Watercare Services Limited

# EROSION AND SEDIMENT CONTROL PLAN

## QUEEN STREET WASTEWATER DIVERSION PROGRAMME: PART 3 - PART 6 LINK PROJECT

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PUBLIC

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Watercare Services Limited

WSP
Auckland
Level 3 The Westhaven
100 Beaumont St
Auckland 1010, New Zealand
+64 9 355 9500
wsp.com/nz

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| Prepared by: | Bailey Sutton | 04/12/2024 |
| Reviewed by: | Rob Gordon | 04/12/2024 |
| Approved by: | Phil McFarlane | 04/12/2024 |

WSP
Auckland
Level 3 The Westhaven
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# ABBREVIATIONS AND DEFINITIONS

| | |
|---|---|
| AC | Auckland Council |
| AEE | Assessment of Environmental Effects |
| AT | Auckland Transport |
| AUP | Auckland Unitary Plan (Operative in Part) |
| CSA | Construction Support Area |
| NES | National Environmental Standard |
| NPS | National Policy Statement |
| OLFP | Overland Flow Path |
| The Project | The Part 3 – Part 6 Link Project, being the construction of a wastewater pipeline from the Part 3 Mayoral Shaft to the new Part 3 – Part 6 Marmion shaft at the intersection of Queen Street and Marmion Street. |
| TMPs | Traffic Management Plans |
| Watercare | Watercare Services Limited |
| WSP | WSP New Zealand Limited |

# EXECUTIVE SUMMARY

WSP has been engaged by Watercare Services Limited to prepare an Erosion and Sediment Control Plan (ESCP) for the Part 3-Part 6 Link project of the Queen Street Wastewater Diversion Programme. The project involves land disturbing activities and has the potential to produce some sedimentation and erosion effects on the receiving environment.

This ESCP has been developed to assist in identifying and responding to the environmental effects of the project generated by earthworks (land disturbance) at locations within the project area. The ESCP has been developed in accordance with best practice and core principles of the Auckland Council guideline GD05 - Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region. This report also highlights the minimal natural flood hazards expected on site, thereby eliminating the need for a separate Flood Hazard Assessment.

Erosion and sediment controls for the Greys Ave Construction Support Area (CSA), as well as a flood hazard assessment, are not included in this Report. Relevant information regarding the Greys Ave CSA is provided in the Queen Street Part 3 and Part 3-4 Connector resource consent applications.

Due to the minimal interaction between the P3-P6 works and flood hazards, a separate Flood Hazard Assessment is not required. Flooding risks are addressed in the technical analysis, and the proposed works do not trigger any permitted or restricted discretionary activities under the AUP.

To manage adverse effects, the main perimetral control devices being proposed during the construction works are hot mix asphalt bunds and plywood diversion bunds. Hot mix bunds are proposed upslope of the construction compound to direct clean water away from the site and into the existing stormwater network. 500mm tall plywood diversion bunds are proposed at the downslope extents of the compound to retain sediment laden water within the compound. Water accumulated within the construction compound is to be pumped into clarifying tanks and discharged off-site once sufficiently treated. Catchpit protection devices are to be installed at all catchpits within the construction compound. Erosion and sediment control devices are expected to be installed, monitored, and maintained as per GD05 guidelines.

This ESCP presents a Best Practicable Option for sediment control based on the current understanding of extent and timing of project works. The appointed contractor will customise this erosion and sediment control strategy to their own specific construction methodology, however the overall environmental outcome will not worsen.

With the application of these best practice erosion and sediment control measures, the project will minimise the erosion and sediment effects on the surrounding environment.

# 1 INTRODUCTION

## 1.1 OVERVIEW

Watercare Services Limited ('Watercare') is a lifeline utility providing water and wastewater services to a population of 1.7 million people in Auckland and Northern Waikato. Its services are vital for life, keep people safe and help communities to flourish. More specifically, Watercare is the council-controlled organisation (CCO) of Auckland Council responsible for municipal water supply and wastewater treatment within Auckland, and the provider of bulk water and wastewater services to Pokeno and Tuakau in the Waikato District.

Watercare are proposing to upgrade the existing wastewater network of the upper (southern) catchment of Auckland City Centre. The current network has insufficient capacity to meet future needs based on increased development in the area. The wider programme of works has been split into separate parts for the purpose of design, consenting and construction; the consenting and construction packages of the Queen Street programme are shown below in Figure 1-1.

