Clean water diversions will be constructed to divert upper catchment clean water away from the area of works.

The clean water diversion bunds will likely be constructed using stripped topsoil (or overburden material) and will be stabilised immediately following construction. This will likely include a perimeter bund around the extent of works and stage boundaries and will be progressively installed (and removed) as the quarry operations progress. See Figure 7.

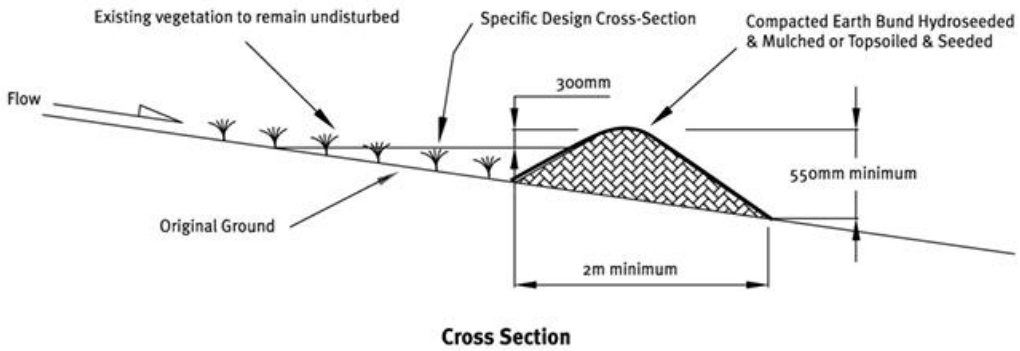


Figure 7: Cross section of a clean water diversion

The maximum contributing catchment area for clean water diversions will be <10ha for all catchments. Calculations and detailed design are provided in Appendix B.

Suitable site material will be utilised to form dirty water diversion bunds (Figure 8) to divert sediment laden water from the site to the sediment treatment devices. Where required, bunds will be turfed on the clean water side to allow for immediate stabilisation. If turfing is not possible, the clean water side will be stabilised with haymulch,

seed and fertiliser, geotextile or coconut matting. The purpose of these diversions is to divert sediment laden water to the correct location for storage (or treatment).

The maximum contributing catchment area for the dirty water diversions will be <5ha. To comply with the WRC ESC Guidelines the calculated minimum perimeter bund height installed across the project would be a minimum of 550mm to provide conveyance of the 5% AEP storm event, plus 300mm freeboard.

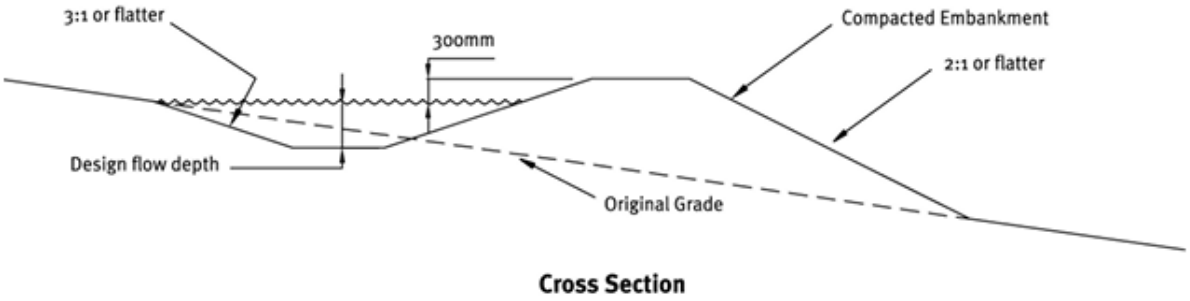


Figure 8: Cross section of a dirty water diversion

6.2 Sediment Retention Ponds

No SRP's are proposed for this site.

6.3 Decanting Earth Bunds

No DEB's are proposed for this site.

6.4 Silt Fences

Silt fences will be used to treat site runoff from the initial establishment phases of topsoil / overburden stripping through to the point where retention of water can be relied upon prior to soakage.

Figure 9 provides a schematic of silt fences that may be used on the project and Table 1 shows the design criteria.

