BLACKPOOL STORMWATER IMPROVEMENTS – STAGE 1

Construction Methodology

Healthy Waters

Design Office

Project	Blackpool Stormwater Improvements – Stage 1
Document	Construction Methodology

Issue and Revision Record

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Author and Designer	Jesse Peeters Senior Stormwater Specialist
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1. Introduction and Background

Auckland Council Healthy Waters are planning to make improvements to the stormwater network in the Blackpool Catchment on Waiheke Island as the existing stormwater network is undersized and the area is subject to flooding, as shown in Figure 1 below.

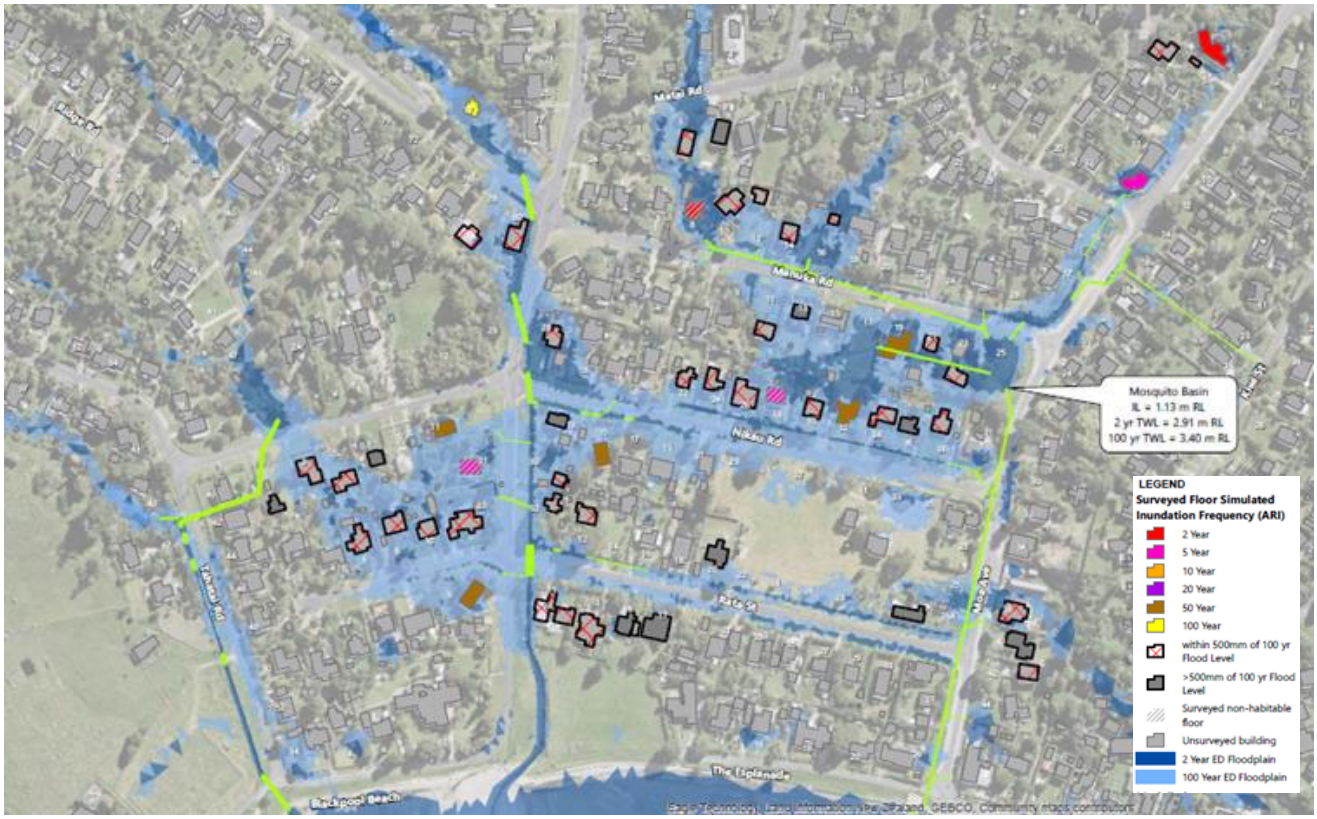


Figure 1 Existing floodplain

1.1. Existing flooding issues

Residents in the Blackpool catchment have expressed significant concern with stormwater management in the area, with flooding issues ranging from frequent nuisance flooding during small storm events to major but less frequent high intensity rainfall events and significant flooding of the road. Following significant storm events in March and April 2017, approximately 33 flooding issues were reported in the Moa Avenue study area, mainly from houses in low-lying areas of Moa Avenue, Nikau Road and Manuka Road.

Further flooding has occurred in subsequent rainfall events and regular complaints are made by the community.

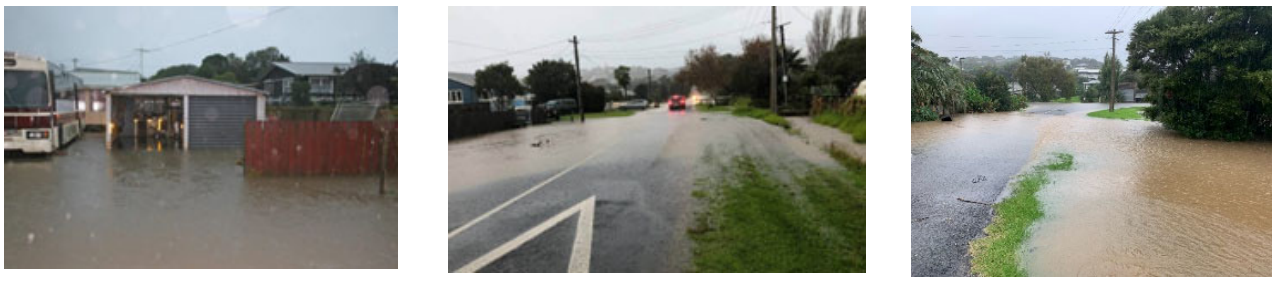


Figure 2 Photos of flooding

There is a lack of piped infrastructure from the upper catchment (i.e. north of Manuka Road) into the lower catchment (i.e. south of Manuka Road). Hence, flows from the upper catchment valleys cannot be adequately drained to the receiving environment. Consequently, stormwater ponds at low points at the bottom of the valleys and thereafter travels as overland flow across the lower catchment area to the sea.

The stormwater road culverts, open channels and driveway culverts are undersized and have very limited capacity, typically <1 year ARI event. Due to the low-lying nature of the lower catchment area, performance of the existing stormwater system is also sensitive to tidal conditions. When storm events coincide with a high tide, increased flood levels occur.

