



NATIVE FISH CAPTURE AND RELOCATION PLAN

NZ Transport Agency Waka Kotahi
Mill Road Stage 1

SEPTEMBER 2026

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QUALITY REVIEW AND APPROVAL RECORD

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GLOSSARY

Specific terms	
EcIA	Ecological Impact Assessment
GMTs	Gee Minnow Traps
NFCRP	Native Fish Capture and Relocation plan
NZFFD	New Zealand Freshwater Fish Database
NZTA	New Zealand Transport Agency
SQEP	Suitably Qualified and Experienced Person
General terms	
Biodiversity	The variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life
Ecology	The study of the relationships between living organisms, including humans, and their physical environment.

1 INTRODUCTION

1.1 Background

The Mill Road Stage 1 project ("the Project") involves the construction of a new 4-lane corridor between Manukau in the North and Takanini in South Auckland. The Project crosses through a number of watercourses within the Puhinui and Papakura catchments and results in some unavoidable streamworks. These works include the upgrading and installation of culverts, installation of riprap, permanent and temporary stream diversions and the reclamation of wetlands.

1.2 Objective and scope of this Report

The objective of this Native Fish Capture and Relocation Plan (NFCRP) ("this Plan") is to reduce injury and mortality of native fish within impacted streams and wetlands during construction of the Project. Successful relocation reduces the potential impacts on native freshwater fauna and minimises the risk of indigenous fish being harmed during streamworks activities.

This Plan is informed by the Freshwater Ecology Assessment (EcIA) report, which describes the freshwater values and effects management for the Project. This Plan sets out best practice method for salvage, relocation, and native freshwater fish management during construction. This NFCRP forms a part of the overall ecology management framework for the Project alongside the Freshwater Management Plan (FMP). Roles and responsibilities/requirements

The roles and responsibilities for implementation of this Plan are detailed in Table 1-1. Staff/contractors will have the appropriate experience, project involvement, and responsibility to ensure that all relevant aspects of the Project are considered when making decisions on NFCRP implementation.

Delivery of, and compliance with this Plan will be the responsibility of the Environmental Manager who will liaise with the ecologists, site engineer(s), and habitat clearance and earthworks contractors as required.

Table 1-1 Roles and responsibilities for implementation of the NFCRP

Name	Responsibility
Environmental Manager	- Overall implementation of and compliance with NFCRP. - Facilitating a Project start-up meeting with the Project Ecologist and relevant contractors prior to commencement of streamworks; - Inviting Mana Whenua to participate in and support any relocation deemed necessary, to ensure appropriate exercise of kaitiakitanga responsibilities and that cultural concerns are addressed; - Maintaining clear lines of communication with the Project Ecologist(s), Site Manager (s) and contractors regarding works schedule and any changes; - Ensuring contractors understand the requirements of this NFCRP.
Site Manager	- Reading and understanding the NFCRP requirements; - Coordinating timing and access with ecologists to ensure streamworks are undertaken in accordance with this NFCRP.
Project Ecologist	- An ecologist that meets the requirements of a Suitably Qualified and Experienced Person (SQEP), for the relevant task. - Overall implementation of this NFCRP across the Project and associated advice. - Certification of Relocation Event Fish Salvage Plan - Coordination of specialist ecologists for the purpose of fish salvage. - Review of fish salvage outcomes and the preparation of close-out reporting.
Technical Lead Ecologist(s)	Must meet the requirements of a SQEP for freshwater management.

Name	Responsibility
	Oversee and facilitate the implementation and compliance monitoring and reporting of the NFCRP.
Supporting Ecologist(s)	- Must meet the requirements of a SQEP (dependent on tasks undertaken). - Assisting Project Ecologist or Technical Lead Ecologist(s) with implementing this NFCRP as required.
Mana Whenua	In accordance with the Cultural Management Plan for the Project and NZTA's commitment to ongoing engagement, Mana Whenua shall be involved in the implementation of the NFCRP, to advise on design and methodology, cultural protocols, requirements and procedures, cultural monitoring, and the exercise of tikanga, as appropriate.