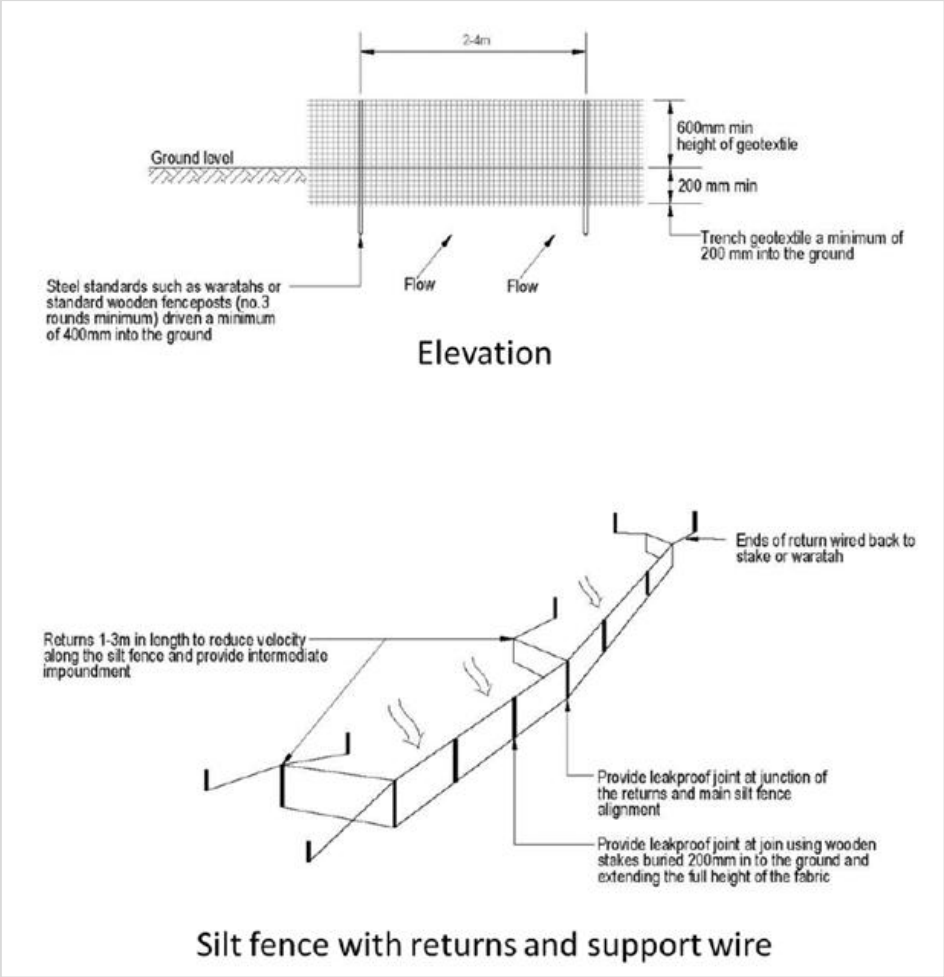


Figure 9: General silt fence schematic

Table 1: Silt fence design criteria

Slope Steepness (%)	Slope Length (m) (Maximum)	Spacing of Returns (m)	Silt fence Length (m) (Maximum)
Flatter than 2%	Unlimited	N/A	Unlimited
2 - 10%	40	60	300
10 - 20%	30	50	230
20 - 33%	20	40	150
33 - 50%	15	30	75
> 50%	6	20	40

6.5 Access and Stabilised Entranceways

The main site entrance to the quarry is on Cambridge Road. This will be fitted with a stabilised, formed entrance in accordance with the WRC ESC Guidelines.

The purpose of these entranceway treatments is to prevent the exit point from site becoming a source of sediment generation and to reduce the tracking of sediment on to public roads.

6.6 As Builts

If required and prior to bulk earthworks commencing on any area, 'As Built Certification Statements', signed by an appropriately qualified and experienced person may need to be submitted to Waikato Regional Council for

certification to ensure that erosion and sediment controls have been constructed in general accordance with the WRC ESC Guidelines.

Certified controls shall include silt fences and diversion channels/bunds. The 'As Built Certification Statement' will include all information as specified in the 'As Built Certification Sheets' (Appendix C) and supplied to the Waikato Regional Council.

6.7 Dust control

Forward planning and management to minimise dust problems from earthworks activities provide the best options for control. If dust management is only addressed after it has become a problem on site, it is very difficult to bring under effective control until the site has been stabilised.

If dust is observed on site or predicted to be an issue, appropriate measures will be implemented. These measures may include:

- Reducing the height that excavated material is dropped from during loading
- Covering exposed stockpiles with geotextile, haymulch or using polymers
- Retention of any vegetation for as long as possible
- Keep stockpiles that are not stabilised in sheltered areas
- Wetting areas regularly with a water truck
- Ceasing works within problematic areas until wind speed decreases or changes direction

Dust must not cause a nuisance beyond the site boundary and needs to be managed using the above options before becoming an issue.