1.2. Previous work completed

An engineering solution is required to provide sufficient conveyance capacity to reduce flood risks. Multiple options were considered and modelled to determine the optimal solution for the catchment. Further details on the options considered is available in the *Blackpool, Waiheke Island Stormwater Options Update 2023 (HAL, 2023).*

A staged approach is therefore likely to be required, starting from the downstream end of the catchment, and making improvements working upstream.

1.3. Staging of catchment work

It is envisaged that the catchment improvements will be undertaken in stages, allowing the improvements to commence from the downstream part of the catchment to ensure no adverse effects are made to the properties in the downstream area from upstream upgrades. The indicative staging of the project is shown in Figure X below

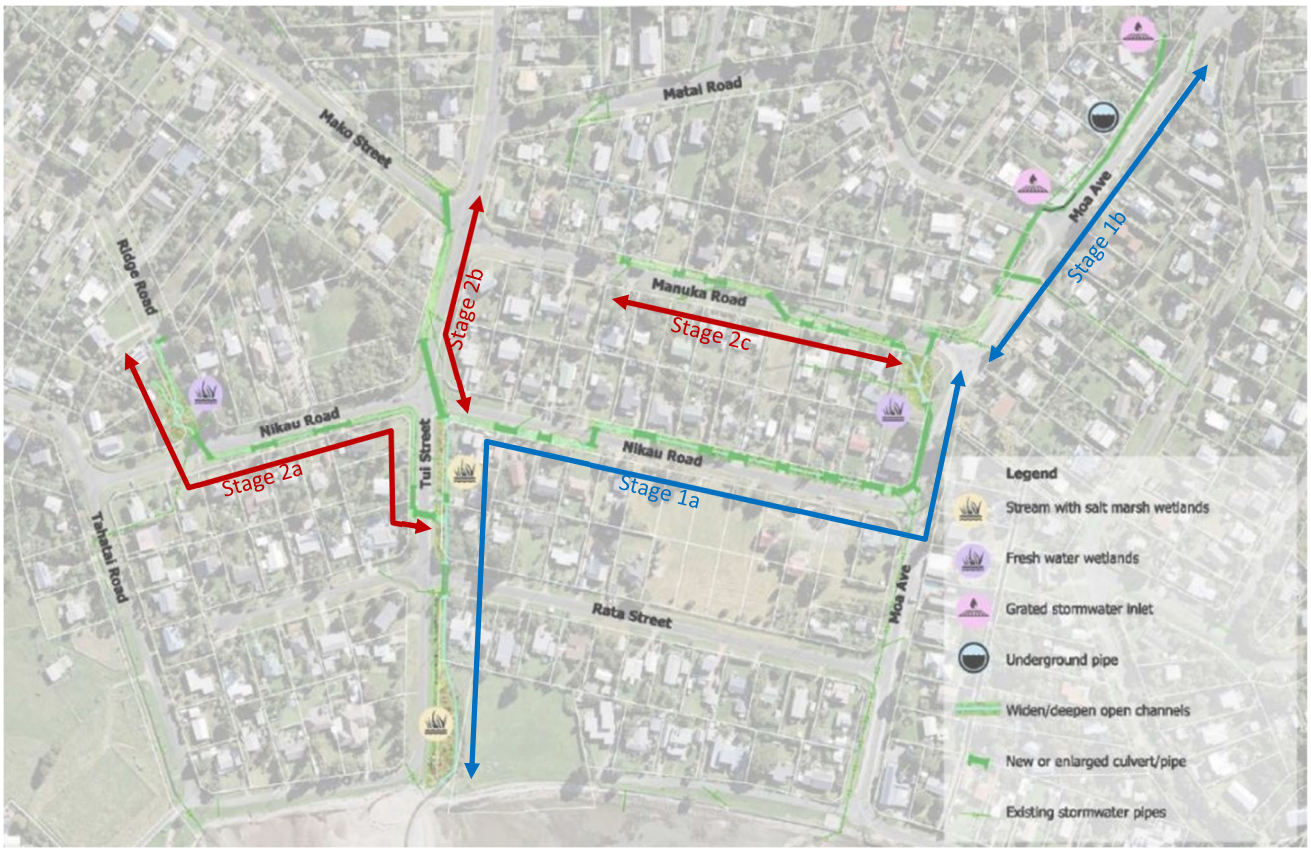


Figure 3 Catchment staging

1.4. Purpose

The purpose of this report is to document the options considered for the catchment, and the design of the preferred option for Stage 1 of the work..

2. Site information

2.1. Catchment

The catchment of interest is approximately 62 hectares in size and discharges to the coast via the open waterway (Te Huruhi Stream) which runs alongside Tui Street, Blackpool. The alignment of overland flowpaths is shown in Figure 4.