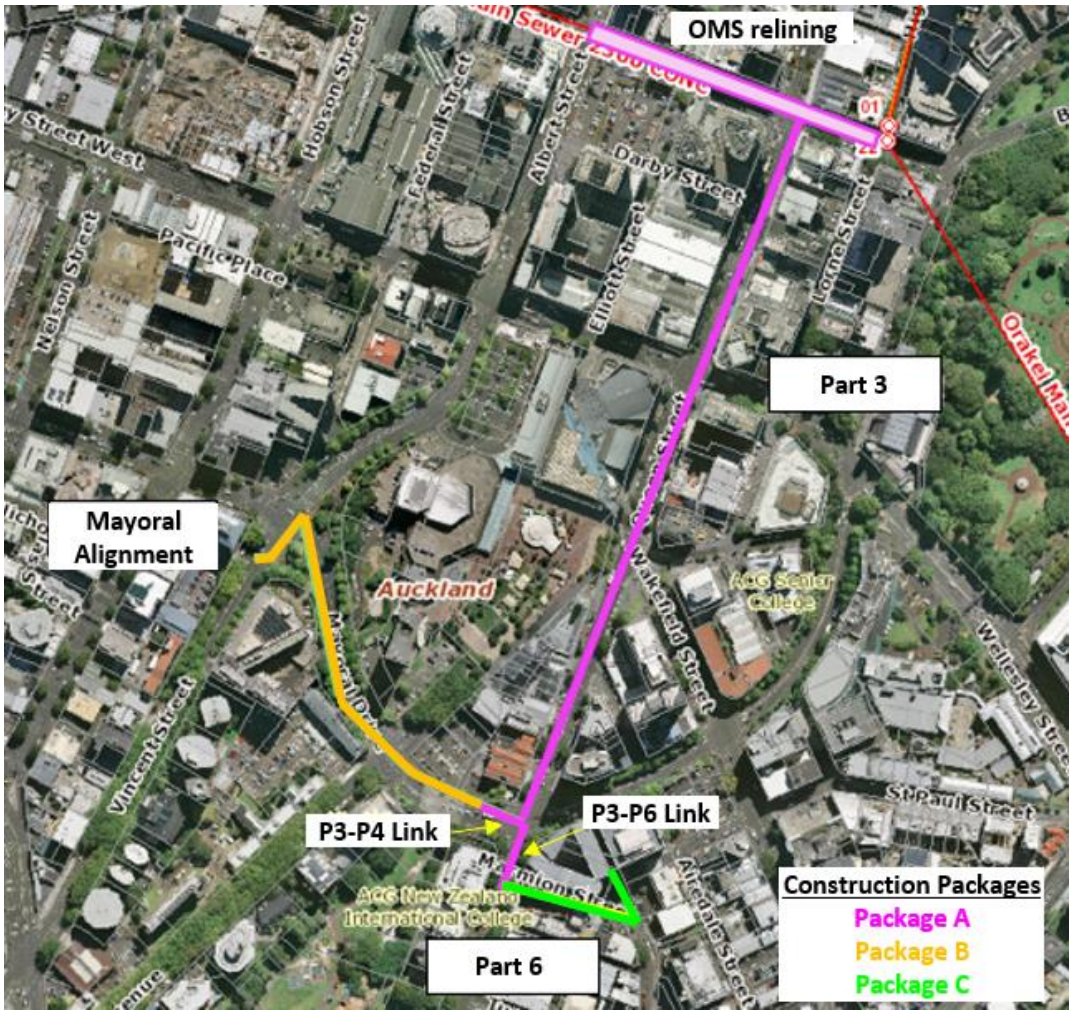


Figure 1-1: Queen Street Wastewater Diversion Programme

The Part 3 – Part 6 Link Project involved the construction of a 450 - 700 mm diameter wastewater pipeline from the Part 3 Mayoral Shaft to a new shaft at the intersection of Queen Street and Marmion Street (known as the 'Marmion Shaft').

## 1.2 CONSENTING BACKGROUND

Resource consents for two sections of the wider Queen Street Programme have already been approved by Auckland Council, being:

1) Part 3 Alignment/Resource Consent No. BUN60422974:

A 650m-long, 1200mm diameter wastewater pipeline within Queen Street between the intersections of Mayoral Drive and Victoria Street, with connections to the local network at Wellesley Street and the Orakei Main Sewer at Victoria Street. This consent was approved on the 4th of July 2024, and was amended via s127 of the RMA by BUN60422974-A on the 5th of September 2024.

2) Part 3 – Part 4 Connector Tunnel/Resource Consent No. BUN60425924:

A 43m-long, 700mm diameter tunnel between the Mayoral Drive shaft established under Part 3 and a new shaft within the Construction Support Area ('CSA') within 329 Queen Street. The tunnel will initially be utilised to provide services to the micro-TBM for Part 3 construction, and will be utilised as a permanent wastewater pipeline once Part 3 construction has been completed. This consent was approved on the 9th of July 2024.

The resource consent application for the following project is currently being prepared and is expected to be lodged with Council in April 2025:

3) Mayoral Drive Alignment (Yet to be lodged)

The Mayoral Drive alignment involves the construction of a new wastewater pipe within or adjacent to the road reserve of Mayoral Drive, between the intersection with Queen Street and Vincent Street. The works include a 375 - 700mm diameter wastewater pipeline between the Part 3-Part 4 Connector Tunnel and a new manhole within Vincent Street.

## 1.3 PURPOSE OF THIS REPORT

The purpose of this report is to provide an assessment of erosion and sediment controls required in relation to the Part 3 – Part 6 Link Project, which is not covered by the Part 3 Alignment Resource Consent (BUN60422974).

Given the negligible interaction between the P3-P6 works and the surrounding flood hazards, a separate Flood Hazard Assessment has not been prepared for this resource consent application. Flooding hazards are thoroughly addressed in the technical analysis section of this report. Furthermore, the proposed works do not trigger any of the permitted or discretionary activities specified in Chapter E36 of the AUP. More information can be found in Section 6.

This report does not cover erosion and sediment control for the Greys Ave Construction Support Area (CSA). Instead, this information is available in the resource consents for Queen Street Part 3 and Part 3/Part 4 Connector projects.

# 2 DESCRIPTION OF EXISTING ENVIRONMENT

The following provides a description of the existing environment applicable to the application.

The Project is located within Auckland City Centre, to the immediate north and south of the intersection of Queen Street and Mayoral Drive. The project alignment extends from the 'Mayoral Shaft', established under the Part 3 consent, to a new shaft opposite the intersection of Queen Street and Marmion Street, as shown below in Figure 2-1.