6.8 Timing of earthworks

Normal quarry operations are possible all year round and extraction activities occur throughout the year. This includes topsoil stripping, the removal of overburden and overburden disposal site remediation.

Once all necessary approvals have been obtained for the development, drainage and erosion and sediment controls will be completed first. Bulk earthworks and sand extraction will commence shortly afterwards.

Winter works

It is proposed to undertake earthworks and the removal of overburden year round, including during the winter months (May to October). Works during winter will be carefully monitored especially during periods of wet weather. See Section 9 for the proposed monitoring and maintenance regime.

6.9 Minimise exposed areas

A range of best practice measures will be employed to maximise the area of land exposed to erosion at any one time. Vegetation clearance will be limited to those areas where soil disturbance will be undertaken, with as much existing ground cover being retained as possible. Staging of works may also be implemented, where practical, to stabilise areas where works have been completed.

6.10 Stabilisation and reinstatement

Exposed soil will be progressively stabilised when quarry works are completed to reduce erosion on these surfaces. Stabilisation will be in accordance with the WRC ESC Guidelines and the Quarry Management Plan objectives. All erosion and sediment controls will remain in-place until 80% vegetation reinstatement has been achieved.

A summary of stabilisation techniques which may be used on site:

- Geotextiles - An immediate form of stabilisation which involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilise disturbed soil areas and protect soils from erosion by wind or water. May be used as a permanent or temporary measure to control erosion.
- Hydroseeding/Hydro-hay - Will provide immediate stabilisation if applied with paper or wood pulp. Hydroseeding by itself will not provide the required amount of stabilisation to meet standards, however it will allow for very quick establishment of vegetation. Ideal for steep batters or slopes or runoff diversion channels/bunds when conditions allow for fast growth.
- Polymer - Will provide immediate stabilisation to areas which will not be disturbed for some time.

Application rates for hydroseeding and haymulching is outlined below. Polymer application rates vary but will be confirmed with a suitably experienced contractor.

6.11 Watercourse protection

No machinery is to enter watercourses, except for authorised works in accordance with an approved resource consent.

All sediment-laden water must be retained on site and allowed to soak to ground.

No in-stream works are required for the quarry.

6.12 Dewatering

No dewatering is expected to be required for the quarry.

7 Construction Methodology

The earthworks construction activities will follow a conventional approach. This will involve removal of vegetation within the areas to be worked; drainage activities; stripping of topsoil to stockpile; cutting and backfilling operations; sand extraction, spreading and; reinstatement of the finished surface with topsoil and grass or other stabilised surface where appropriate. The stages outlined in Table 5 may occur at different timeframes, or overlap each other depending on progress, weather and aggregate demand.

The general construction methodology for all expansion areas will be as follows:

Table 2: Construction Methodology

Stage	Description	ESC Control
1	Enabling works to commence, including defining the 3 – 4ha area where sand extraction will occur on the site. Sand extraction will occur in a north - south (general) direction. Enabling works will include: - Establishment of the silt fence around the segment of works - Delineation of the 5m - 8m wide buffer of original ground which remains to allow for the retention of sediment laden water – see hold point. - Topsoil stripping to stockpile - Quarry set up including offices, processing plant and stockpile areas The processing plant will only need to be relocated once or twice during the operation of the quarry	Silt Fence Stabilised Construction Entrance **HOLD POINT:** It is recommended that the 5m – 8m wide buffer is confirmed by an engineer. This is especially important in later stages when the quarry pit deepens to prevent potential of instability.
2	Sand extraction to commence. Once the quarry excavation has reached several meters, it may be beneficial to replace the silt fence around the work area with a diversion bund. This is to keep clean water from entering the site, if the silt fence is no longer being maintained.	Silt Fence Clean water diversion (if required) Retention of sediment laden water
3	Backfilling to commence in areas where sand extraction has been exhausted. Progressive stabilisation to occur in completed areas.	Silt Fence or cleanwater diversion Retention of sediment laden water
4	New areas may be opened up (3-4ha). The same methodology in points 1 -3 will be followed.	Silt Fence or cleanwater diversion Retention of sediment laden water
5	Once sand extraction is complete, all areas to be backfilled, topsoiled and stabilised. ESC's may be decommissioned once 80% stabilisation has been achieved.	

During construction works, all effort will be made to stabilise parts of the site as areas are topsoiled and completed. Erosion and sediment controls will remain in place until a satisfactory level or reinstatement has been achieved, at which time the temporary controls will be selectively removed.

