



Erosion and Sediment Control Plan - Whenuapai Redhills Package 2

For Resource Consent

Prepared for Watercare Services Ltd
Prepared by Beca Limited

9 June 2023



Contents

1 Introduction and Project Context..... 3

1.1 Scope and Purpose 3

1.2 Project Description..... 3

2 Proposed Design and Construction Methodology 5

3 Site Description 7

3.1 Receiving Environment..... 7

4 Principles of Erosion and Sediment Control 8

5 Erosion Controls..... 9

5.1 Timing of Earthworks and Staging..... 9

5.2 Site Access Points 9

5.3 Minimise Exposed Areas 9

5.4 Limiting Site Length 9

5.5 Stabilisation and Reinstatement 10

5.6 Dust Control 10

5.7 Stockpiling..... 10

6 Sediment Controls..... 11

6.1 Clean Water Diversions 11

6.2 Dirty Water Bunds..... 11

6.3 Sediment Retention Ponds and Decanting Earth Bunds..... 11

6.4 Silt Fences 11

7 Dewatering 12

8 Specific Area ESC Summary 13

9 ESCP Monitoring and Maintenance 16

10 Conclusions 17

Appendices

Appendix A – ESC Schematics

Revision History

Revision N°	Prepared By	Description	Date
1	Alex McDonald	For resource consent	31.03.2023
2	Alex McDonald	Updates following client review	09.06.2023

Document Acceptance

Action	Name	Signed	Date
Prepared by	Alex McDonald		09.06.2023
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Approved by	Jenny Vince		09.06.2023
on behalf of	Beca Limited		

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1 Introduction and Project Context

1.1 Scope and Purpose

This Erosion and Sediment Control Plan (ESCP) has been prepared by Beca Ltd (Beca) on behalf of Watercare Services Limited (Watercare). The purpose of this document is to describe how earthworks associated with Whenuapai Redhills: Package 2 Project (The Project) can be effectively managed to mitigate any potential sediment discharge risk and avoid adverse impact on the environment from land disturbance activities during construction.

This plan details the principles and practices of erosion and sediment control methodology with some commentary about what earthworks staging and sediment devices may be required in various areas of the site to support resource consent application for land disturbance activities.

It is expected that the resource consent will require the appointed contractor to prepare a site-specific ESCP (SSESCP) which will detail design specifications of erosion and sediment control devices aligned with the finalised design and Contractor's earthworks methodology. This ESCP will form the basis for preparing any SSESCPs in the future.

1.2 Project Description

Watercare is proposing to install approximately 4 km of wastewater pipeline between 32 Mamari Road, Whenuapai and the existing Hobsonville Pump Station at 2A Buckley Avenue, Hobsonville. This pipeline will provide additional wastewater servicing capacity to accommodate growth in the North West region of Auckland.

The Project includes the following five key components (see **Figure 1**):

1. A **break pressure chamber** located on the corner of Mamari and Spedding Roads which connects to the Package 1 works.
2. The **Massey Connector**, a gravity pipeline (approximately 1km long and 2100mm in diameter) between the break pressure chamber and the Northern Interceptor at 27 Trig Road, Whenuapai.
3. Phase 2 / Stage 1 of the **Northern Interceptor**, comprising of a new gravity tunnel (approximately 2.8km long and 2100mm in diameter), which will run adjacent to SH18 between 27 Trig Road, Whenuapai, and 2 Buckley Avenue, Hobsonville.
4. A **pump station connection** (approximately 40 m in length, and 800 mm in diameter), between the Northern Interceptor and the Hobsonville Pump Station
5. **Three permanent shafts** along the Northern Interceptor alignment.

For the purposes of this assessment, the Project also includes construction activities, including three temporary shafts (in addition to the three permanent shafts and Break Pressure Chamber), construction yards/laydown areas at each shaft site, and a temporary access road.

The wastewater pipeline installation involves a trenchless methodology, utilising a tunnel boring machine.

Therefore, for the purposes of this assessment, the ESC methodology focuses on the following independent sites, associated with earthworks and associated construction activities, as shown on **Figure 1**:

- Break Pressure Chamber (BPC) and Laydown Area
- Shaft 8
- Shaft 10 and Access Road
- Shaft 12 and Access Road
- Shaft 14
- Shaft 16

- Shaft 17 and Pump Station Connection

This report assesses the effects in relation to sediment discharges to the environment from land disturbance in these areas.

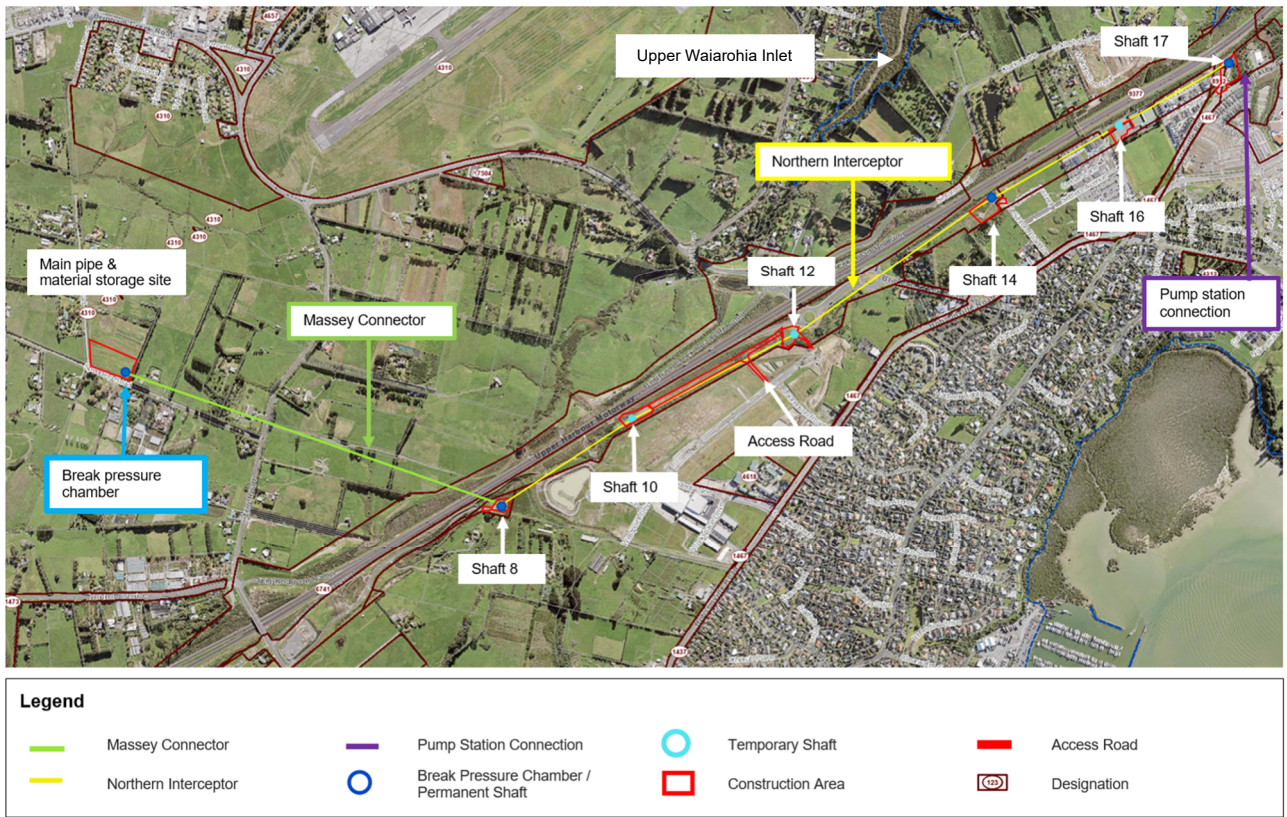


Figure 1. Site layout, from BPC and laydown site in the west, to the Hobsonville Pump Station connection in the east.