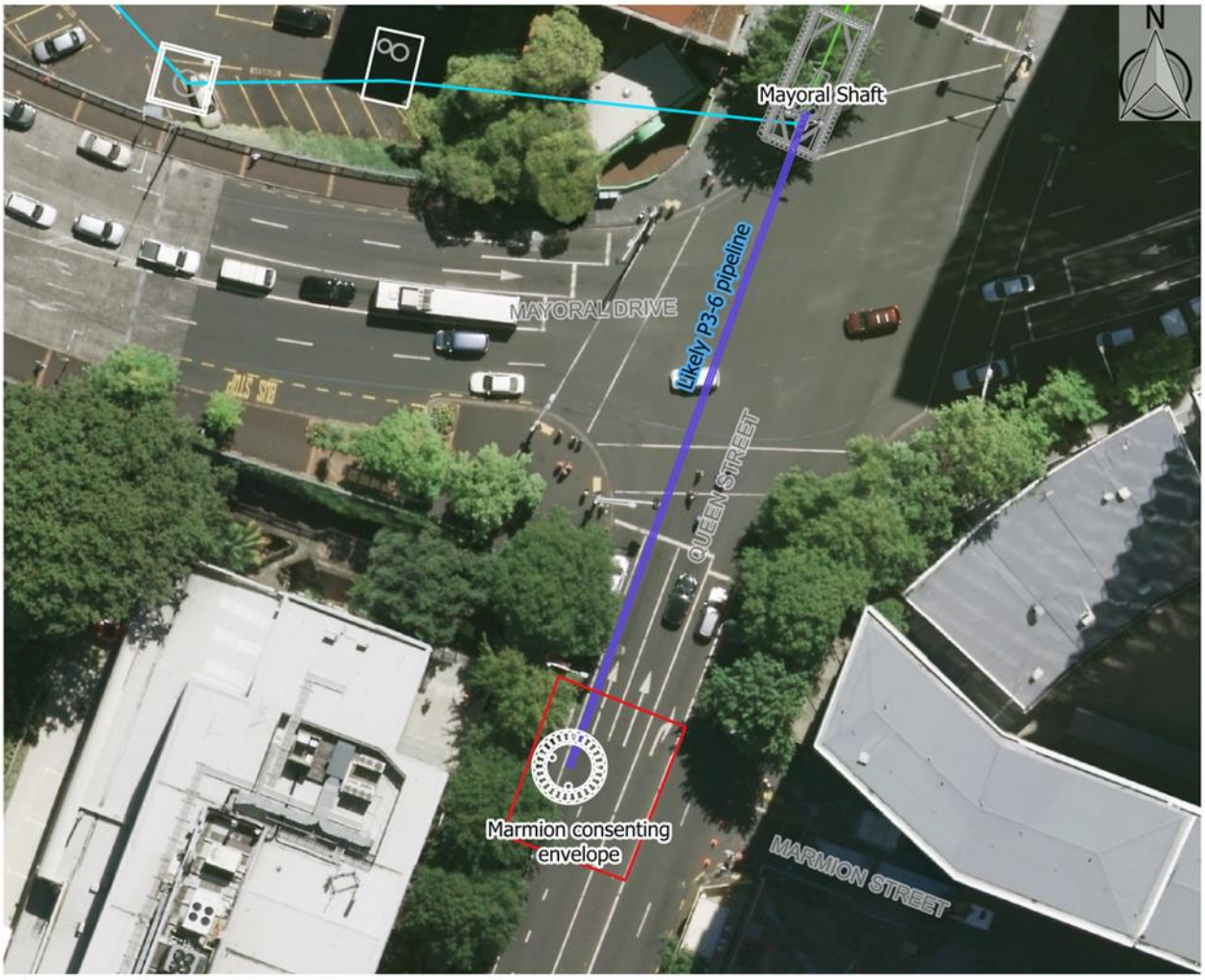


Figure 2-1: Project area

Queen Street is generally two lanes in width (following the pedestrian upgrades undertaken in 2021), with some vehicle access restrictions between Wakefield and Wellesley Street to enable priority for bus movements. Mayoral Drive is an arterial road linking Wellesley Street, Cook Street and Queen Street and is generally five lanes in width with a painted central median. Marmion Street is a one-way laneway-style street that primarily provides access to adjacent residential apartment buildings.

The land use surrounding the project area is typified by medium and high-density development containing apartments, offices, accommodation, education facilities and entertainment, with retail

predominantly occupying the ground level of most buildings. The area contains a combination of heritage and special character buildings (such as the Auckland Sunday School Union Building at 323-327 Queen Street) and modern buildings. The Auckland Civic Precinct is located a short distance to the north-west and contains a range of landmarks including Auckland Town Hall, Aotea Square, Aotea Centre and the former Civic Administration building, which has been recently renovated and converted into apartments.

# 3 NATURE OF WORK (ACTIVITIES) SUBJECT TO ASSESSMENT

## 3.1 OVERVIEW

Watercare are proposing a programme of works to upgrade the wastewater network in the upper section of Auckland City Centre to accommodate the substantial and sustained urban growth from residential, municipal and commercial development. This Project relates to the construction of a new wastewater sewer line from the existing Mayoral Shaft to a new shaft opposite the intersection of Queen Street and Marmion Street.

The Project will be constructed using a combination of trenchless pilot bore to construct the wastewater pipeline tunnel, and secant piling to construct the temporary shaft. An overview of the proposed construction activities is shown below as Figure 3-1.