8 Maintenance and Monitoring

The operational effectiveness and efficiency of all erosion and sediment control measures must be maintained throughout the duration of, and each stage of, earthworks/quarrying activity, or until the site is permanently stabilised against erosion. Maintenance activities and site checks to be undertaken by quarry staff (under direction of site management) are summarised in Table 3**Error! Reference source not found.**. All maintenance inspections and remedial actions should be documented and available upon request to Waikato Regional Council. A suggested maintenance record template and inspection record is included in Appendix D.

A record will be maintained of the date and time of inspection undertaken, any maintenance requirements identified and of maintenance undertaken to all erosion and sediment control structures.

Table 3: Recommended maintenance activities and checks

Control Type		Frequency
Weather forecast	Check Metservice New Zealand for rainfall forecasts	At least weekly
Diversion bunds and channels	Ensure they are in the correct place (clean water diverting flows away from the work areas and sediment-laden flows directed to sediment treatment devices)	Weekly
	Inspect for signs of scouring or collapse and repair	Weekly
	Remove any materials that may have accumulated	As required
	Take particular care to protect against damage from earthmoving operations and reinstate the diversion if damaged.	As required
	Look for low spots, areas of water ponding, formation of tunnel gullies, sediment deposition and debris blockage	Weekly
Monitoring of sediment discharge	Check whether the erosion and sediment devices are operating as designed	During rainfall events
	Inspect areas of earthworks and identify whether additional erosion and sediment control measures are necessary	During rainfall events
	Determine whether excessive sediment is discharging to roadways, land, or watercourses	During rainfall events
Stabilising areas	Identify areas that require stabilisation	As works progress (minimum of once a week)

Any accumulated sediment deposited in the diversion channels where there is a risk of overtopping due to a lack of freeboard will be removed and disposed of to a secure area to ensure it does not discharge to the receiving environment.

8.1 Monitoring and Triggers

All erosion and sediment control structures must be inspected at least weekly, as well as within 24 hours after any rainstorm event that could affect their performance. Records of each inspection must be kept (See Appendix D), including the date and time, any maintenance needs identified, and all maintenance actions completed. These maintenance records must be made available to Waikato Regional Council upon request.

This section will be updated with further requirements once consent conditions are confirmed.

9 Incident Management and Reporting

Incident response in relation to an unauthorised sediment discharge shall be undertaken. In relation to erosion and sediment control, an incident is defined as:

- Discharges from non-stabilised areas that are not treated by erosion and sediment control measures as required by the ESCP;
- Failure of any erosion and sediment control measures; or
- Any other incident, which either directly or indirectly causes, or is likely to cause, adverse ecological effects in any waterbodies, that is not authorised by a resource consent.

Incidents will primarily be identified by site observations by quarry staff and as a result of specific environmental and erosion and sediment control inspections undertaken by an appropriate Shaw's Quarry representative. An incident may also be identified as a result of the monitoring undertaken, through complaints, or stakeholder feedback.

An internal incident report will be prepared (within 5 working days), and include the following details:

- Description and location of incident;
- Description of the weather conditions before/during the incident;
- Description of work being carried out at the time of the incident and how the incident occurred;
- Immediate corrective actions taken to rectify the situation and mitigation measures to be taken to minimise the adverse effects on the environment;
- Root causes of the incident; and
- Environmental controls in place at the time of the incident.

9.1 Corrective Actions

As soon as practicable after an incident, the following recommendations should be made:

- Determine the immediate actions to be taken to ensure compliance with the relevant management plan(s), as soon as possible
- Corrective actions to address root causes shall be assigned and actioned as soon as practicable, taking into account health and safety.
- If required, liaise with Waikato Regional Council to establish what remediation or rehabilitation is required and whether this is practicable to implement.

Additional monitoring may be required as a result of an incident, and changes may be required to the certified ESCP. Any such changes will be made in accordance with the conditions of consent(s).

9.2 Site Contacts

For the purpose of this document, specific site responsibility for the operation and maintenance of all key erosion and sediment control structures will be:

Quarry Manager (TBC)

Email:

Phone:

10 Decommissioning

All erosion and sediment controls detailed in this plan are to remain until all surfaces within the contributing catchments are stabilised by grass (strike > 80%), aggregate or other appropriate stabilisation measure.