2 Proposed Design and Construction Methodology

The following provides an overview of the construction methodology. A more detailed construction methodology is provided in the Assessment of Environmental Effects report.

The entire pipeline length is proposed to be installed via a trenchless methodology involving a tunnel boring machine (TBM). An example of a TBM is shown in **Figure 2**. The pipeline will be installed at various depths, up to a maximum of 29m below ground level in some sections, to allow a gradual fall for the gravity wastewater pipe. This methodology requires the installation of up to 7 shafts along the alignment, to act as pilot or receiving points for the TBM¹. It is these shaft sites that are the focus of this ESCP.



Figure 2. Example Tunnel Boring Machine and working area in shaft

Each shaft site will require the disturbance of soil to establish a working area, from which the shaft can be installed and to enable material to be either installed/or removed associated with the drilling operations.

In general, earthworks proposed at each site will involve:

- Stripping topsoil and stockpiling into windrows or isolated stockpile areas to be stabilised. Consideration of flow paths will be made prior to stockpiling.
- Land stripped to create a working area will be covered with geotextile and a 400mm compacted aggregate running surface.
- Creation of temporary bunding impoundment areas for the stockpiling of waste material sourced from the tunnelling operations (only at shafts where spoil is removed).
- Removal of excavated material will be carried out by trucks from the sites to a local fill site.

¹ Once tunnelling works are complete, the break pressure chamber will be installed within the shaft at 32 Mamari Road, and Shaft 8, 14 and 17 will be retained as permanent manholes to provide for future pipeline maintenance.

- Dedicated haul roads developed for the construction areas will be covered with a 400mm compacted aggregate running surface over a geofabric membrane.
- All exposed ground within the site will be covered where practical to prevent sediment laden run off.

Approximate earthworks areas and volumes from each site are estimated in **Table 1**.

Table 1. Details of construction area, shaft dimensions, and tunnelling spoil volumes to be removed from each location.

Location	Construction area (m ²)	Shaft Dia (m)	Shaft Depth (m)	Shaft volume (m ³)	Tunnel spoil vol. removed (m ³)
BPC + Laydown area	8,500	14	10	573	0
Shaft 8	3,200	13	14	2,400	8,748
Shaft 10 + Access Road	5,500	7.5	24	1,200	0
Shaft 12 + Access Road	4,300	11	14	1,621	6,062
Shaft 14	6,000	7.5	22	1,336	0
Shaft 16	3,500	11	19	1,370	4,221
Shaft 17 + Pump Station Connection	2,700	11	11	1,335	30

3 Site Description

The existing land use of the proposed construction footprint is predominantly agricultural or within the existing road reserve corridor of the Upper Harbour Motorway.

The various sites are generally small scale and flat, however do contain nearby overland flow paths or watercourses that will require protection.

3.1 Receiving Environment

The immediate receiving environment from these project works is the Waiarohia Stream which has several tributaries extending into, or near the project sites. This stream discharges to the Waiarohia Inlet and the upper estuary of the Waitemata Harbour (**Figure 1**). Wetlands have also been identified in the vicinity of works areas at the following locations:

- 32 Mamari Road (BPC site)
- 27 Trig Road (Shaft 8 site)
- Adjacent to 19 Westpoint Drive (Shaft 10 site)

All site discharges from exposed areas will either be directed to a sediment control device or through a dewatering mechanism.

All receiving aquatic environments have the potential to be affected by sediment runoff during construction works. Sediment suspended in water can clog fish gills within the stream or limit light penetration, affecting various plant or algal species. Once settled, additional sediment loading can smother benthic organisms or coat plant leaves.

4 Principles of Erosion and Sediment Control

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 all sediment laden water prior to discharging from the site (sediment control). The 10 basic principles of erosion and sediment control taken from Auckland Council's Guidance Document 005: Erosion and Sediment Control ('GD05', 2016) will be applied to each of the defined scenarios (as applicable) and are outlined for completeness as follows:

- Minimise Disturbance: Only work those 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 exist 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 with sowing new seed or mulch cover.
- Install perimeter controls: Divert clean water away from areas of disturbance and divert runoff from areas disturbed to sediment control measures.
- Employ detention devices: Treat runoff by methods that allow sediment to settle out.
- 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.
- Use trained and experienced contractors

Any Site-Specific Erosion and Sediment Control Plan (SSESCP) prepared by the Contractor or their delegate as a requirement of any future conditions of consent will be developed and maintained in accordance with GD05.

5 Erosion Controls

A number of considerations regarding the control of erosion within areas of disturbance are outlined below which will be applied to all areas of construction. These erosion controls are to be prioritised above the reliance on any sediment controls to minimise the amount of erosion and thus minimising the volume of sediment that requires treatment.

5.1 Timing of Earthworks and Staging

The contractor shall endeavour to complete earthworks during the Auckland Council's earthwork season (1st October – 30th April). Should earthworks be required outside this period the contractor will apply to Auckland Council for permission to complete works outside this time period following the standard winter works approval process.

It is likely this project will be undertaken over the winter months, however the stabilisation of all sites with a clean running surface will minimise risk.

5.2 Site Access Points

Stabilised entranceways will be installed at points where the site is accessed from public roads, namely:

- Break Pressure Chamber and Laydown Area - off Spedding Road.
- Shaft 8 - off Trig Road, utilising the existing stabilised access road / driveway to this site.
- Shaft 10 – off Westpoint Drive (access haul road to be constructed between site and Shaft 12 site).
- Shaft 12 - off Westpoint Drive.
- Shaft 14 - off Sinton Road South.
- Shaft 16 - off Memorial Park Lane.
- Shaft 17 and Pump Station Connection - off Buckley Ave.

These stabilised entrances will be built and maintained in accordance with GD05. Any sediment losses to the road surface during works will be removed as required using dry methods only.

The lead Contractor will assess the requirement of a wheel wash should sediment be tracked onto public roads. This is a low possibility given the proposed clean running surface, however may occur at the sites requiring larger volumes of spoil removal from the TBM.

5.3 Minimise Exposed Areas

A number of best practice measures will be employed to minimise the area of land exposed to erosive forces 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. Stabilisation of the site will also be undertaken to ensure effective management of the open earthwork areas. Temporary stabilisation with the use of pinned geofabrics, hay mulch or soil stabilisers will also be used for small isolated areas where required.

5.4 Limiting Site Length

Exposure of long slopes increases the potential for water travelling over the site to cause erosion and generate increases in sediment loss. Therefore, limiting the length of a slope exposed is an effective way of further reducing the amount of sediment generated by earthworks.

5.5 Stabilisation and Reinstatement

Exposed soil will be progressively stabilised when earthworks are completed to reduce erosion of these surfaces. Stabilisation will be dependent on the specific area of site, with the majority of each site proposed to be stabilised with geofabric and aggregate cover to create clean working areas for the shaft and tunneling operations. Once covered in hardfill, the area is considered erosion resistant.

Progressive stabilisation of fringe areas of works will include top soiling, hydro-seeding or seed and mulch application where required. These areas will require mulch application until 80% vegetation reinstatement has been achieved.

Use of pinned geofabrics, soil stabilisers, aggregates or hay mulch, may be required for isolated areas throughout construction.

5.6 Dust Control

Dust will be controlled by water spray as required. Water for dust control purposes will be sourced from public supply applied for at the time of construction. Dust management will need to comply with Permitted Activity conditions of the Auckland Unitary Plan. Given the confined, relatively small extent of these works and use of imported hardfills it is unlikely they will become a source of dust.