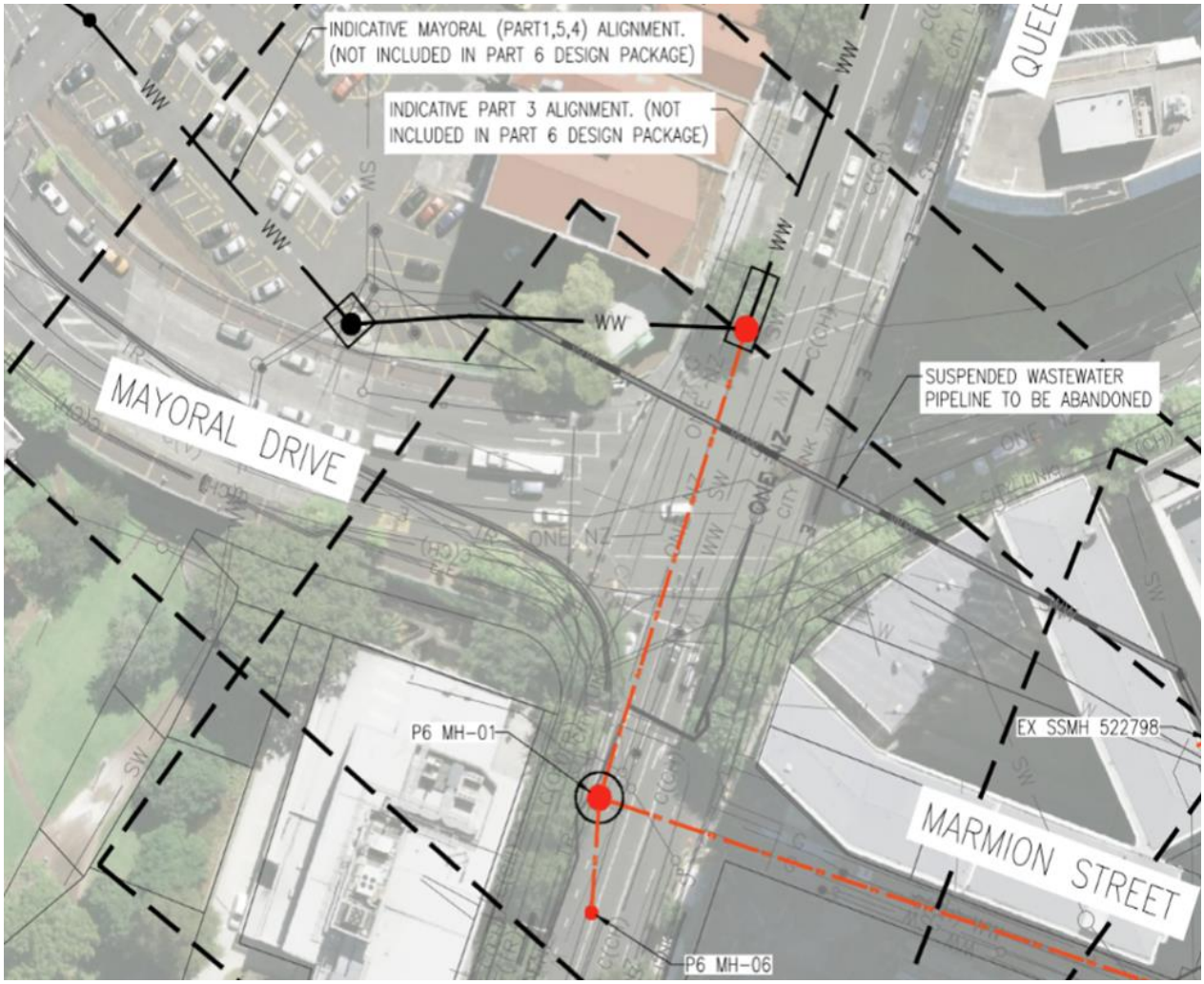


Figure 3-1: Overview of construction works

## 3.2 CONSTRUCTION HOURS AND DURATION

The anticipated construction hours are noted in Table 3-1 below.

Table 3-1: Construction hours

| | |
|---|---|
| Shaft Construction | Monday to Saturday – 0700hrs to 1800hrs<br>*Sunday and night work will only be caried out if required by traffic management restrictions or Watercare operational requirements for tie ins/ connections to existing network* |
| Tunnelling works | Monday to Saturday – 0700hrs to 1900hrs |

## 3.3 TEMPORARY CONSTRUCTION SHAFT

The temporary shaft opposite Marmion Street will be used as a reception pit for the Pilot Guided Boring Machine. The shafts outside diameter will be 6.4m constructed using 600 - 900mm piles, 200mm in-situ shotcrete lining, 4m internal diameter and will be up to 17m deep.

The shaft will be constructed as follows:

1. A concrete guide wall is excavated and formed at ground level to guide the drill rig
2. Soft piles are drilled in a hit and miss fashion to avoid damaging the adjacent pile while they are curing.
3. The missed soft piles are then constructed.
4. Hard piles are then drilled through the soft piles creating a continuous retaining wall
5. Steps 2 to 4 are repeated until all piles are constructed and there is a continuous retaining wall.

Once the shaft has been excavated to approximately 1m below the invert, a 300-500mm thick concrete plug will be poured to form the base. This plug creates a level working platform while also retaining the groundwater from below. Once the plug has been constructed the dewatering requirements will significantly reduce or stop.

The shaft will be lined using shotcrete in 2m lifts to the depth of the shaft. The shaft lining and secant piles will remain in place and form part of the permanent works.

## 3.4 TRENCHLESS TUNNELLING WORKS

The proposed wastewater pipeline will be installed using a Pilot Guided Boring Machine. This method drills a smaller diameter pilot bore from the launch pit to the reception pit; a reamer is then connected in reception pit and guided back to the launch pit. A soft pile window will be constructed on the pipe alignment at each shaft to allow the boring machine to breakthrough. A summary of the key steps of the boring machine is as follows:

### *3.4.1 PILOT BORE*

1. Set up the Guidance System in the Launch Pit
2. Place drill rig in launching pit and align rack
3. Place Drill Head on Drill Rack
4. Connect all supporting items including vacuum to carry the slurry
5. Commence pilot bore

### 3.4.2 REAMER AND PIPE INSTALLATION

1. Install pusher unit at reception pit
2. Attach the reamer to the pilot
3. Place pipe on pusher and install vacuum system through the pipe
4. Start the reamer and push pipe into bore
5. Place next pipe disconnect vacuum system and install through second pipe
6. Repeat steps 3-5 until all the pipes have reached the launch pit