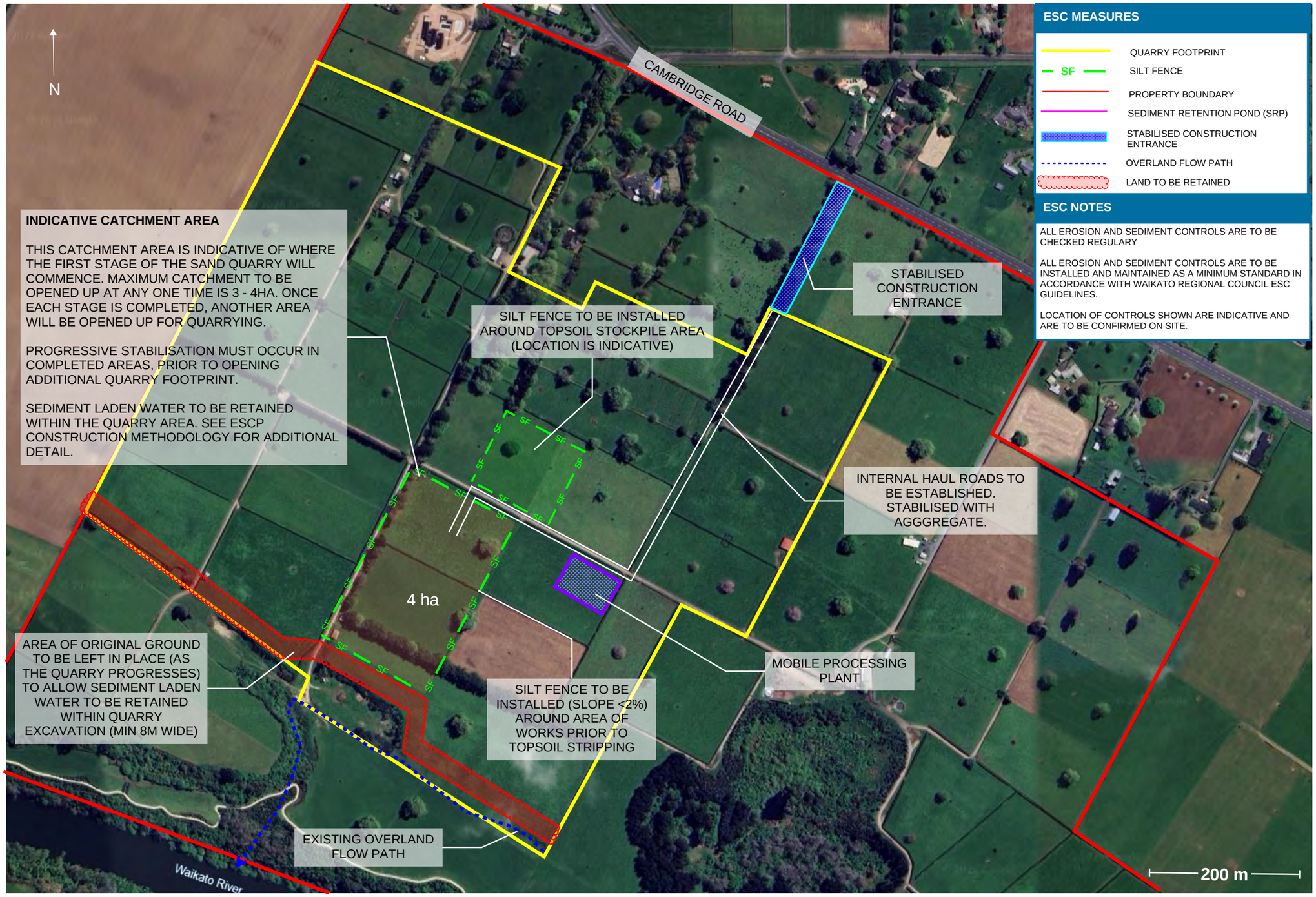
Once the above stabilisation criteria have been met. The decommissioning of controls will meet the following standards:

- Prior to backfilling of any devices, the silt fence or super silt fences that were utilised during the installation devices will be reinstated if required (particularly over the spillways), note this requirement will be subject to the duration of the backfilling.
- Any accumulated sediment is to be removed as part of this decommissioning and will be disposed of in one of the site spoil disposal areas.
- The exposed areas resulting from sediment retention pond or decanting earth bund decommissioning will be rapidly stabilised in accordance with the final landscaping for the area. Where this final landscaping requires grassing, additional stabilisation in the form of hay mulch may be appropriate.
- Any recyclable materials as the result of silt fence or super silt fence removal, waratahs, wire, tensioners, waratah caps etc will be retained and reused as practical.
- The geotextile from the silt fences or super silt fences is not (typically) suitable for reuse so will be removed from site as waste.
- As with the silt fence material, geotextile used for site stabilisation will be recycled if practical, where this is not practical it will be removed from site as waste.
- Throughout the duration of the project, the ability to salvage and recycle silt fence and geotextile will continue to be investigated. Off-site recycling opportunities will also be investigated.