5.7 Stockpiling

Stockpiling of topsoil will be undertaken for reuse at each site. These topsoil stockpiles will be positioned as windrows or bulk stockpiles (kept to a manageable height) and stabilised immediately with mulch and seed.

Temporary spoil stockpile areas are proposed to be located at each shaft site where spoil is removed from tunneling operations. These stockpile areas will be banded to create handling areas, allowing the transfer of spoil from the TBM, to the stockpile, and then loaded to trucks for removal. This process occurs daily during operations, so the stockpile is not considered permanent and will be removed/worked continually.

6 Sediment Controls

Emphasis on mitigating erosion of the site should be considered foremost as opposed to the reliance on sediment control devices. Notwithstanding this, the following sediment control mechanisms will be implemented throughout the site to provide treatment capacity of sediment laden discharge from the site.

6.1 Clean Water Diversions

Diverting clean water minimises the erosion of worked areas and allows sediment retention devices to specifically retain dirty water thus increasing efficiency. Clean water diversions will be adequately sized to convey their upgradient catchment.

6.2 Dirty Water Bunds

Dirty water bunds act in preventing offsite dirty water discharges and conveying dirty water to retention devices for impounded or treatment. Dirty water bunds can be stabilised on their outer face to form a clean water diversion in some instances. Dirty water bunds will be constructed in accordance with GD05 where required.

6.3 Sediment Retention Ponds and Decanting Earth Bunds

No sediment retention ponds (SRPs) or decanting earth bunds (DEBs) are proposed for this project given each site is intended to be stabilised, or is of a small enough size that it can be managed with alternative devices.

Should either retention device be proposed in the Contractor's SSESCP, they will be designed in accordance with GD05, with a minimum volume equivalent to 2% of the contributing catchment area, include floating T-Bar decants and stabilised emergency spillways and discharge points. All final design detail of SRPs or DEBs will be provided in the Contractor's SSESCP.

6.3.1 Flocculation

Chemical flocculation will be used in all SRPs and DEBs, if constructed, to improve their sediment removal efficiency. This flocculation will be with a rain activated dosing system.

All flocculation methodology and dosing rates will be detailed in a Flocculation Management Plan (FMP), as required by condition of consent. This approach will allow the appointed contractor to size their flocculation devices specifically to their constructed devices, as detailed in their SSESCP.

6.4 Silt Fences

Silt fences are proposed as the primary treatment device for all sites. It is acknowledged the stabilised surfaces are unlikely to generate sediment, however given the removal of spoil operations, and general stockpiling of construction material and movement of trucks, each site is intended to be protected with silt fences to offer some sediment treatment of potential stormwater discharges.

Silt fences are to be installed across the contour to slow sheet flow and impound sediment. Any silt fence will be installed in accordance with GD05 and will remain in place until 80% permanent stabilisation is achieved within their contributing catchment.

Heavy machinery operation and earthworks will not occur on the downhill side of silt fences unless it is undertaken following a strict cut and cover methodology for small work areas only.

7 Dewatering

It is likely that areas throughout the construction zone will become inundated with stormwater and/or groundwater and will require dewatering, particularly within the deep excavations of the various shafts.

Clean water (>150mm clarity measured with a Secchi or Black Disk) may be discharged offsite directly, under close management. Any dirty water dewatering will be passed through a dewatering treatment device such as a dewatering bag, turkey's nest, baffled bin, or lamella clarifier (e.g. 'Silt Buster'). This device will be set up in an area that allows the discharge of treated water to a nearby overland flow path or watercourse. Alternatively, dewatering can be directed to an established sediment retention device (SRP or DEB, if constructed) onsite to enable sedimentation and passive discharge through the device's constructed outlet. Examples of these dewatering devices are provided in **Figure 3** below, with the likely device being a lamella clarifier. Any dewatering undertaken will be closely monitored to ensure no excess sediment is being discharged out of the site.

Any specific contaminated groundwater treatment may be detailed in a Dewatering Management Plan or similar specific contaminated site management plan (yet to be drafted).



Figure 7. Example dewatering devices, clockwise from top left: turkeys nest, baffled skip bins, small dewatering bag, lamella clarifier.

8 Specific Area ESC Summary

The following summaries provide an overview of the methodology and controls within each specific area. Refer to **Appendix A** for the indicative ESC Plans detailing the controls referenced in this section.

Break Pressure Chamber and Laydown Area

- The site is a flat grassed paddock with a fall towards the northern boundary.
- The existing roadside swale along Spedding Road and Mamari Road acts as a clean water diversion for this site.
- Stabilised entranceways with temporary culverts for the roadside swales will be installed off both roads.
- A silt fence with returns will be installed along the northern boundary of the site.
- The entire site will be topsoil stripped, with a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.
- BPC dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.

Shaft 8

- The site is on a peninsula with a gentle fall to two intermittent streams on the northern and eastern boundaries.
- A stabilised entranceway will be established off the end of the existing accessway off Trig Road.
- A small clean water bund diversion will be constructed along the southern property boundary and stabilised. This is precautionary only, as the contour in this area will not generate a large volume of clean water requiring diversion.
- A silt fence with the appropriate number of returns will be installed around the northern and eastern perimeter boundary of site.
- The entire site will be topsoil stripped, with a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.
- Shaft dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.
- Spoil from Shaft 8 tunnelling operations to be temporarily placed in bunded spoil management area near the shaft for loading and removal from site.

Shaft 10 and Access Road

- The site is a relatively flat strip (~25m wide) of vacant grassed land with overland flow paths running each side to an intermittent stream to the south west.
- A 4m wide stabilised access will be established along the strip between the Shaft 12 site and this site. This access will be topsoil stripped, with a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.
- The position of the site does not require any clean water diversions as it sits above surrounding areas.
- A silt fence with the appropriate number of returns will be installed along the northern perimeter boundary of the site.
- The entire site will be topsoil stripped, with a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.

- Shaft dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.
- A small portion along the site's southern boundary falls to the south. This area will be stabilised so will not present a sediment discharge risk. No stockpiling or spoil movements are to occur in this area, therefore a silt fence is not considered necessary.

Shaft 12 and Access Road

- The site is vacant grassed land between vegetated margins of the expressway with a gentle fall to the west to an overland flow path and north to the highway.
- The position of the site does not require any clean water diversions. An existing stormwater outfall along the site's southern boundary acts as a clean water diversion from this area.
- A 4m wide stabilised access will be established from Westpoint Drive.
- Silt fences with the appropriate number of returns will be installed along the western, northern and southern perimeters of the site.
- The entire site will be topsoil stripped, with a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.
- Shaft dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.
- Spoil from Shaft 12 tunnelling operations is to be temporarily placed in a bunded spoil management area near the shaft for loading and removal from site.

Shaft 14

- The site is a relatively flat area of vacant grassed land with overland flow paths running each side to an intermittent stream to the north east.
- A stabilised access will be established off the Sinton Road East cul-de-sac.
- The position of the site does not require any clean water diversions as is sites above surrounding land.
- A silt fence with the appropriate number of returns will be installed along the northern and southern perimeter of the site.
- The entire site will be topsoil stripped, with a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.
- Shaft dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.
- A small area along the north eastern boundary is to remain vegetated, however may require a silt fence constructed along the northern boundary if incorporated into site operations.

Shaft 16

- The site utilises existing concrete surfaces of the Bowling Club carpark and maintained grassed land surrounding this area. Existing stormwater infrastructure runs through the site, including several catchpits or scruffy domes that will require protection during works. An overland flow path is the receiving point of stormwater discharges, which discharge to a culvert running beneath the highway on the site's northern boundary.
- A temporary 4m wide stabilised access will be established for the Bowling Club off Memorial Park Drive, independent from the project site access.
- The existing concrete accessway to the site will be utilised for access and connect to the stabilised running surface of the site. Where currently grassed, topsoil will be stripped, with a geofabric and clean

aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.