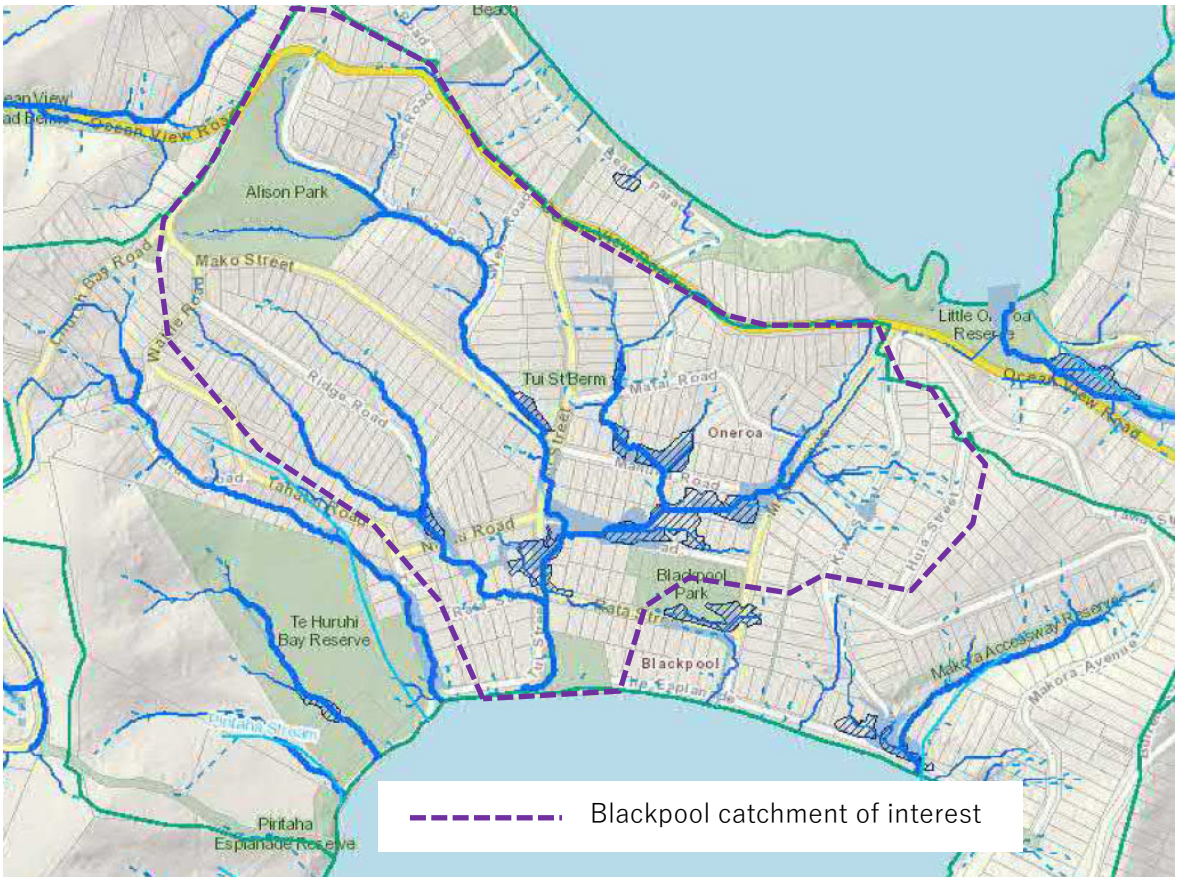


Figure 4 Overland flowpaths

2.2. Hydrological and hydraulic modelling

Hydrological modelling has been carried out for the catchment following the guidelines outlined in the ARC Technical Publication No. 108 (TP108, 1999), with MPD assumptions as outlined in the Hauraki Gulf District Plan. A 2D model was prepared due to the wide floodplain and variable flow directions within the catchment. Further information regarding the catchment modelling including impervious area assumptions, rainfall assumptions, asset data, topographical information and other model inputs is available in the *Blackpool, Waiheke Island Model Build and System Performance Report (HAL, 2019)*.

2.3. Existing services

2.3.1 Stormwater

The existing stormwater network in the area consists of a mixture of open waterways, road culverts, driveway culverts and pipe networks. Runoff from roads typically drains to open channels as sheet flow from the paved road surface.

There is a 600mm pipe network under Manuka Road with a number of field catchpits which collect water from the grass berm area, and helps to drain low points, however the pipe is undersized and is unable to convey large storm flows.

There is a 600mm pipe network under Moa Ave which drains Waeroa Reserve and some field catchpits which collect water from the grass berm areas of the road, however the pipe is undersized and is unable to convey large storm flows.

There is a 750mm and 900mm pipe which drains the wetland area at the intersection of Nikau Road and Ridge Road and discharges to the open channel on Tahatai Road. This pipe is undersized and is untable to convey large storm flows.

The remainder of the catchment is typically serviced by informal open channels in the road berms and within private property which receive surface water runoff. These channels are very flat, narrow and not sufficiently sized to convey large storm flows, therefore there is significant flooding in the catchment, particularly at low points.

2.3.2 Wastewater

There is no public wastewater infrastructure servicing the catchment. Properties are serviced by private onsite wastewater treatment plants, typically with disposal of treated effluent to land within the private property boundaries. The majority of grassed areas in private properties are utilized as treated effluent land application areas, often with minimal separation from open waterways and overland flowpaths.

2.3.3 Water Supply

There is no public water supply infrastructure servicing the catchment. Properties are typically serviced by private rainwater collection (rain tanks) and/or groundwater bores treated with cartridge filters and UV disinfection.

2.3.4 Power and comms

There is overhead powerlines along most of the roads with power poles located typically in the grassed road berm. Poles also include communications cables.

There are also some buried underground comms cables and power cables in some areas.

2.3.5 Transport

Roads in the catchment are sealed, low speed roads. There are very few footpaths in the catchment and the berm is typically a grassed verge, with some swales and/or stormwater channels as described above. Private vehicle crossings are a mixture of concrete driveways, gravel driveways and informal grassed

driveways. Some vehicle crossings include stormwater culverts or bridges over the existing open channels.

2.3.6 Open waterways

Tui Street (beach outlet to 11 Rata St): There is a permanent stream channel (Te Huruhi Stream) with wetland riverine margins which runs along the eastern berm of Tui Street. This is the primary stormwater conveyance network for this area which receives sheet flow runoff from the road and surrounding area.

Figure 5 Tui St (beach outlet to 11 Rata St) photo

Tui Street (11 Rata St to Rata St Intersection): Te Huruhi Stream runs through the private property of 11 Rata Street where it has been highly modified with a concrete base lining and riprap installed on the sides.

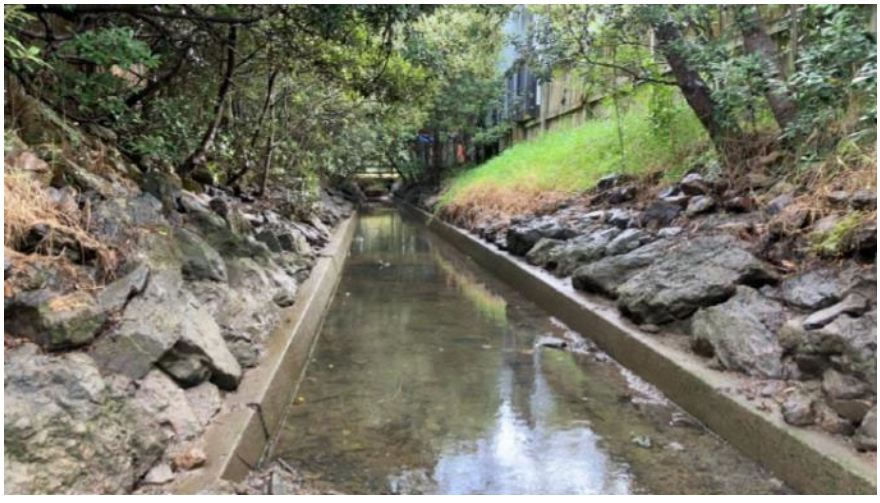


Figure 6 Tui St (11 Rata St to Rata St Intersection) photo

Tui St (Rata St to Nikau Rd): Te Huruhi Stream runs through private properties 32 Tui St, 30 Tui St and 13 Nikau Rd close to the grassed road berm. The stream is steeply incised and has low ecological value and capacity to convey stormwater flows.