2 SALVAGE LOCATIONS

A total of 16 streams and stream/wetland complexes have been identified that are likely to require fish salvage prior to works for the construction of culverts, stream diversions, and/or stormwater scour protection. The stream locations are listed in Table 2-1 and shown on Figure 2-1.

Table 2-1 Stream and wetland sites requiring fish salvage prior to Project works.

Site(s)	Type	Permanence Classification	Catchment	Activity	Total length impacted (m)
S02	Stream	Intermittent	Otara Creek	Riprap	4
S03 / MW_03	Stream-wetland complex	Intermittent / ephemeral	Puhinui	New Culvert	21.2
S04 / MW_04	Stream-wetland complex	Intermittent / ephemeral	Puhinui	New Culvert	25.03
S05	Stream	Intermittent / ephemeral	Puhinui	New Culvert	7.57
DS04/S12C	Stream	Intermittent / ephemeral	Puhinui	New Culvert	37.56
S12	Stream	Permanent	Puhinui	Diversion	33.56
S13	Stream	Permanent	Puhinui	Diversion	70.63
S13a/MW_10	Stream, upstream wetland	Intermittent	Puhinui	Reclamation	4
S14	Stream	Intermittent	Papakura	Culvert	20.39
DS05/MW_13	Stream, upstream wetland	Intermittent / ephemeral	Papakura	New Culvert(s), reclamation, diversion.	88.68
S17/MW_19a	Stream-wetland complex	Intermittent	Papakura	Culvert replacement, riprap.	24.08

Site(s)	Type	Permanence Classification	Catchment	Activity	Total length impacted (m)
S17/S18	Stream	Intermittent	Papakura	New culvert, riprap.	25.58
S21/MW_2 1a	Stream-wetland complex	Intermittent	Papakura	New culvert, riprap.	34.97
S19/MW_2 1a	Stream-wetland complex	Intermittent	Papakura	Riprap	16.11
S20/MW_2 1b	Stream-wetland complex	Intermittent	Papakura	Stream diversion, new culvert, riprap.	207.89
S22	Stream	Intermittent	Papakura	Culvert upgrade	8.91

Maps of the locations and photos of the streams are provided in **Appendix A** and **Appendix B**. Many of the streams are classified as intermittent, with the potential to be dry, or have very little water, at the time of fish salvage.

Additional wetland habitat is being reclaimed, but no potential fish habitat has been identified within these wetland area (MW_06, MW_31, MW_32, MW_10a, and MW_25) and fish salvage is not required.