- The existing stormwater catchpits within the Bowling carpark will act as clean water diversions, however a small asphalt bund may be required through the carpark to delineate the boundary of the site and prevent any localised clean stormwater entering the site off the carpark.
- A silt fence with the appropriate number of returns will be installed along the northern perimeter.
- Shaft dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.
- Spoil from Shaft 16 tunnelling operations is to be temporarily placed in a bunded spoil management area near the shaft for loading and removal from site.

Shaft 17 and Hobsonville Pump Station Connection

- This site is currently utilised as a contractors yard for the Northern Interceptor project and has a stabilised hardfill or chip-seal surface across most of the site (see recent aerial inset in **Appendix A** of this site). The back portion of this site will be used for this project. An overland flow path runs along the shoulder of the highway, discharging north east to a wetland.
- The existing stabilised access off Buckley Ave will be maintained.
- Where small areas of grass exist, topsoil will be stripped, and a geofabric and clean aggregate running surface placed and compacted. The topsoil stockpile will be stabilised with mulch and seed for reestablishment at the end of the project.
- The position of the site does not require any clean water diversions.
- A silt fence with the appropriate number of returns will be installed along the northern perimeter.
- Shaft dewatering treatment will be positioned in an area to allow discharge offsite via overland flow or tradewaste, to be informed by a Dewatering Management Plan or similar specific contaminated site management plan.

9 ESCP Monitoring and Maintenance

The following monitoring and maintenance activities shown in **Table 1** are recommended as a minimum for the site. This table provides several aspects of ESC that the Site Manager or delegate will assess regularly so that the ESC measures are optimised. Final maintenance and monitoring will be detailed in the Contractor’s SSESCP.

Table 1. General Inspection and Maintenance Requirements

Control Type	Inspection and Maintenance Requirements	Frequency
Weather Forecast	• Check forecast provider for rainfall forecasts ◦ Undertake a pre-check of the site controls prior to any large rainfall events.	Daily during operations
Silt fences	• Check that silt fences are toed in correctly. • Check for tears and other damage – fix if required. • Any areas of collapse, decomposition or ineffectiveness are to be replaced immediately. • Remove silt build ups when bulges develop or when deposition reaches 20% of the silt fence height.	Weekly
Monitoring of Sediment Discharge	• Check whether erosion and sediment devices are operating as designed via checking water clarity in devices and/or receiving waterways. • Inspect areas of earthworks and identify whether additional erosion and sediment control measures are necessary. • Determine whether excessive sediment is discharging to roadways, land, or watercourses and remediate immediately.	Prior and during rainfall events and weekly
Stabilised Entranceway	• Inspect the stabilised accessway and top up with clean aggregate if required. • Inspect surfaces at exit points are not having sediment tracked onto them – sweep if required. • Inspect any structure used to trap sediment from the stabilised entranceway.	Daily during operations
Stabilised Areas and Stockpiles	• Assess topsoil stockpiles for erosion and sediment runoff and reapply mulch and seed, or pinned geofabric, as required. • Check that all stabilised areas have at least 80% cover before removing control devices. • Identify areas that require stabilisation and remedy.	Daily during operations.

10 Conclusions

The measures outlined in this ESCP will provide for the effective prevention of erosion and control of sediment runoff from land disturbance activities associated with the construction of the project. The measures outlined in this ESCP can be adopted by the Contractor, with details of any additional sediment device design associated with their earthworks methodology and staging to be detailed in Site-Specific Erosion and Sediment Control Plans through construction. All environmental controls will follow the general specifications provided in Auckland Council's Guideline Document 005, "GD05".

The following standard conditions relating to erosion and sediment control are recommended for the project consent:

- Erosion and sediment control measures shall be constructed and maintained in accordance with Auckland Council Guideline Document GD2016/005 ('GD05') and any amendments to this document, except where a higher standard is detailed in the approved ESCP, in which case the higher standard shall apply.
- The operational effectiveness and efficiency of all erosion and sediment control measures specifically required as a condition of resource consent or by any approved SESCO shall be maintained throughout the duration of earthworks activity, or until the site is permanently stabilised against erosion.

Via implementing best practice erosion and sediment control methodology as outlined in this ESCP it is considered that the effects on the receiving environment from land disturbance activities will be less than minor. Management of the site and evolution of the ESC methodology with any project changes will be required to ensure protection is maintained throughout the project's duration.



Appendix A – ESC Schematics

EROSION AND SEDIMENT CONTROL MARK UPS OVERLAIN ON
PRELIMINARY DESIGN SET FOR INFORMATION

KEY PLAN

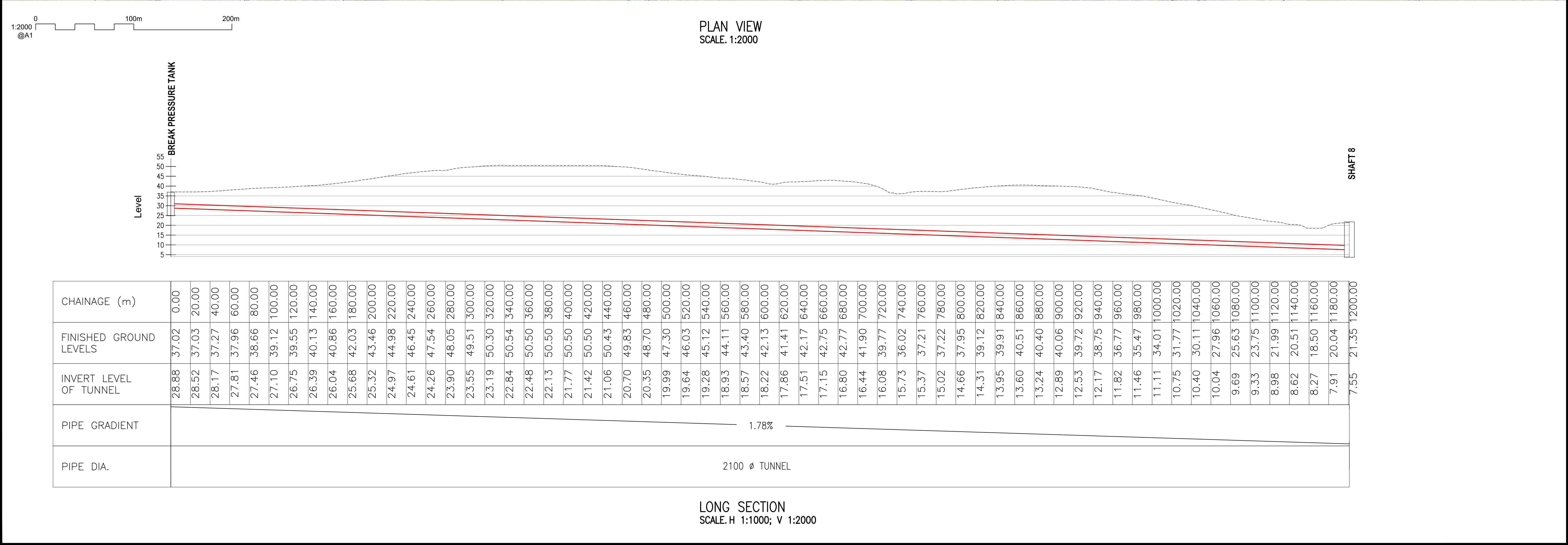
In addition, the following existing watercare drawings have been included for reference:

Document Title	WSL Drawing Number
Single Line Diagram 1 of 2 06-SWBD-X01	2012753.011
Communication Architecture	2012753.037