## 3.5 CONSTRUCTION EQUIPMENT

The following equipment is required to construct the Project:

Table 3-2: Construction equipment required for the Project

| Secant shaft construction | Trenchless construction |
|---|---|
| CFA piling - SR-45 or SR-65 | 35-90T All Terrain / mobile crane |
| 3-35T excavators | HIAB truck |
| 6-8-wheeler trucks | Power pack container |
| 400kg plate compactor | Tool truck |
| Concrete pump | Vacuum truck |
| Concrete trucks | Axis / Pilot bore micro-tunnelling machine |
| Silenced generator | Bentonite mixing system (if required) |
| 7T vibrating drum construction roller | |
| 90T Crane | |

## 3.6 MANHOLE CONSTRUCTION AND ROAD REINSTATEMENT

A manhole will be installed in the shaft and the road surface reinstated upon completion of the shaft and tunnelling construction works.

## 3.7 NETWORK UTILITY RELOCATIONS

The existing network utilities within the carriageway of Queen Street will need to be relocated to enable construction of the Marmion Shaft. As a flexible 'consenting envelope' is being sought, the exact utilities to be diverted are yet to be confirmed, but will likely include potable water, electricity, wastewater, stormwater and communications.

Open-cut progressive trenching will be utilised to relocate any utilities that are required to be relocated. The trenches are expected to typically be between 0.4m and 2m in width and between 0.3m and 4m deep, depending on the location of the utility, and will be constructed in 3 to 10m-

long sections per day (depending on depth of trench). Once the new ducts and pipes are installed, the trenches shall be backfilled with the footpath and / or road reinstated.

Where trench works are required within the road corridor, this will involve a combination of reduced traffic lanes and full closure of traffic lanes to enable utility relocation works to be completed.

The following high-level methodology will apply to network utility relocations:

Table 3-3: High-level network utility relocation methodology

| Stage | Construction Activities | Equipment and Materials |
|---|---|---|
| Site set out | Set up traffic management and fencing. Identify and mark-out position of trenches along the affected roadway and footpath areas. | Truck, handheld service locator, spray paint |
| Pavement removal | Saw cut and remove existing pavement. | Concrete saw, handheld concrete breaker (only where necessary), 8T excavator, truck. |
| Trench construction | Expose, identify, and support existing utilities up to a 1.5m – 3m depth.<br>Trenches will be constructed to a width of approximately 1m. All spoil will be loaded onto trucks and disposed of off-site. | Hydro vac, normal excavator, truck, trench shields, air actuated compaction equipment, compressor and mobile generator. |
| Utilities installation | Once trench is at required depth, bedding will be placed in the trench, with the new utility assets installed. | Trench shield, 4 -8 wheeled truck, excavators, plate compactor, concrete trucks, asphalt paver, double drum roller, small water cart or water blaster |
| Reinstatement | Once installed, the trench will be backfilled and compacted in layers as specified. Surface is then reinstated with asphalt. Backfill material will be imported. Fill will be a mixture of cut to fill aggregate from site and imported fill.<br>Backfill may be stockpiled on site for a short period. | |

The network utilities within the Marmion Shaft's consenting envelope which may need to be relocated or protected are outlined in Table 3-4 below.

Table 3-4: Summary of potentially affected network utilities

| Asset ID | Type | Owner | Action |
|---|---|---|---|
| N/A | Electricity – 11 kV | Vector | Relocate |
| N/A | Electricity - HV | Vector | Avoid |
| Cable ID HOB-PEN-A-CBL | Electricity – LV | Transpower | Relocate |
| Manholes – IDs 2000465764, 2000308548, 2000017189 | Stormwater | Healthy Waters | Protect |
| Pipes – IDs 2000110404, 2000937040, 2000486432 | Stormwater | Healthy Waters | Protect |
| Pipes – IDs 2000277930, 2000679895 | Stormwater | Healthy Waters | Relocate |

| | | | |
|---|---|---|---|
| Pipe ID 852334 | Wastewater | Watercare | Relocate |
| Manhole ID 522814 | Wastewater | Watercare | Protect |
| Pipe ID 1650257 | Potable Water | Watercare | Relocate |
| N/A | Communications | Vector | Relocate |
| N/A | Communications | One NZ | Relocate |
| N/A | Communications | City Link | Relocate |

Due to the proximity of these services to each other, a wider trench may be necessary to divert the services in a common service trench which would be either benched or shored. This may increase the earthworks volumes described in Table 3-5 below.

## 3.8 EARTHWORKS

The following table provides an estimate of the earthworks requirements for the Project:

Table 3-5: Earthworks summary for the Project

| Activity | Area | Volume |
|---|---|---|
| Network utility relocations | 260m$^2$ | 507.5m$^3$ |
| Crane & piling platform | 216m$^2$ | 152m$^3$ |
| Shaft construction | 32m$^2$ | 544m$^3$ |
| Trenchless (pilot bore) | 46m$^2$ | 25m$^3$ |
| Total | 554m$^2$ | 1,228.5m$^3$ |

The spoil material will be drilled out using an SR-45 or SR-65 and loaded using a 20T excavator into 6-8-wheeler trucks to be carted offsite over a period of 1-2 weeks.

## 3.9 CONSTRUCTION PROGRAMME

Construction works are anticipated to commence in September 2025 and take approximately 8 – 11 months. The estimated construction timeframe for each key activity is detailed below in Table 3-6.