Notice of the decommissioning must be provided to the Council at least two working days prior to the removal of any erosion and sediment control works specifically required as a condition of resource consent or by this document.

A template for decommissioning any erosion and sediment control device is included in Appendix E.

Appendix A – ESCP Drawings



CLIENT **SHAWS QUARRIES** PROJECT **PROPOSED WHANAKUI STUD QUARRY DEVELOPMENT**				REV	DESCRIPTION	DRAWN	CHECK	DATE	DRAWING STATUS FINAL PROJECT PHASE PROPOSED THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS APPROVED	SHAW'S MPD ENVIRONMENTAL
TITLE	ESCP DRAWING 1			1	ESCP DRAWINGS FOR PROPOSED WHAKANUI STUD QUARRY DEVELOPMENT	MD		23.06.26		
DWG NO	ESCP-SWQ-01	SCALE	SEE DRAWING							

Appendix B – ESC Design

The following information includes further details of key construction aspects of the proposed enabling works and bulk earthworks. All controls will be designed, installed, and maintained in accordance with best practice. This includes being in general accordance the Waikato Regional Council ESC Guidelines

Minimum Design Standards

Peak flows are based on HIRDS data from NIWA (Earth Science New Zealand) for the site location. At the time of writing, no provision has been made for climate change due to the temporary and adaptive nature and duration of the works.

The coefficients used in the ESCP are based on the NZIE (New Zealand Institute of Engineers) Coefficient Chart (1980). This is the chart provided in MPI's Standardisation of design flows for coastal catchments in NZ by Craig Martell. This allows for extreme events, soil and slope type. Adjustment due to ground slope can also be made, up to a factor of +0.10 which can be done for steep areas of the site (20% or steeper).

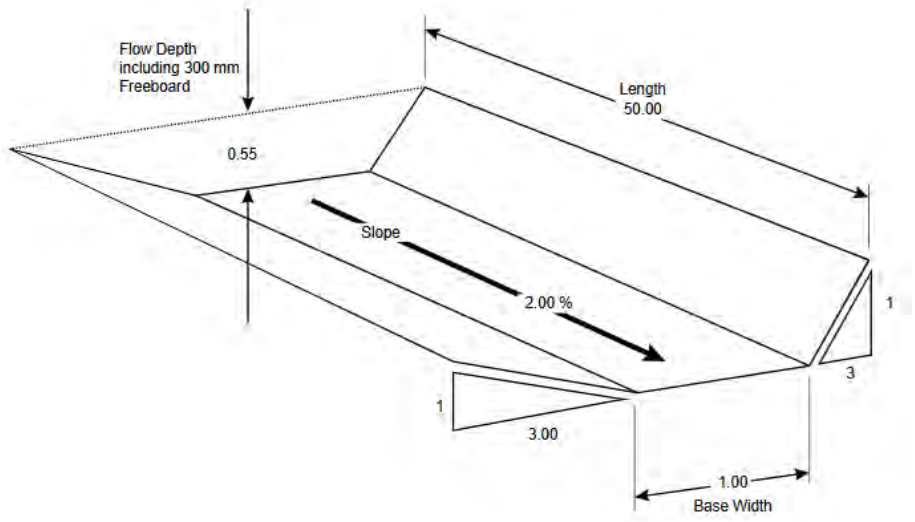
Final measurements and stabilisation requirements will be captured in the as built process.

Diversions

Dirty Water Diversions (All)

Peak Flow = 0.308m³/s
Maximum Catchment Area 4ha
Rainfall (I) – 39.7mm/1hr (ARI 20)
Mannings (n) (Bare Earth - Rough) = 0.03

Bund Dimensions
Minimum height 0.55m (including 300mm freeboard)
Channel slope 2% (Flattest)
Base width – 1m (or 1m gap on the dirty water side of the bund)
Channel Flow Velocity (m/s) = 1.24m/s
Channel Capacity (m3/s) = 0.54m³/s