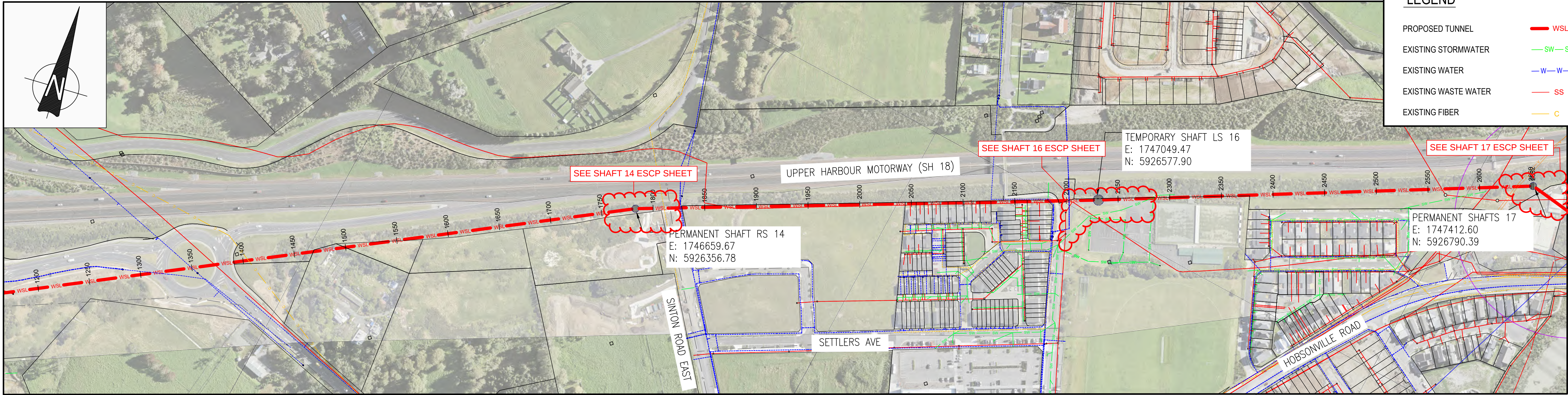
						DESIGNED	C. UNDERDOWN		 Watercare COPYRIGHT – This drawing, the design concept, remain the exclusive property of Watercare Services Limited and may not be used without approval. Copyright reserved.	 MOTT MACDONALD	NORTHERN INTERCEPTOR PHASE 2 WESTGATE TO HOBSONVILLE TITLE SHEET	CAD FILE 2013661.001		DATE 11-07-22
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3	05-22	PRELIMINARY DESIGN – FOR REVIEW	FM	PC		REF. No.				417039-MMD-01-XX-DR-C-0100			
2	02-22	SHAFT 8 REVISED	FM	PC		DWG. No.				2013661.302	ISSUE	3	
1	10-21	SKETCH FOR DISCUSSION	FM	PC									
ISSUE	DATE	AMENDMENT	BY	APPD.		DATE							

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LEGEND

PROPOSED TUNNEL

EXISTING STORMWATER

EXISTING WATER

EXISTING WASTE WATER

EXISTING FIBER

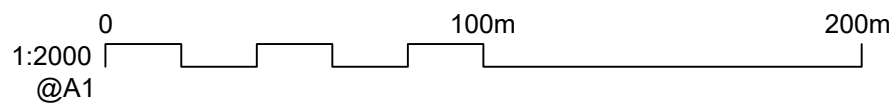
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SW-SW

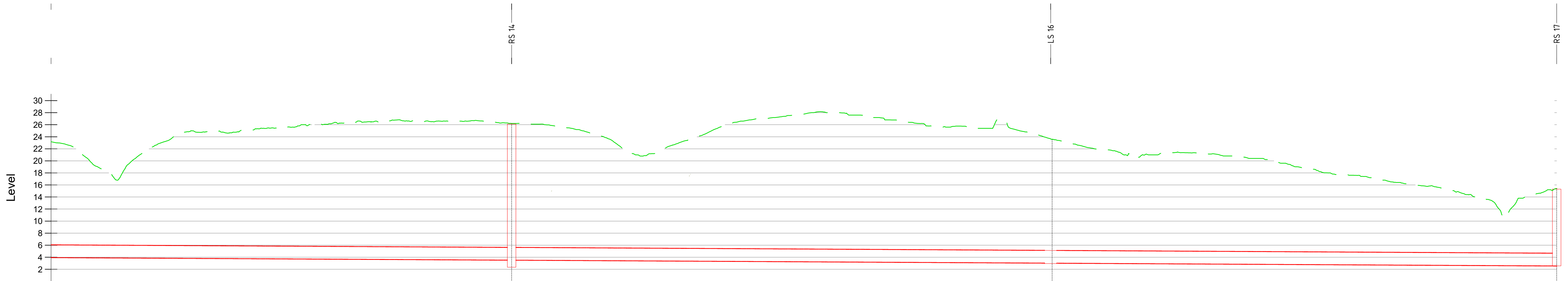
W-W-W

SS

C



PLAN VIEW
1:2000



Chainage (m)	1400.00	1450.00	1500.00	1550.00	1600.00	1650.00	1700.00	1750.00	1800.00	1850.00	1900.00	1950.00	2000.00	2050.00	2100.00	2150.00	2200.00	2250.00	2300.00	2350.00	2400.00	2450.00	2500.00	2550.00	2600.00	2651.80
Existing Ground Levels	22.75	18.73	25.62	24.61	25.64	26.65	27.02	27.25	26.73	23.97	21.35	24.80	27.04	28.04	27.05	26.56	25.15	22.80	21.40	21.54	20.03	18.55	18.29	16.09	13.20	
Pipe Gradient	1:900							1:900							1:900											
Cover	Min	13.91			9.17			20.57			15.28				18.45					5.78						
	Max			21.09				20.57			22.81				18.45					18.45						10.74
Invert Level		4.33						3.52							3.02											2.55
Inside Pipe Dia.					2100Ø						2100Ø									2100Ø						
MH Name/Internal dia								RS 14 7500							LS 16 10000										RS 17 7500	

LONG SECTION
1:2000 V
1:400 H

					DESIGNED	C. UNDERDOWN	
					DES. APPROVED	T. HAARHOFF	
					DRAWN	F. MISPLON	
3	06-22	PRELIMINARY DESIGN – FOR REVIEW	FM	TH	DWG. APPROVED	P. CORRIS	
2	02-22	FOR INFORMATION	FM	PC	WSL DESIGN MGMT.		
1	02-22	FOR INFORMATION	FM	PC	WSL PROJ. LEAD		
ISSUE	DATE	AMENDMENT	BY	APPD.		BY	DATE

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M

MOTT

MACDONALD

NORTHERN INTERCEPTOR PHASE 2

WESTGATE TO HOBSONVILLE

NI TUNNEL PLAN AND LONG SECTION (2 OF 2)

CAD FILE	417039-MMD-03-XX-DR-C-0101	DATE	28-06-22
ORIGINAL SCALE	A1	CONTRACT No.	—
REF. No.	417039-MMD-03-XX-DR-C-0101		
DWG. No.	2013661.203	ISSUE	3



1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date



Original Scale (A1)	Design	-	-
Reduced Scale (A3)	Drawn	-	-
	Dwg Verifier	-	-
	Dwg Check	-	-