Figure 7 Tui St (Rata St to Nikau Rd) photo

Nikau Road (13 Nikau Road to 28 Nikau Rd): The stormwater network along Nikau Road consists of an open channel which was defined as an artificial watercourse by the ecologist. The open channel runs along the southern berm of Nikau Road between 13 to 17 Nikau Road, before crossing under the road through a 450mm diameter culvert and then continuing along the northern berm of Nikau Rd to 28 Nikau Road.

Figure 8 13 Nikau Rd to 28 Nikau Rd

28 Nikau Rd to Waeroa Reserve: There is an overland flowpath that runs through private properties 28 Nikau Rd,30 Nikau Rd, 15 Nikau Rd and 17 Nikau Rd. It is uncertain whether this overland flowpath is continuous or has been partially filled in by landowners. The flowpath has been piped under 19-23 Manuka Road, including under buildings, with a 375mm diameter pipe.

3. Stage 1 Design

The layout of the proposed infrastructure is outlined in Figure 9. The layout plan also identifies opportunities for creating salt marsh and fresh water wetlands to achieve improved ecological outcomes and key areas for stormwater inlets at the upstream end for the piped network.

Figure 9 Stage 1 design layout

An artists impression of the Concept Design for the section of work along Nikau Road is shown in

Figure 10 Artists impression of stormwater improvement along Nikau Road

4. Design philosophy

The design philosophy for the Blackpool Stormwater improvements includes:

- Lowering the floodplain of the existing open waterways to provide increased capacity to convey flood flows, generally following the alignment of existing overland flowpaths where possible.
- Providing new overland flowpaths and/or open waterways within the road corridor/berm to reduce flows through private property.
- Upsizing existing culverts to maximise the flow capacity under roads and driveway crossings.
- Installing new culverts where required.
- Sizing of infrastructure is based on maximizing capacity based on available space. It is anticipated that capacity of up to the 2 year or 10 year can be achieved in most locations. The 100 year ARI will continue to flood many properties in the catchment, however the number of habitable floor flooding will be reduced.

Further information about the design is outlined in the Blackpool Stormwater Improvements Stage 1 Design Report (HWDO, 2024).

5. Construction Methodology

The following section provides an indicative construction methodology for the work, the contractor will prepare a final construction methodology prior to starting work.

The construction works are anticipated to be done progressively, starting from the downstream end and working upstream. The following methodology is expected for construction of the works:

1. Vector to move power poles prior to civil contractor establishing, arborist to remove trees where required.
2. Set up traffic management and civil contractor to establish on site.
3. Civil works
   - 3.1. Bund upstream waterway to delineate initial working area and install novacoil pipes to divert flows through initial working area.
   - 3.2. Set up erosion and sediment controls, such as silt fences, sediment ponds and bunds. Refer to ESCP.
   - 3.3. Remove fish and aquatic life from working area.
   - 3.4. Pump out water to create dry working area.
   - 3.5. Install any culverts within the working area.
   - 3.6. Excavate to design surface for waterway formation.
   - 3.7. Install any in-stream features such as root wads, coir logs, rocks or grade control.
   - 3.8. Install topsoil / planting media where required.
   - 3.9. Cover exposed areas with jute matting and pin down.
   - 3.10. Remove flow diversion and reinstate flow through completed section.
4. Repeat steps 3.1-3.10 for next delineated working area, progressing from downstream to upstream.
5. Civil contractor to disestablish, clean up and planting contractor to mobilize.
6. Planting contractor to plant vegetation as per planting plan, include community planting days.
7. Planting contractor dis-establishment and clean up.

5.1. Site establishment

It is expected that Blackpool Park would be used for the contractors site compound, however further discussions with Community Facilities and Ngati Paoa will be required to approve this. An alternative, and/or additional location would be in the berm area of Tui Street and within 36 Tui Street. The site will be secured with appropriate security fencing, access tracks constructed as required and erosion and sediment controls set up (refer to Erosion and Sediment Control Plan).

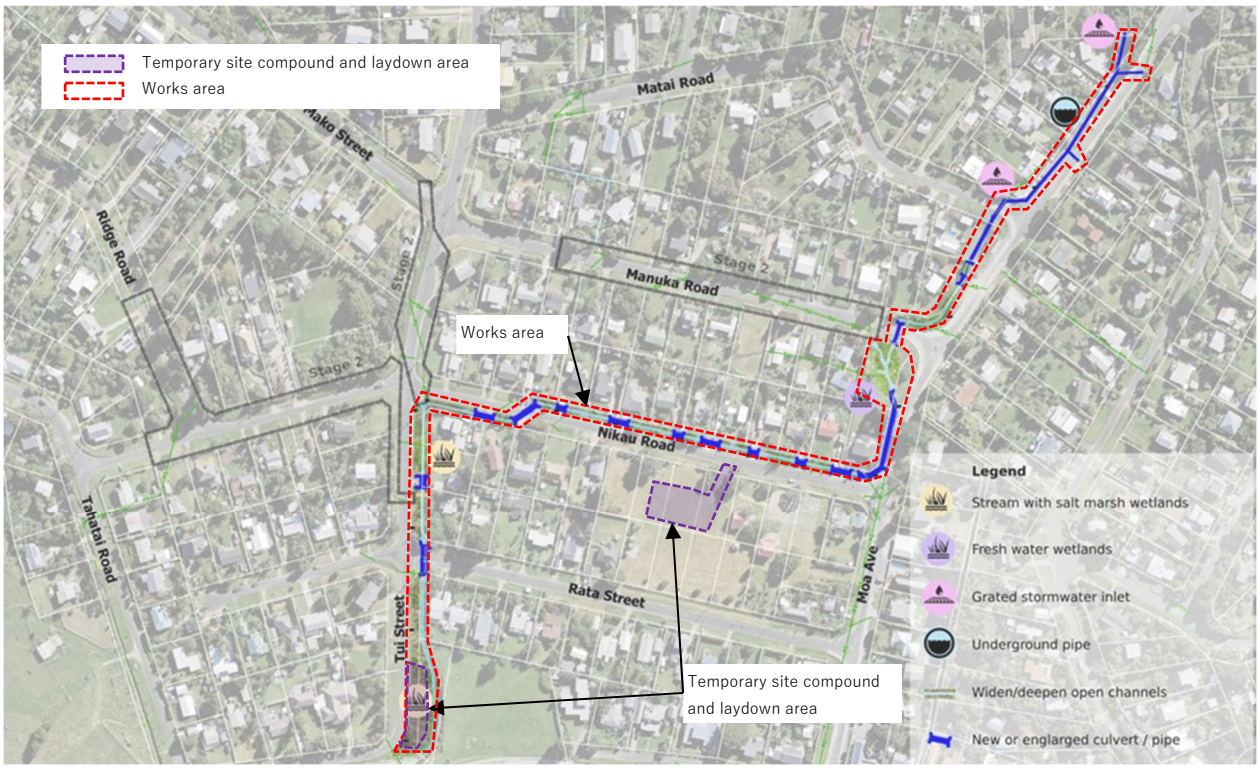


Figure 11 Site compound and works area

5.2. Civil works

Figure 12Figure 13 outlines a typical working area for installing road culverts. A full road closure is expected and detours would be minor due to the grid-like road network and low traffic volumes. The culvert can be constructed in one half of the road at a time to allow more space for construction machinery to move around the works area and storage of materials.