Table 3-6: Estimated construction activity durations

| Activity | Timeframe |
|---|---|
| Compound / traffic management set up | 13 days |
| Network utility relocations | 3 – 6 months |
| Shaft construction | 70 days, of which dewatering is required for 50 days |
| Tunnel construction | 15 days |

| | |
|---|---|
| Manhole construction[1] | 30 days |
| Road reinstatement | 10 days |

## 3.10 CONSTRUCTION SUPPORT AREA AND COMPOUND

To support the proposed construction activities, a CSA within the public carpark at 34-38 Greys Avenue and 329 Queen Street will be required. This CSA has been initially established to support the Part 3 Alignment and Part 3 – Part 4 Connector Tunnel projects.

The CSA contains site offices and welfare facilities, along with some limited site laydown and materials storage areas. Note however that most excavated materials will be immediately removed from site, while construction materials (such as pipes and aggregates) will be delivered to site on a 'just in time' basis.

The site layout for the Greys Avenue CSA (as approved in the Part 3 consent) is shown below in Figure 3-2.

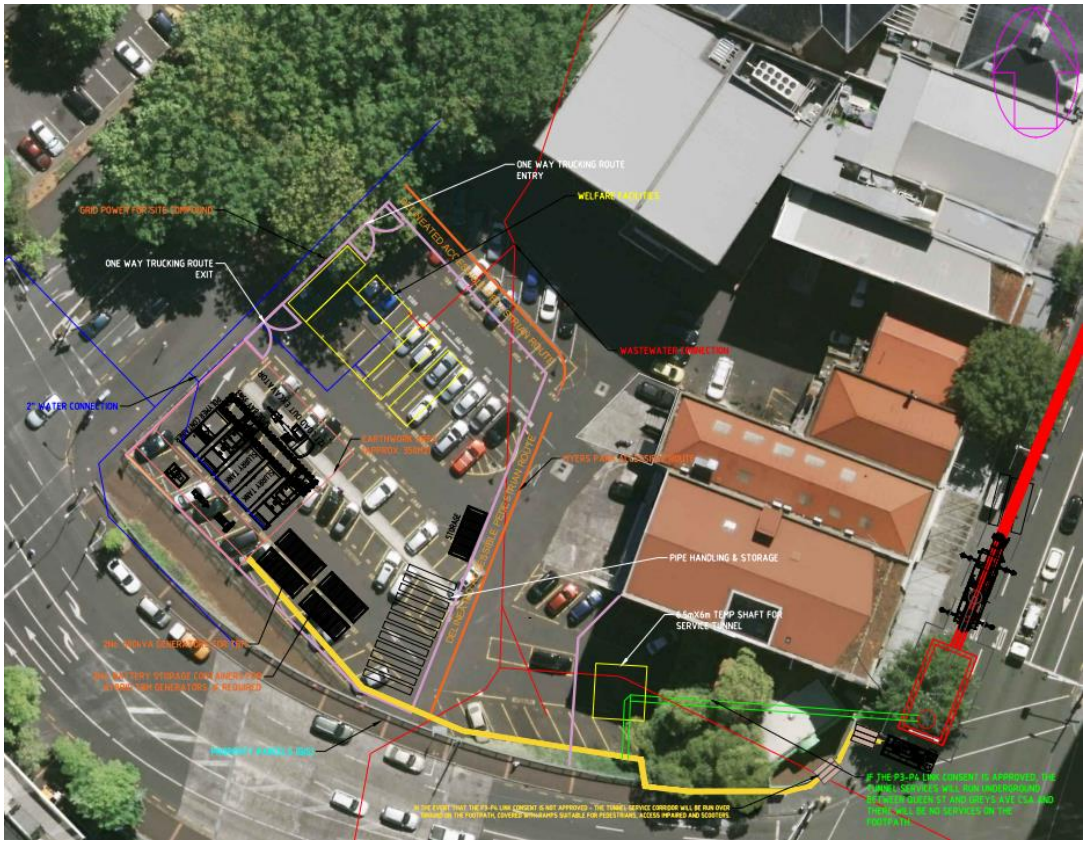


Figure 3-2: Greys Avenue CSA Layout

A 45m long by 11m wide compound will be set up around the Marmion Shaft to allow for the construction of the shaft and the tunnelling operations. The compound will make use of temporary concrete or steel barriers with hoardings around the perimeter of each, with access gates one or both ends.

[1] Manhole construction may be completed at a later date

Figure 3-3 below shows the consenting envelope for the proposed Marmion Shaft (red box). The construction compound for the shaft, defined by the pink lines for the hoarding and traffic barrier, will move with the shaft as drawn below, and will be finalised in the Construction Management Plan to be prepared by FH.