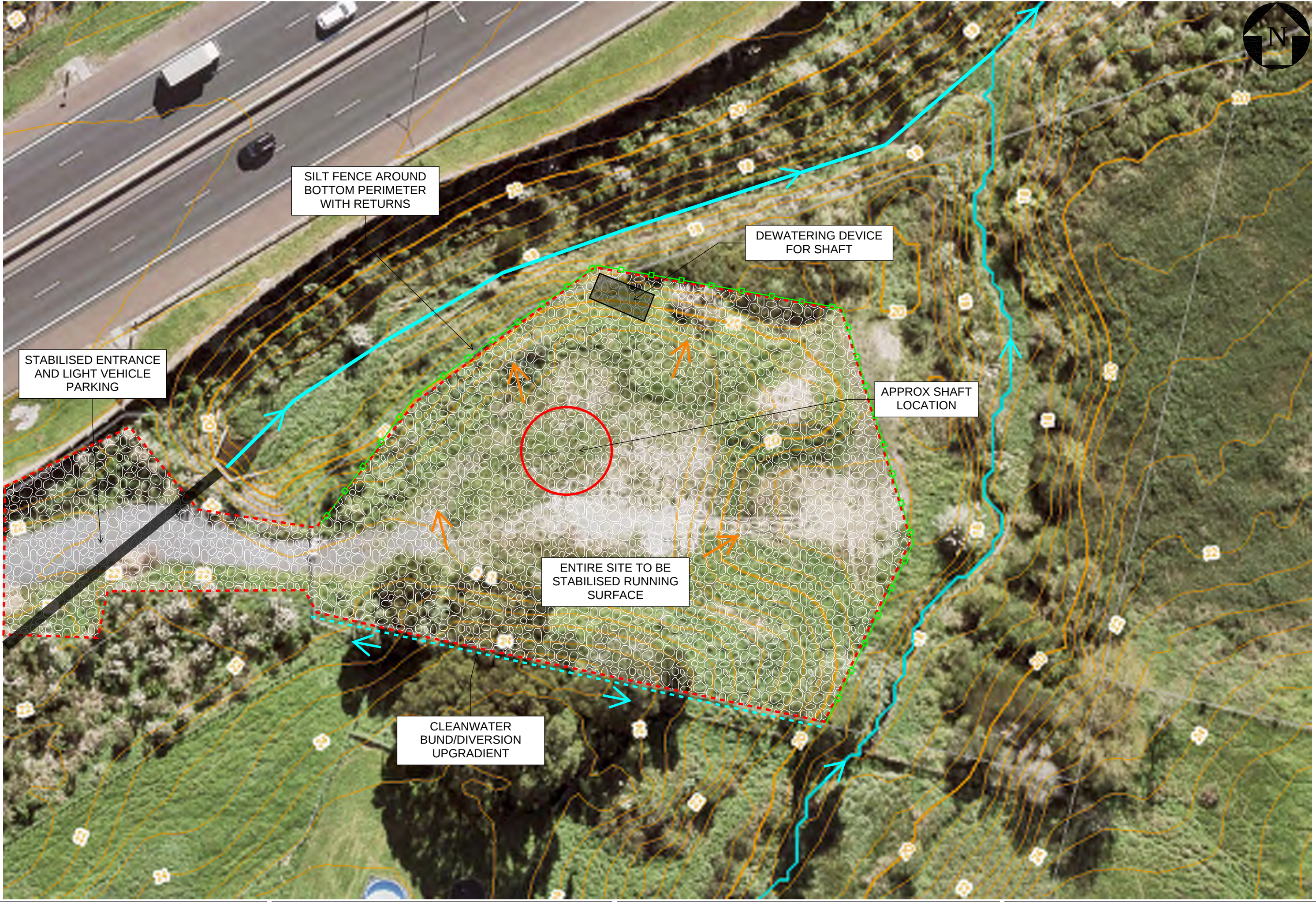
* Refer to Revision 1 for Original Signature

Client: WATERCARE SERVICES LTD

Project: WHENUAPAI - REDHILLS: PACKAGE 2

Title: DRAFT EROSION AND SEDIMENT CONTROL PLAN - BREAK PRESSURE CHAMBER AND LAYDOWN AREA

Discipline	ENVIRONMENTAL
Drawing No.	-
Rev.	-



1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date

Drawing Originator:

 **Beca**

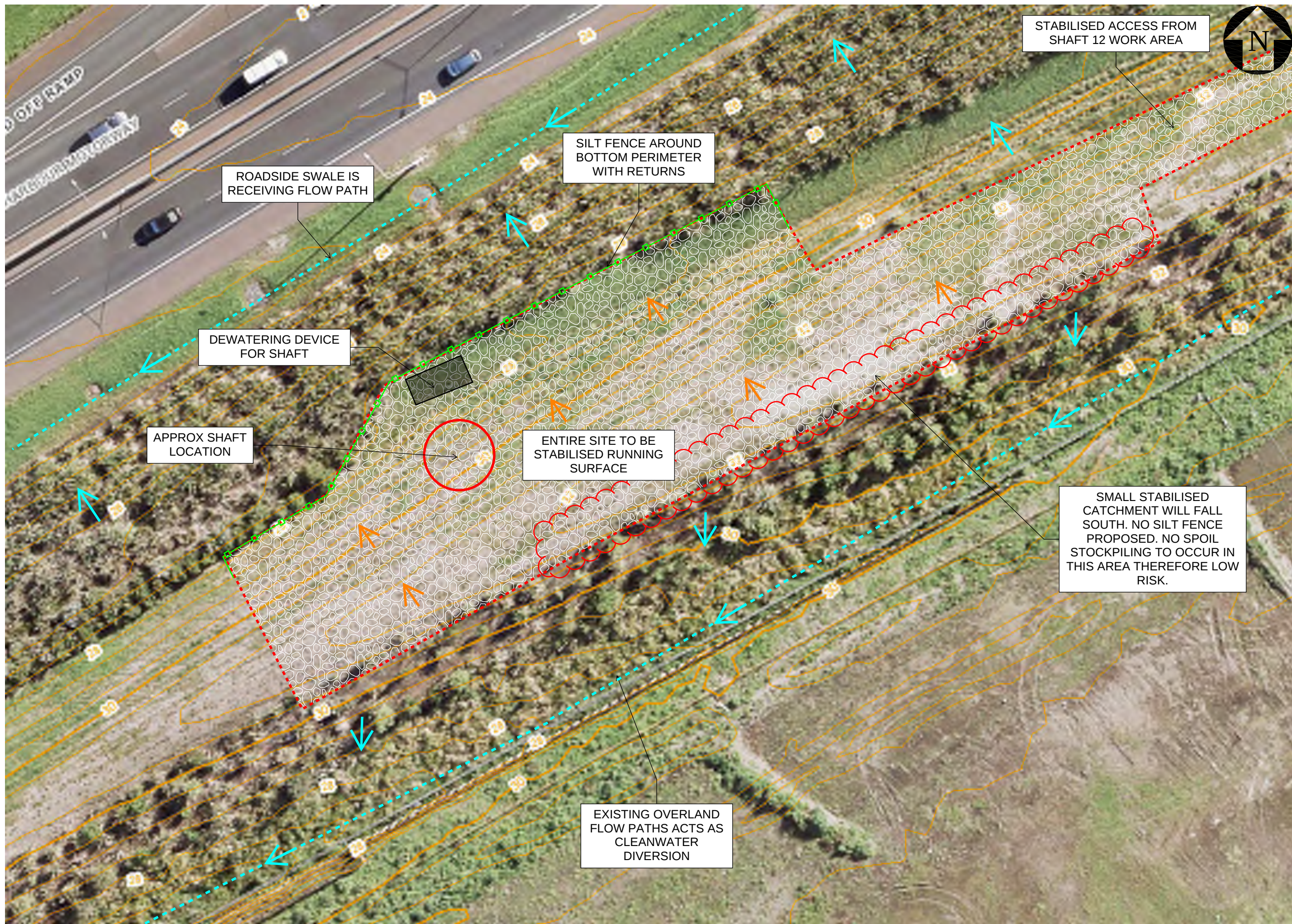
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Reduced Scale (A3)	Drawn	-	-	-
	Dwg Verifier	-	-	-
	Dwg Check	-	-	-
* Refer to Revision 1 for Original Signature				

Client: WATERCARE SERVICES LTD

Project: WHENUAPAI - REDHILLS: PACKAGE 2

Title: DRAFT EROSION AND SEDIMENT CONTROL PLAN - SHAFT 8

Discipline	ENVIRONMENTAL
Drawing No.	-
Rev.	-



ROADSIDE SWALE IS RECEIVING FLOW PATH

SILT FENCE AROUND BOTTOM PERIMETER WITH RETURNS

STABILISED ACCESS FROM SHAFT 12 WORK AREA

DEWATERING DEVICE FOR SHAFT

APPROX SHAFT LOCATION

ENTIRE SITE TO BE STABILISED RUNNING SURFACE

SMALL STABILISED CATCHMENT WILL FALL SOUTH. NO SILT FENCE PROPOSED. NO SPOIL STOCKPILING TO OCCUR IN THIS AREA THEREFORE LOW RISK.