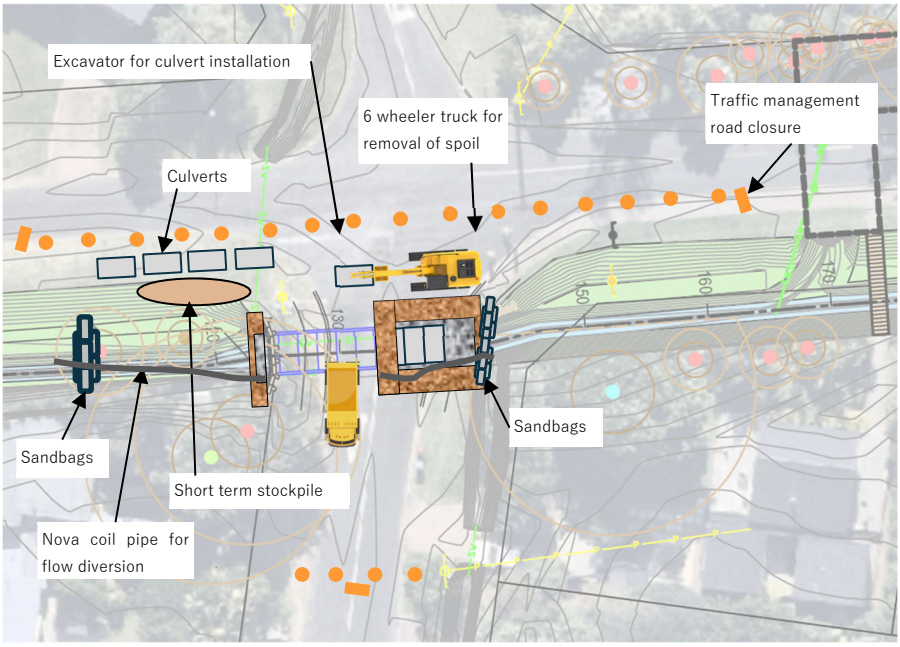


Figure 12 Road Culvert Installation typical working area

Figure 13 outlines a typical working area for installing driveway culverts. A full road closure is expected, however provision would be made to allow access for residents. During driveway culvert installation some short term restrictions on access to properties will be required, however the contractor will liaise with landowners to minimise disruption, and time their movements to and from the properties.

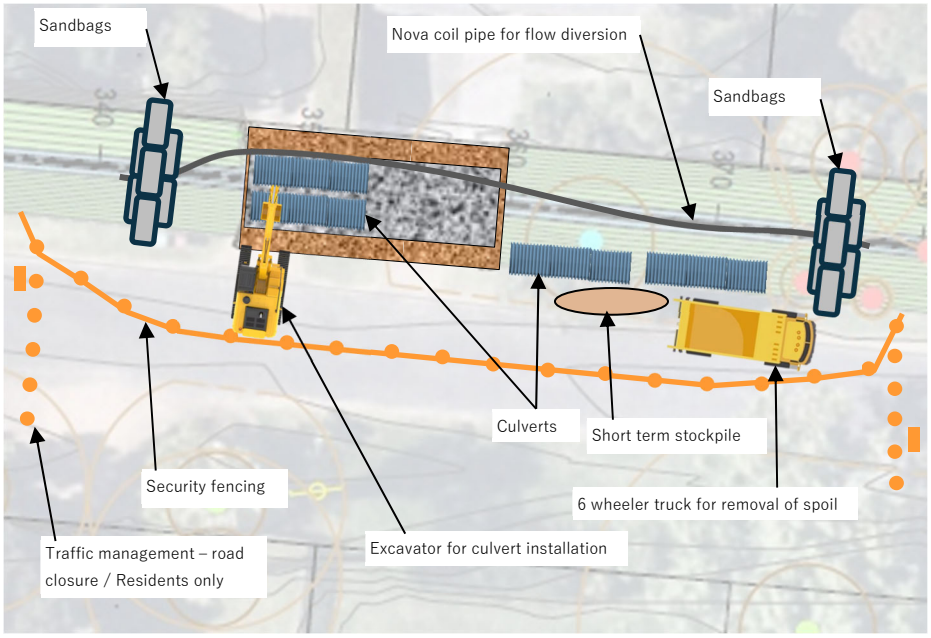


Figure 13 Driveway Culvert Installation typical works area

Figure 14 outlines a typical working area for carrying out watercourse excavations and installation of in-stream features. The size of the working area will be planned to minimise disruption of the construction works to the community. Excavated material may be stockpiled for a short period of time and then removed from site by trucks.

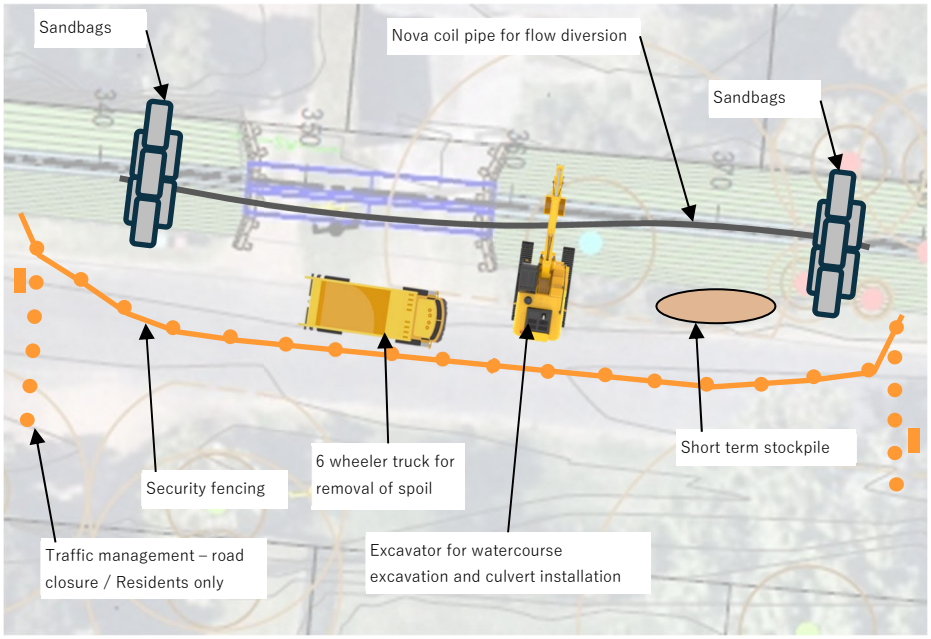


Figure 14 Watercourse excavation typical working area

5.3. Earthworks areas and volumes

The work will include the following earthworks areas and volumes:

- Earthworks area = 5,550m^2
- Total earthworks volume = 3,600m^3.