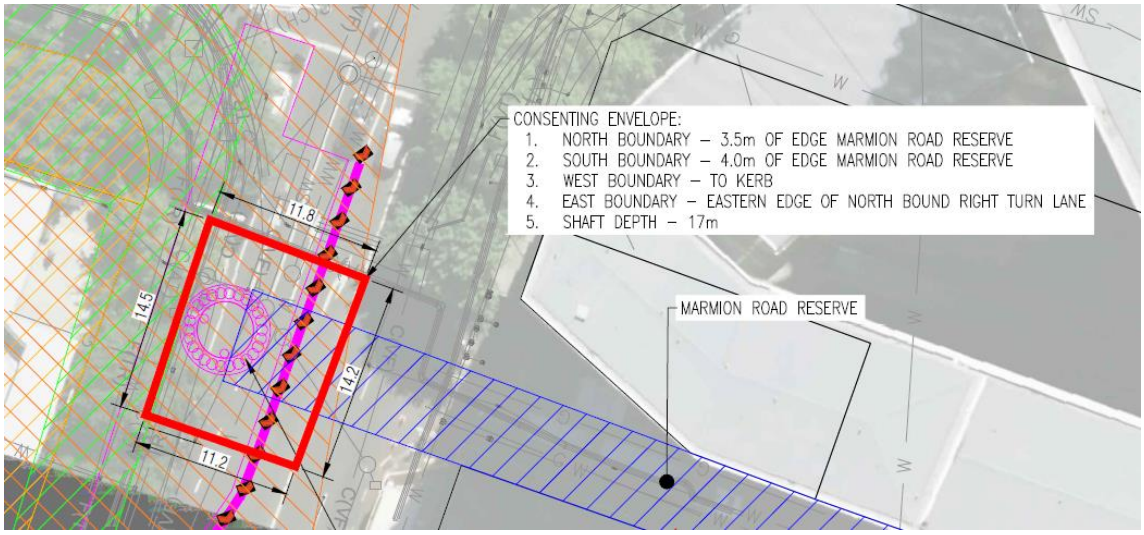


Figure 3-3: Shaft footprint and indicative compound

# 4 ASSESSMENT METHODOLOGY

The purpose of the ESCP is to outline potential environmental effects, and to suggest the most appropriate mitigation measures. The Auckland Unitary Plan (AUP), Chapters E11 and E12, recognise that it is not feasible to prevent all discharges of sediment, and requires the application of a Best Practicable Option (BPO) approach. It further defines best practice as compliance with Auckland Council guideline GD05 - Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, or alternative equivalent.

The ten fundamental principles of erosion and sediment control listed under Auckland Council guideline GD05 are as follow:

- *Minimise disturbance by retaining existing environmental values and minimising earthworks.*
- *Stage construction to minimise the extent of land disturbance at a given time.*
- *Protect steep slopes.*
- *Protect receiving environments. Locate and map out all existing watercourses on the plan.*
- *Fully stabilise disturbed soils and exposed earthworks areas with vegetation rapidly after each stage and at specific milestones within stages.*
- *Install perimeter controls to retain dirty water within the site and keep clean water out of the working site.*
- *Employ sediment retention devices to collect and treat sediment-laden water to protect surrounding watercourses.*
- *Engage trained and experienced staff when implementing erosion and sediment controls.*
- *The erosion sediment control must adapt to the site's changing needs as the project progresses.*
- *Inspect, monitor, and maintain the operation of erosion and sediment control measures.*

These best practice principles have informed the ESC strategy presented on the following pages.

# 5 TECHNICAL ANALYSIS

The Universal Soil Loss Equation is not suited to quantifying the sediment yield from the discrete Queen Street site, and there is no readily available alternative form of analysis that might be used. Therefore, the erosion and sediment control analysis has largely been qualitative, focusing on whether applied erosion and sediment control represents a suitable Best Practicable Option.

The receiving environment is the upper Waitemata Harbour, where sediment mainly enters through the stormwater system. There are no natural watercourses in or downstream of the project area.

Currently, the work area is developed, almost entirely impervious, and fully stabilised from an earthworks perspective. While other contaminants from human activities, such as hydrocarbons and heavy metals, are present, these are outside the scope and purpose of the Erosion and Sediment Control Plan (ESCP).

Project works include one shaft construction site where earth will be exposed. The greatest risk involves the exposed earth at surface level, with excavators or vehicles transporting excavated spoil around and beyond the work site. Spoil within the excavated shaft does not cause much concern as the only way this can reach the surface is by being pumped out (assuming extreme event flows are suitably managed).

The construction site compound consists of a perimetral boundary and an indicative shaft area. Based on Auckland's GeoMaps, there appears to be minimal local flood hazards in the compound's vicinity. The site is not within any mapped floodplains, and there appears to be one minor OLFP passing through the south-western corner of the compound. This is likely to be diverted down the road corridor via the implemented hot mix bunds. GeoMaps shows existing 10- and 100-year flow path flow rates of 0.173 $m^3/s$ and 0.275 $m^3/s$. A relationship between the 10, 20 and 100-year rainfall intensities of the site were obtained from HIRDS-v4 and used to interpolate the 10-minute, 20-year clean water flow rate that would need to be diverted around the site. This flow rate was 203 L/s which can easily be accommodated using a hot-mix bund only 50mm above ground. Generally, a taller bund would be better suited, but providing the 300mm freeboard stipulated in Auckland Council's GD05 Erosion and Sediment Control Guide is considered to be excessively cautious in this context.


Figure 5-1: Site compound interaction with surrounding flood hazards

Sediment laden flows are the primary concern regarding the receiving environment. Through the application of best erosion and sediment control (ESC) practice described in this document, the residual environmental effects of the project works will be acceptably low or negligible.

# 6 CONSENT RULES TRIGGERED

## 6.1 AUCKLAND UNITARY PLAN (AUP) – CHAPTER E36 NATURAL HAZARDS

The following permitted activity is relevant to the proposed works:

*E36.4.1 (A54)*
*Infrastructure within roads or the Strategic Transport Corridor Zone:*
- *in overland flow paths*

There are no permitted standards to comply with for activity (A54). Therefore, the works can be undertaken as a permitted activity.

# 7 MITIGATION MEASURES

The following erosion and sediments controls are proposed to prevent clean water from entering the site and to retain and treat sediment laden runoff within the site for treatment. The devices described must be monitored during construction and adapted to suit the specific conditions as required.

Appendix A shows the indicative layout of the proposed controls. The appointed contractor is expected to refine this strategy into a more detailed ESCP based on their own specific construction methodology and work sequencing and to submit their ESCP to Council for approval.

## 7.1 EROSION AND SEDIMENT CONTROL MEASURES

### *7.1.1 CLEAN WATER DIVERSION*

Hot mix asphalt bunds are to be constructed around the upstream perimeter of the proposed Marmion Shaft construction compound. The role of these devices is to direct clean water, including flow from major storms of up to 20 years' Average Recurrence Interval (ARI), away from the construction site and into existing street catchpits and stormwater channels downslope of the site.