EXISTING OVERLAND FLOW PATHS ACTS AS CLEANWATER DIVERSION

1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date

Drawing Originator:

Beca

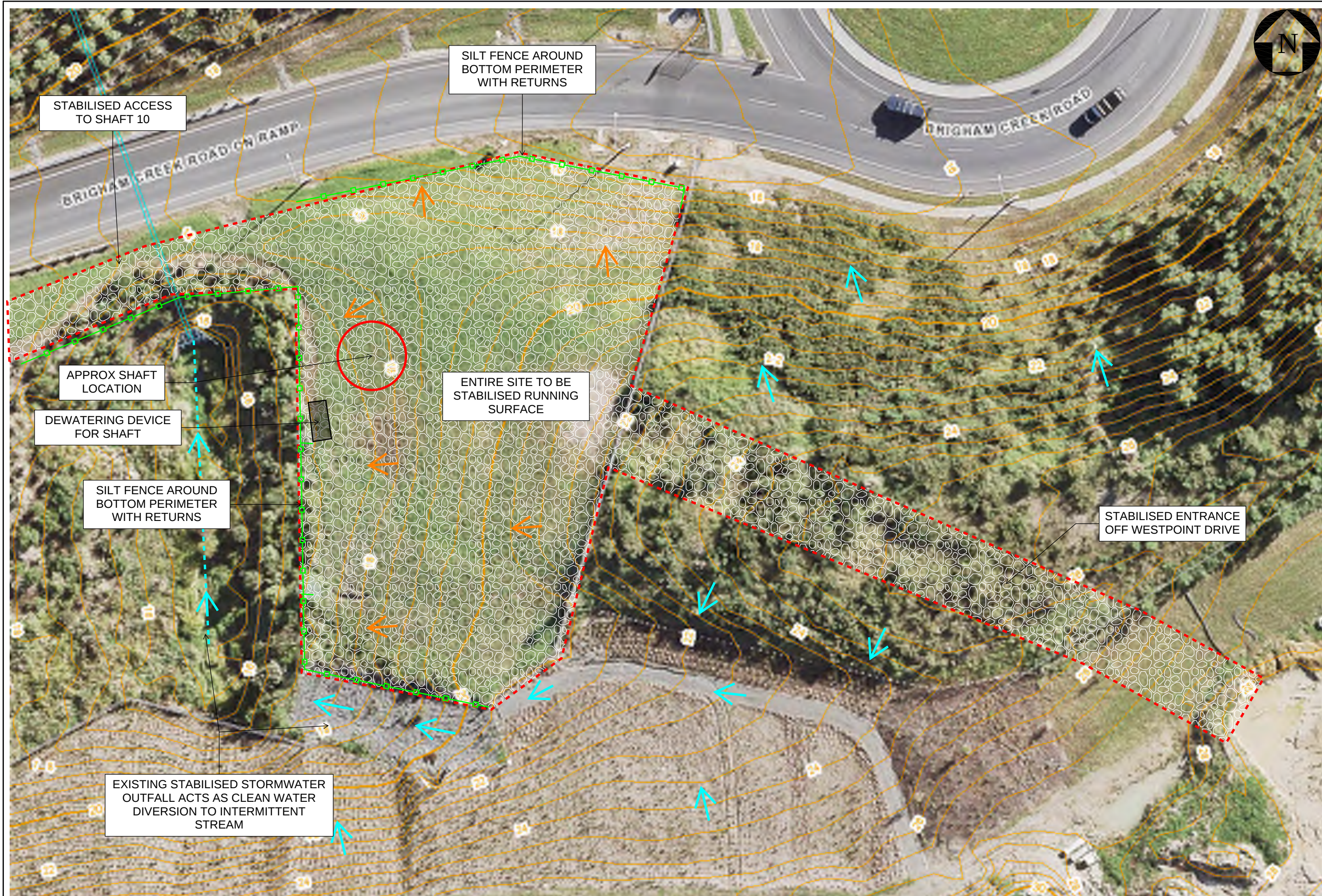
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Reduced Scale (A3)	Drawn	-	-	-
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	Dwg Check	-	-	-
* Refer to Revision 1 for Original Signature				

Client: WATERCARE SERVICES LTD

Project: WHENUAPAI - REDHILLS: PACKAGE 2

Title: DRAFT EROSION AND SEDIMENT CONTROL PLAN - SHAFT 10

Discipline	ENVIRONMENTAL
Drawing No.	-
Rev.	-



1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date

Drawing Originator:

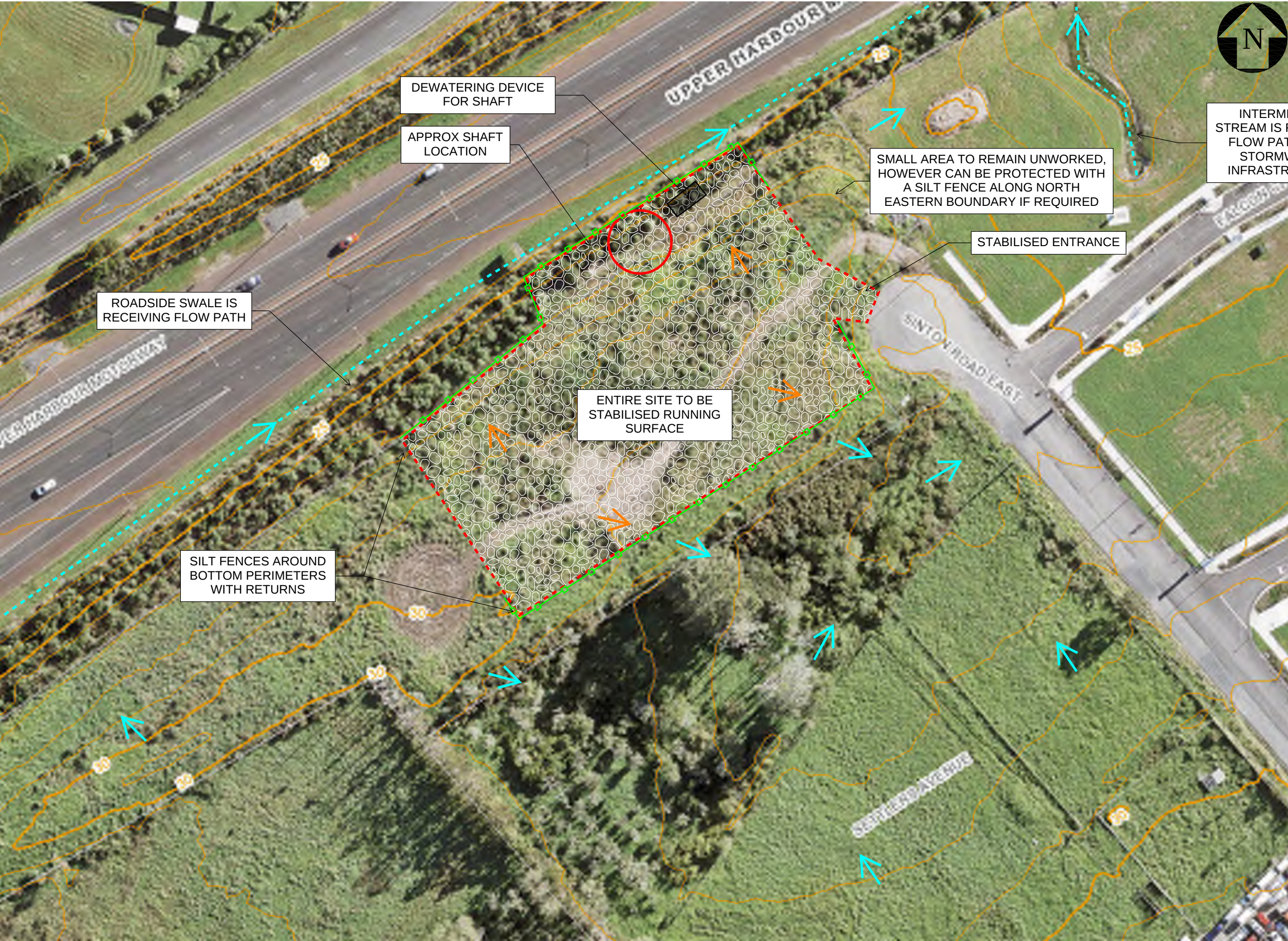
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Original Scale (A1)	Design	-	-
Reduced Scale (A3)	Drawn	-	-
	Dwg Verifier	-	-
	Dwg Check	-	-
* Refer to Revision 1 for Original Signature			