5.4. Traffic impacts and vehicle movements

A traffic management plan with approval by Auckland Transport will be required. Traffic management will generally include a full road closure with diversion signage set up where required. The road closure will move locations as the work progresses to keep the smallest area of road closed at any one time during the works. Diversions will be minimal due to the grid-like nature of the roads, low traffic volumes, low speeds and given the area does not contain any significant through-routes.

There will be some truck movements to and from the site for bringing machinery and materials to site. The highest number of truck movements will be due to removing excavated material from the site in trucks. A total of 375 truck movements over the duration of the project is expected to move the 3,000m^3 of excavated material (assuming 8m^3 per truck load). The 375 truck movements would be spread over approximately 12 months with an average of 2 truck movements per day, although it is likely that excavation works will happen intermittently during the programme, and the peak number of truck movements could be up to 10 per day. This would be approximately 1-2 trucks per hour during peak times.

An additional 1-2 trucks per hour is not expected to have any noticeable affect on traffic in the area.

5.5. Indicative methodology and programme

The programme for construction is estimated to take a total duration of 12 months for the civil works and an additional 20 weeks for the planting. Table 1 shows the indicative breakdown of timeframes.

Table 1 Indicative programme

	Task	Duration
1	**Civil works**	**52 weeks**
1.1	Site establishment, set up erosion and sediment controls, fish removal and other pre-construction works.	1 weeks
1.2	Open waterway along Tui Street from beach outlet to Rata St	2 weeks
1.3	Road culvert across Rata Street: 3m(W) x 1.5m(H)	4 weeks
1.4	Open waterway along Tui Street from Rata St to Nikau Rd including 3m(W) x 1.5m(H) box culvert across driveway and pedestrian bridge	8 weeks
1.5	Open waterway along Nikau Rd including plastic culverts for driveway crossing and concrete box culvert under road	8 weeks
1.6	1800mm diameter culvert along Moa Ave	6 weeks
1.7	Open waterway from Manuka Road to 15 Moa Avenue including one road culvert and one driveway culvert	2 weeks
1.8	Pipeline from 15 Moa Ave to 3 Moa Ave including manholes	16 weeks

1.9	Clean up and disestablishment	1 weeks
1.10	Contingency	4 weeks
2	**Planting works**	**20 weeks**
2.1	Planting contractor establishment	1 week
2.2	Planting of open waterways	16 weeks
2.3	Final disestablishment from site and handover	1 week
2.4	Contingency	2 weeks
3	**Total duration**	**72 weeks**

6. Erosion and Sediment Control Plan

The following section provides an indicative erosion and sediment control plan (ESCP) for the works. The contractor will prepare a final ESCP and submit to Auckland Council for approval prior to construction.

6.1. Erosion and sediment control principles

Key principles of erosion and sediment control are outlined in *Auckland Council Guidance Document 005: Erosion and Sediment Control ('GD05', 2016).* These principles are summarized below and will be incorporated into the works by the contractor.

6.1.1 Minimise disturbance

Stripping of ground surface material will only be undertaken in those areas required for construction of the works. No unnecessary areas will be exposed in order to minimise disturbance and reduce sediment generation.

6.1.2 Stage Construction

Works will be planned to minimize the length of time any surfaces are exposed. Any temporary gravel access tracks or laydown areas will be constructed using a cut and cover method and be progressively stabilized.

6.1.3 Protect Slopes

Side slopes of the proposed and existing waterways are steep. Water from the upstream areas and works areas above the waterway slopes will not be allowed to run-off onto the slopes unless adequately stabilized and protected from scour. Dirty water will be trapped behind silt fences where required.

6.1.4 Protect Receiving environments

No water will be discharged from the works area into the receiving environment before being properly treated using methods in GD05 or other approved methods. Using the principles to reduce the generation of sediment at the source will result in the volume of water required to leave the site to be reduced.

6.1.5 Rapidly stabilise exposed areas

Disturbed soils will be progressively stabilized with jute matting, mulch, hardfill or other stabilizing methods. Stabilisation will be undertaken as soon as practicable.

6.1.6 Install perimeter controls and diversions

Perimeter controls will be used (such as silt fences) where required to prevent dirty water leaving the site such as downgradient of stockpiles or exposed earth areas. Clean water diversions will be implemented to reduce the amount of water entering the works area.

6.1.7 Employ sediment retention devices

Given the nature of the works, sediment retention devices are unlikely to be required. If the contractors design and methodology result in generation of sediment laden water, then sediment retention devices (such as filtration tanks or turkey nests) can be installed. The topography of the site is very flat and tightly constrained and is therefore not ideal for installing sediment ponds.

6.1.8 Get trained and develop experience

A competent and trained contractor will be used for the works.

6.1.9 Adjust the ESC Plan as needed

As construction progresses and the type of works change, the ESCP will be modified to reflect the current conditions on site and planned works.

6.1.10 Assess and adjust your ESC measures

Inspect, monitor and maintain erosion and sediment control measures. Check weather daily and plan works accordingly.

6.2. Sediment generation

Sediment could be generated from rainfall and/or runoff onto exposed areas such as the trimmed waterway banks or when forming access tracks and laydown areas. Sediment could also be generated when dewatering excavations for culverts. The following management approaches will be used to reduce the amount of sediment generated.

- Cut and cover method used when forming access tracks and laydown areas to immediately stabilize areas following exposure of bare soil.
- Install clean water diversions where clean upstream water can potentially flow into works area.
- Stabilize channel banks progressively with jute matting to reduce the amount of time bare soil is exposed.
- Undertake the work in stages.

6.3. Controls for managing sediment laden water

The proposed Erosion and Sediment Control Plan drawing is attached in Appendix 1. As described above, mitigating the area of exposed surface will be a key management approach, however some dirty water is expected to be generated from the works site. Additional controls for managing dirty water will include:

- Downstream end of waterway excavation works area to be bunded to trap dirty water within works area. Dirty water to be pumped out of works area into treatment device such as turkeys nest, geotube, settling tank or sediment pond (if practical).
- Water from culvert excavations to be pumped into treatment device where clarity is below GD05 limits. Treatment device could include turkeys nest, geotube, settling tank or sediment pond (if practical).
- GD05 compliant inlet protection to be installed on catchpits within the works area.
- Any wash down areas for plant and equipment will be contained within the site and treated using methods approved in GD05 and TP90 before being discharged into the stormwater network.