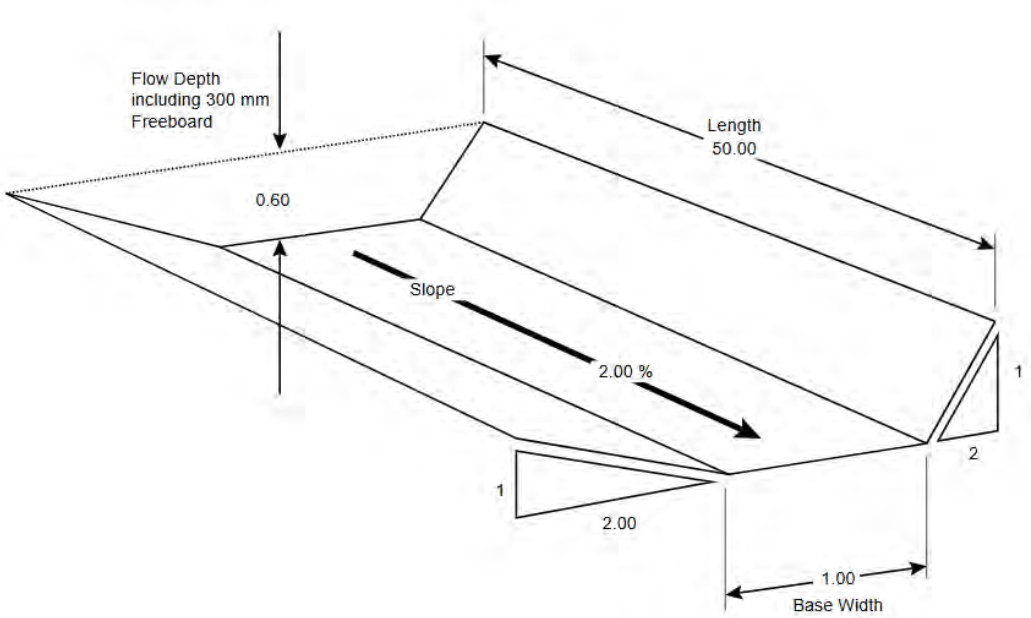


Clean Water Diversion Bunds (All)

Peak Flow = 1.842m³/s
Maximum Catchment Area = Estimated at 10ha
Rainfall (I) – 39.7mm/1hr (ARI 20)

Slope 2%
Length = 500m

Trapezoidal Channel
Base Width = 1m
Flow Depth = 0.6m (including 300mm freeboard)
Mannings (n) (Bare Earth - Rough) = 0.03
Channel Flow Velocity (m/s) = 1.64m/s
Channel Capacity (m3/s) = 0.79m^3/s



Appendix C – As Built Certification Sheets

Silt/Super silt fence (SF) As-built Certification Sheet

Silt/super silt fence name/number:

Contributing catchment area (m^2)		
Spacing between support posts (m)		
Support wire installed	Y ☐	N ☐
Trenched into ground minimum of 200mm	Y ☐	N ☐
Joins sealed	Y ☐	N ☐
Spacing between returns (m)	Y ☐	N ☐
Length of returns (m)		
Silt fence intercepting only sheet flows	Y ☐	N ☐
Chain mesh/netting backing (super sf)	Y ☐	N ☐
Double layer of fabric (super sf)	Y ☐	N ☐
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 & 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)_____

Signed and dated:_____

Please provide drawings of as-builts, which include all of the above details along with this certification sheet. An example of a suitable silt fence/super silt fence as-built is overleaf.

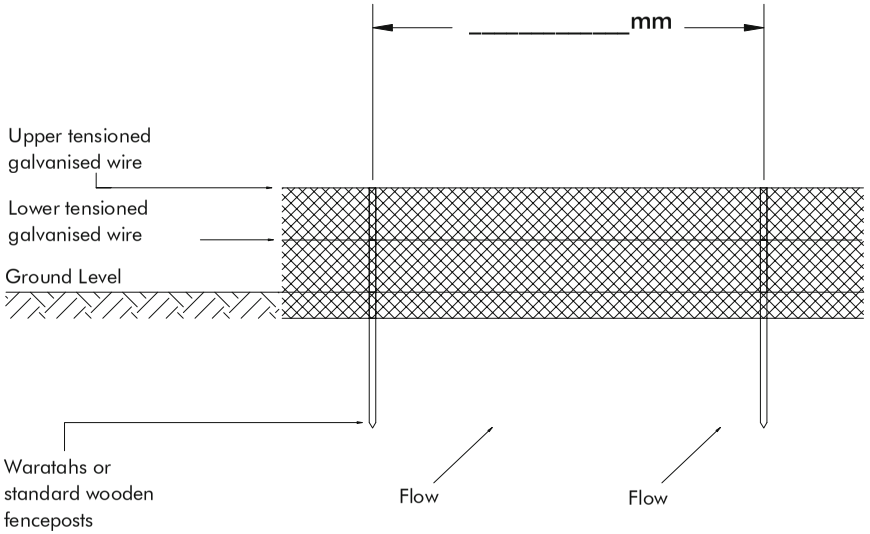
Note: As-builts are not approved by Waikato Regional Council. Responsibility for construction of the structures and accuracy of the as-builts rests with the certifying agent. This list is not exhaustive and should be used to highlight some key "Erosion and Sediment Control Guidelines for Soil Disturbing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