Client:	WATERCARE SERVICES LTD
Project:	WHENUAPAI - REDHILLS: PACKAGE 2

Title:	DRAFT EROSION AND SEDIMENT CONTROL PLAN - SHAFT 12
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Discipline:	ENVIRONMENTAL
Drawing No.	-
Rev.	-



1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date

Drawing Originator:

 **Beca**

Original Scale (A1)	Design	-	-	-
Reduced Scale (A3)	Drawn	-	-	-
	Dwg Verifier	-	-	-
	Dwg Check	-	-	-
* Refer to Revision 1 for Original Signature				

Client: WATERCARE SERVICES LTD

Project: WHENUAPAI - REDHILLS: PACKAGE 2

Title: DRAFT EROSION AND SEDIMENT CONTROL PLAN - SHAFT 14

Discipline	ENVIRONMENTAL
Drawing No.	-
Rev.	-



1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date

Drawing Originator:

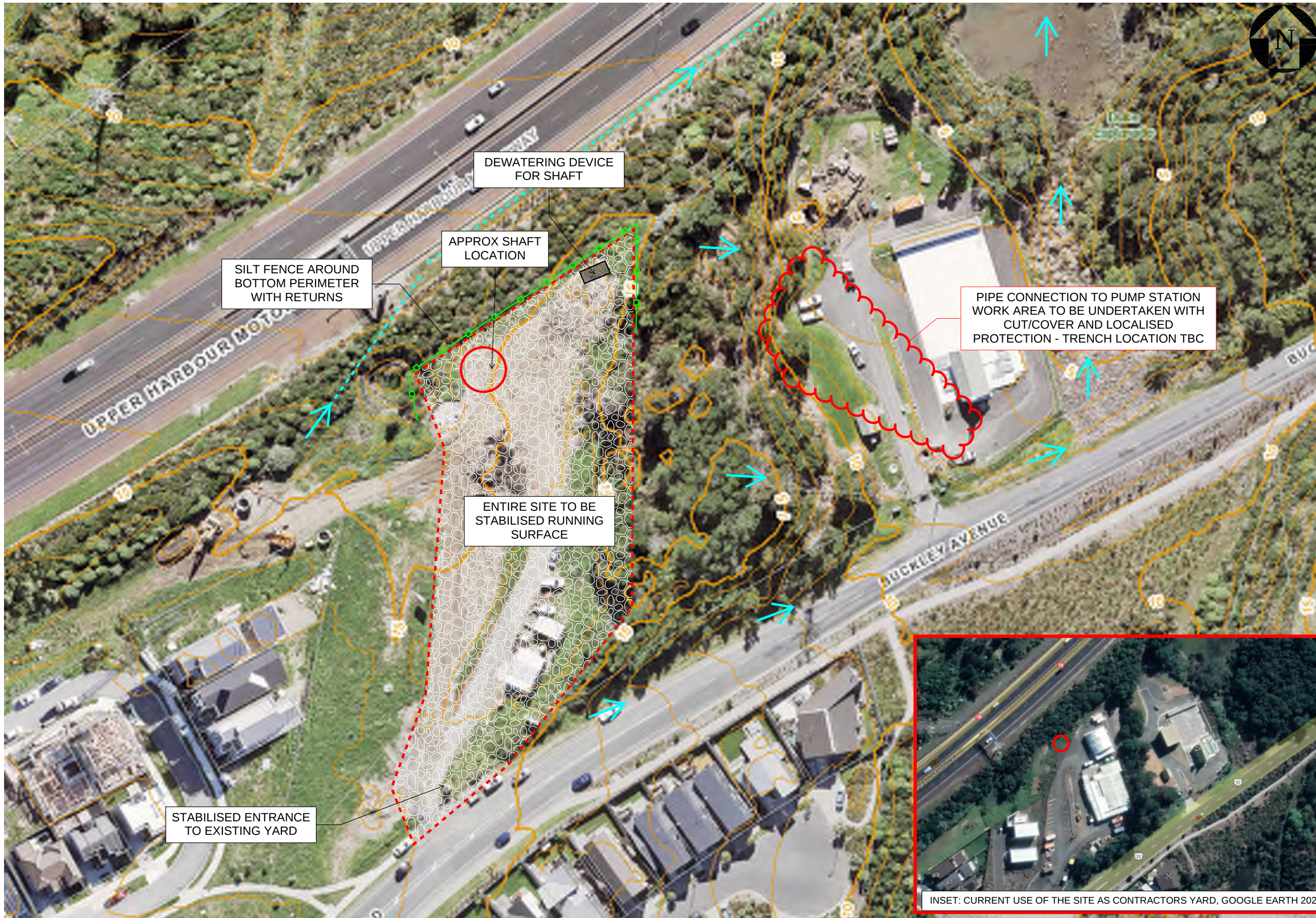
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Original Scale (A1)	Design	-	-
Reduced Scale (A3)	Drawn	-	-
	Dwg Verifier	-	-
	Dwg Check	-	-
* Refer to Revision 1 for Original Signature			

Client:	WATERCARE SERVICES LTD
Project:	WHENUAPAI - REDHILLS: PACKAGE 2

Title:	DRAFT EROSION AND SEDIMENT CONTROL PLAN - SHAFT 16
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Discipline:	ENVIRONMENTAL
Drawing No.	-
Rev.	-



INSET: CURRENT USE OF THE SITE AS CONTRACTORS YARD, GOOGLE EARTH 2022

1	DRAFT FOR RESOURCE CONSENT	AM	CB	CB	22.12.22
No.	Revision	By	Chk	Appd	Date



Original Scale (A1)	Design	-	-
Reduced Scale (A3)	Drawn	-	-
	Dwg Verifier	-	-
	Dwg Check	-	-
* Refer to Revision 1 for Original Signature			

Client: WATERCARE SERVICES LTD

Project: WHENUAPAI - REDHILLS: PACKAGE 2

Title: DRAFT EROSION AND SEDIMENT CONTROL PLAN - SHAFT 17

Discipline	ENVIRONMENTAL
Drawing No.	-
Rev.	-