6.4. ESCP Monitoring and Maintenance

The contractor shall propose an inspection and maintenance schedule in their ESCP for managing their erosion and sediment controls. This shall include daily checks of the weather, monitoring sediment discharge and state of erosion and sediment controls, checking that all exposed areas are stabilized before leaving site each day.

Given that the site is within a floodplain, if a large storm is predicted the site will need to be stabilized as much as possible, machinery removed and made safe for the storm.

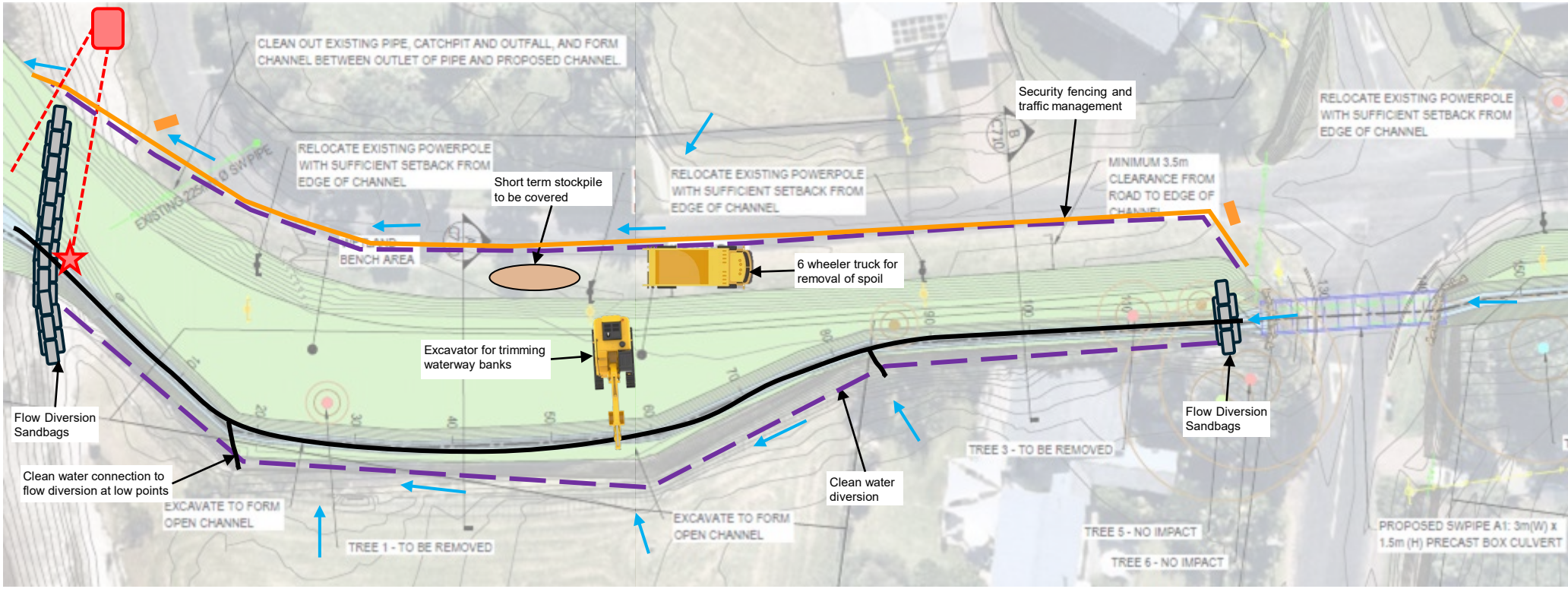
7. Conclusion and recommendations

The construction methodology and erosion and sediment control plan outlined in this report provides a suitable method for constructing the Blackpool Stormwater Improvement Stage 1 works.

It is recommended that the contractor prepares their own construction methodology and erosion and sediment control plan which takes into account the points covered in this report.

8. Appendices

Appendix 1 – Preliminary Erosion and Sediment Control Plan



FLOW DIVERSION SANDBAG

GD05 DIRTY WATER TREATMENT (TURKEY'S NEST, SETTLING TANK, SEDIMENT POND ETC)

NOVACOIL GRAVITY DIVERSION PIPE

DEWATERING PUMP

CLEAN WATER DIVERSION

PUMP LINE

FLOW DIRECTION

BLACKPOOL STORMWATER IMPROVEMENTS – STAGE 1

PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN – TYPICAL WATERWAY TRIMMING

N.007799.60.E001

Healthy Waters Design Office
AUCKLAND COUNCIL, LEVEL 17, AUCKLAND HOUSE

Auckland Council
Te Kaunihera o Tāmaki Makaurau

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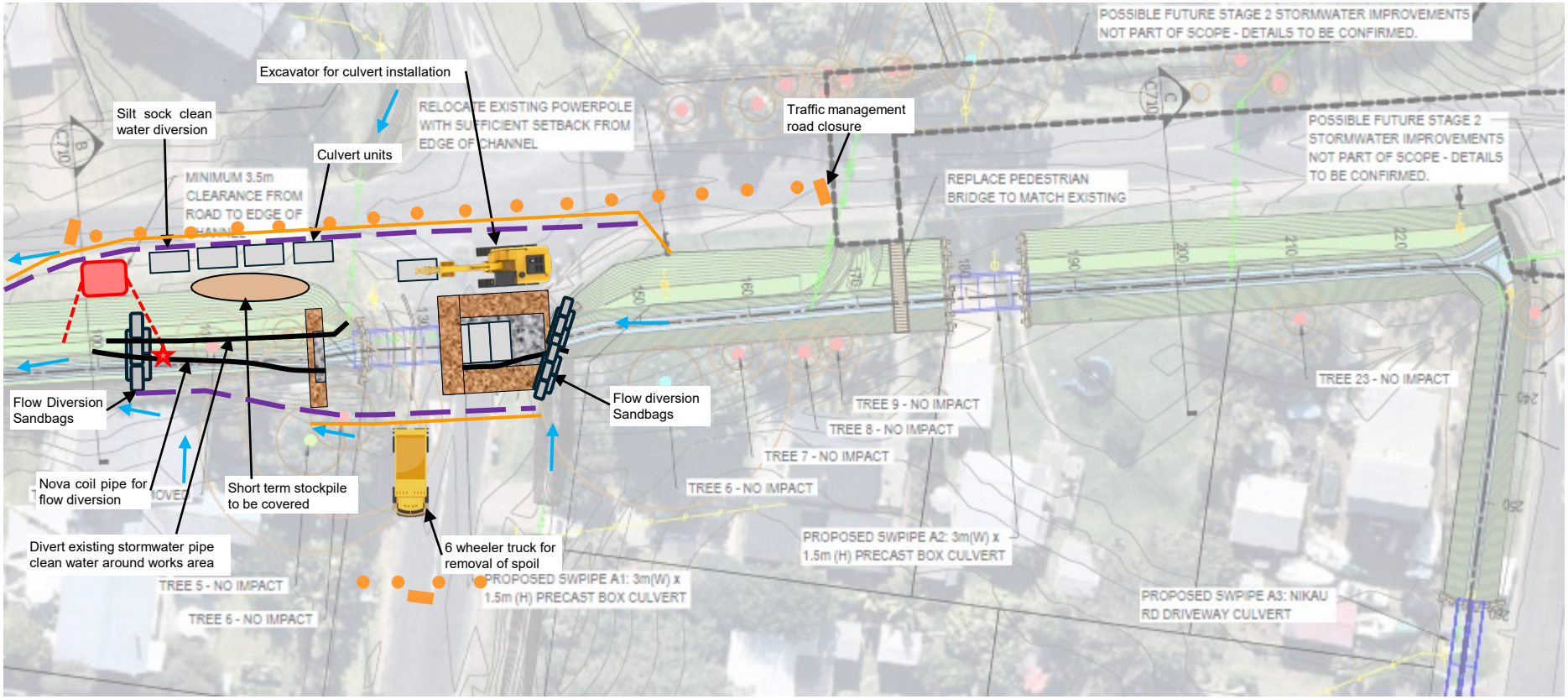
30/09/2024