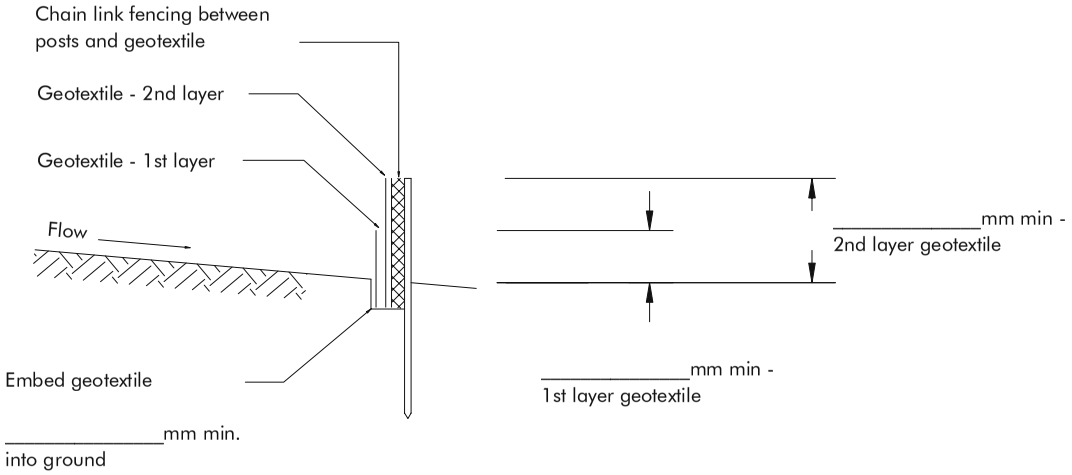
Waikato
REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

Example: Scaled drawing as built - Super silt fence

Standard detail
for Super Silt Fence



ELEVATION



CROSS SECTION

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-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 only be used to highlight some of the key requirements.

Appendix D – Example Inspection Sheets

Environmental Site Inspection

This inspection sheet is designed to be used for regular inspection of all ESC devices and after rainfall trigger events (25mm/24hrs and/or 15mm/1hr). Inspections after rainfall trigger events must occur within 24hrs. Where it is identified that any ESC measure has become ineffective and maintenance is required, the Environmental Manager or Site Manager for Whitehall Quarry must be notified.

Site Information

Date:		**Time:**	
Work Area:			
Inspection By:			
Works at the Time of Inspection:			

Erosion and Sediment Controls

Critical Risks Identified
Actions Discussed or Raised

As per ESCP, check off controls as you inspect them:			
Control	**Compliant**	**Non-Compliant**	**N/A**
Stabilised Entryway	☐	☐	☐
Clean water diversions	☐	☐	☐
Dirty water diversions	☐	☐	☐
Silt fences	☐	☐	☐
Super silt fences	☐	☐	☐
Sumps	☐	☐	☐
Stabilisation requirements	☐	☐	☐
Actions Required (All non-compliant devices require an action point below)			

Comments and Photos

Appendix E – Decommissioning Form

Decommissioning Form: ESC Device

This decommissioning form confirms the details required to decommission/disestablish erosion and sediment control(s). No ESC devices shall be removed or decommissioned from site before that location is appropriately stabilised, and Waikato Regional Council must be informed no less than 2 working days prior to removal. Removal of devices must be approved by the Environmental Manager or equivalent.

Device Details	
Work Area	
Name of Device *(as per ESCP)*	
Size of Catchment *(Ha)*	
Reason for Removal	

ESCP Drawing
Approved ESCP Drawing:

Stabilisation of Catchment			
Type of stabilisation			
80% stabilisation met?	☐ Yes	☐ No	☐ N/A
Will the device be replaced?	☐ Yes	☐ No	☐ N/A

Stabilisation of Catchment		
Environmental Manager: I have confirmed on site that the control can be removed in accordance with the Waikato ESC Guidelines.		
Name:	**Date:**	**Signature:**

Statement of Approval			
I am satisfied that: • **The control needs to be removed, and** • **There is adequate stabilisation of the catchment or the replacement control has been designed as per best practice, and** • **Consultation with Waikato Regional Council has taken place.** **Therefore, I give authority for the above control to be removed by the person named above.**			
Name/Position:	**Company:**	**Signature:**	**Date:**