Hot mix bunds are to be constructed along the southern and western side construction compound.

Any stormwater downpipes running down the walls of surrounding buildings and discharging near the area of works should be diverted to a suitable discharge location. The method of diversion is for the appointed contractor to decide as BPO.

Hot mix bunds must be installed prior to the excavation works at the construction compound.

### *7.1.2 DIRTY WATER DIVERSION*

Dirty water is intended to be retained within the site using 500mm plywood diversion bunds surrounding the construction compound. Dirty water is to be treated and disposed of using the appointed contractor's on-site disposal method; for treatment we have specified Lamella clarifiers. Additional freeboard will be provided at the downslope bunds of the site to retain dirty water up to the 5% annual exceedance probability (AEP) storm. This is also the location where dirty water is pumped out of the Marmion Shaft, as per the dewatering scheme.

Catchpit protection devices are to be installed only within the confines of the construction compound.

### *7.1.3 STABILISED ENTRANCES*

The access points and entrances to the construction compound will be adequately stabilised in accordance with GD05. In general, this will involve retaining the existing sealed surface or installing hardfill. Appropriate stabilisation of entrances and access paths will prevent these locations from becoming sources of sediment, minimise dust generation, and minimise disturbance to surrounding areas.

### 7.1.4 CONSTRUCTION DISCHARGE LOCATIONS

Sediment laden water collected within the compound is to be treated and discharged off site or as per the recommendations outlined in the Dewatering Assessment Report (Appendix D of the resource consent application). Silt socks will be installed around all existing catchpits near the site before the commencement of works in any of the site. Inlets downstream of the construction compound will also receive sediment filter protection as a precaution. These measures will prevent residual sediments from entering the surrounding stormwater network.

## 7.2 DEWATERING

Low-lying sections or excavations within the construction compound may be inundated after a severe rainfall event. The following steps will be undertaken when dewatering is required subject to ground investigations:

- Water to be removed using a 50-to-100mm submersible pump
- Generator to run continuously while the trench is open, subject to water ingress
- Lay flat hose to be used to remove water
- Water will be pumped into clarifying tanks/containers for treatment
- Water to be discharged directly to an approved offsite location after being treated to a minimum clarity of 100mm.

## 7.3 HEAVY RAINFALL RESPONSE AND CONTINGENCY MEASURES

Heavy rainfall events have the potential to damage or displace erosion and sediment controls and result in uncontrolled sediment discharge. As a minimum, the appointed contractor must monitor weather patterns on the site daily and ensure the erosion and sediment control devices are fit for purpose before and during any forecast rainfall event. Notwithstanding this, the selected ESC devices and methods (hot mix bunds, plywood bunds) are not generally vulnerable to weather events.

In general, the appointed contractor must:

- Monitor weather forecasts regularly to assess the risks and amend erosion and sediment controls to suit weather conditions
- Inspect controls after heavy rainfall and repair any damage immediately
- Report heavy rainfall incidents and liaise with Auckland Council as part of routine reporting
- Report any serious incidents within 24 hours. In the worst event and if the shaft is expected to flood, contain the silty water on site until it can be pumped out and processed after the event.

## 7.4 MONITORING AND MAINTENANCE

GD05 provides indicative methods for ESC device maintenance. As a minimum, it is recommended that each device is inspected once a week, and after every rainfall event for correct operation. It is also recommended to remove accumulated sediment in the devices regularly and

to clearly identify sediment disposal locations. Any damage to devices must be immediately remediated. The contractor is expected to have a trained environmental manager to supervise the sediment controls. The contractor must also keep all records of inspection and provide related reports at the request of the Engineer.  Table 7-1 highlights the key device-specific maintenance procedures.

Table 7-1 - Indicative Maintenance Procedures

| Erosion and Sediment Control Measure | Indicative Maintenance Procedure | Frequency |
|---|---|---|
| Hot mix bunds and plywood diversion bunds | — Inspect for water ponding and blockages. Reinstate if damaged.<br>— Inspect inverts and outlets for any signs of scour and erosion.<br>— Maintain full stabilisation cover and reinstate as necessary.<br>— Remove sediment deposited around the bunds to avoid overtopping due to lack of freeboard. | Weekly and after every rainfall event. |
| Stabilised construction entrances | — Inspect daily and after each rainfall maintain as required to preserve function.<br>— Pick up droppings and sweep surface regularly.<br>— Re-construct or re-surface construction entrance if it becomes ineffective through surface contamination. | Daily and after every rainfall event. |

# 8 CONCLUSION AND RECOMMENDATIONS

The Queen Street Wastewater Diversion Project – Part 3 to Part 6 Link project has the potential to create some sedimentation and erosion effects on the receiving environment. Provided the control measures are implemented as per this Report, and noting that works can be undertaken as a permitted activity, the Project will have a less than minor effect on the environment.

Within the construction compound, control measures such as hot mix bunds, plywood diversion bunds, catchpit protection devices, and lamella tanks will be implemented to manage erosion and sediment discharge. If the hot mix bunds and plywood diversion bunds are positioned to separate clean water from dirty water such that no clean water enters the site and no dirty water is allowed to exit the site, minimal sediment is anticipated to flow downstream, greatly reducing the risk of adverse environmental impacts. Dirty water is not to be tracked by vehicles leaving the site and allowed to enter the downstream stormwater system. Catchpit protection will be installed at all on-site stormwater inlets, and contingency measures will be in place to ensure the site is stable during large storm events.

This provisional ESCP is expected to be adopted and developed further by the appointed contractor. Any developments on the controls listed on this plan must align with the principles and guidelines provided by Auckland Council's GD05 and deliver environmental outcomes equivalent to those described in this plan.

# 9 LIMITATIONS

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# APPENDIX A – ESCP