FLOW DIVERSION SANDBAG

GD05 DIRTY WATER TREATMENT (TURKEY'S NEST, SETTLING TANK, SEDIMENT POND ETC)

NOVACOIL GRAVITY DIVERSION PIPE

DEWATERING PUMP

CLEAN WATER DIVERSION

PUMP LINE

FLOW DIRECTION

BLACKPOOL STORMWATER IMPROVEMENTS – STAGE 1

PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN – TYPICAL ROAD CULVERT

N.007799.60.E002

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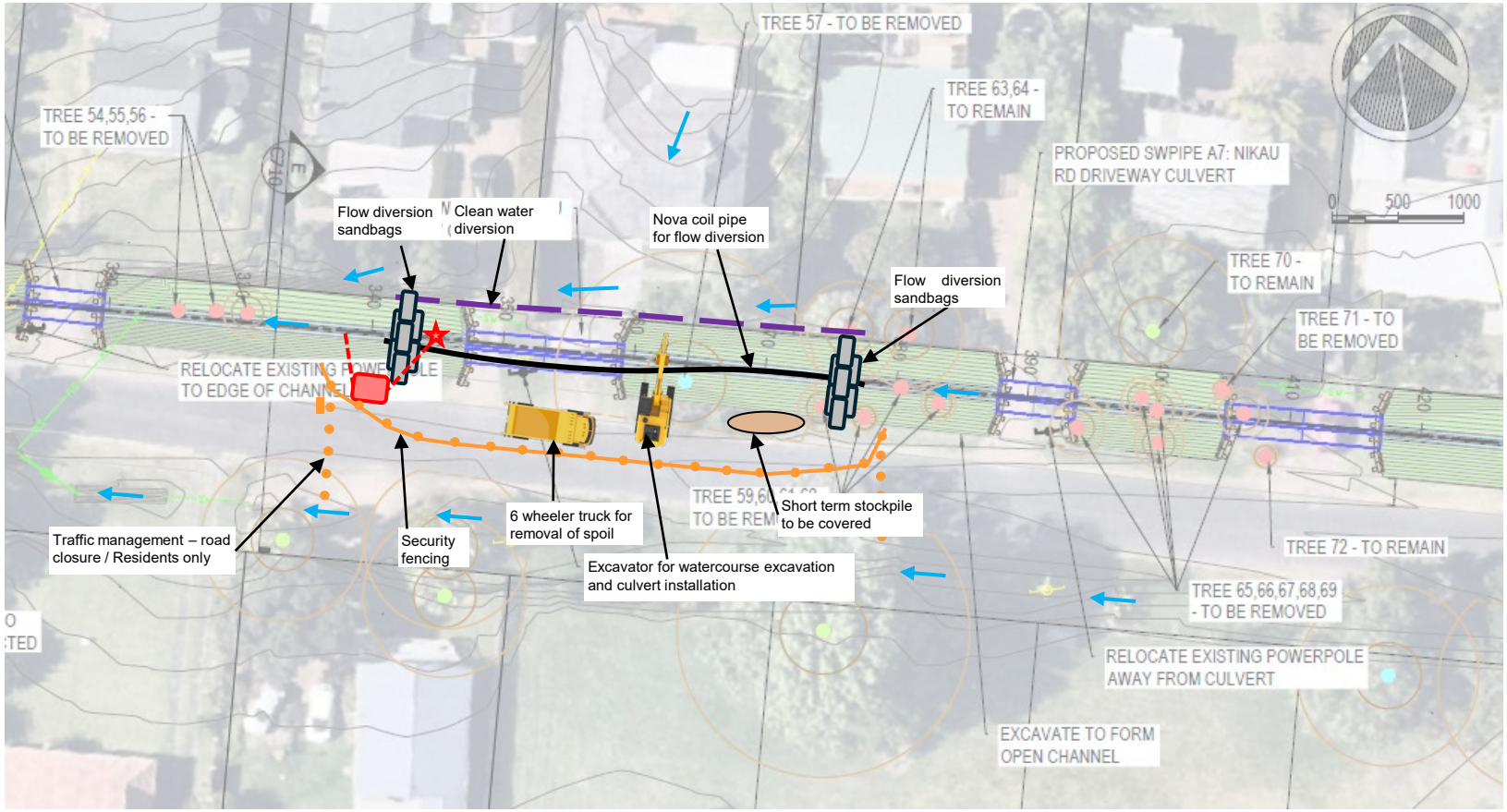

FLOW DIVERSION SANDBAG

GD05 DIRTY WATER TREATMENT (TURKEY'S NEST, SETTLING TANK, SEDIMENT POND ETC)

NOVACOIL GRAVITY DIVERSION PIPE

DEWATERING PUMP

CLEAN WATER DIVERSION

PUMP LINE

FLOW DIRECTION

BLACKPOOL STORMWATER IMPROVEMENTS – STAGE 1

PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN – TYPICAL DRIVEWAY CULVERT

N.007799.60.E003

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