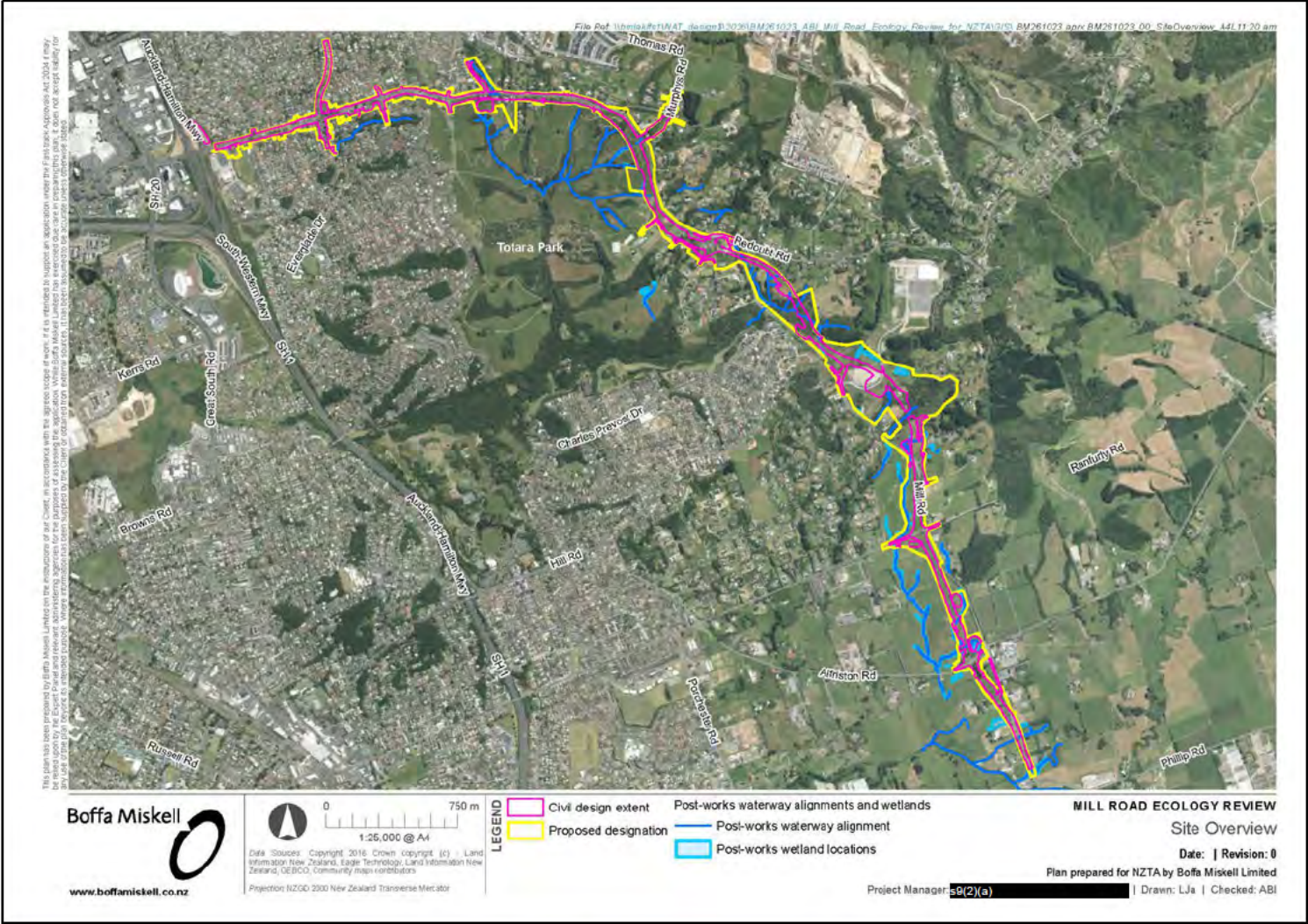


Figure 2-1 High-level streams overview of streams within Mill Road designation and alignment

2.1 Freshwater Fauna Communities

Seven native freshwater fauna species have been identified from streams within the Project area (refer to the Freshwater EclA and **Appendix C**) and are listed below in Table 2-2. Species were identified using a combination of the New Zealand Freshwater Fish Database (NZFFD), records from previous site surveys (in 2020), and the results of 2025 field surveys, including eDNA.

One freshwater fish species, longfin eel (*Anguilla dieffenbachia*), has a threat status of At Risk – declining, while a further three are At Risk – Naturally Uncommon (Table 2-2). These species have potential to be present within the directly impacted reaches requiring fish salvage.

Table 2-2 Native freshwater species present in Puhinui Creek and Papakura Stream tributaries

Species	Scientific Name	Conservation Status (Dunn et al., 2018)
Tuna kuwharuwharu/longfin eel	<i>Anguilla dieffenbachii</i>	At Risk – Declining
Banded kōkopu	<i>Galaxias fasciatus</i>	At Risk – Naturally Uncommon
Redfin bully	<i>Gobiomorphus huttoni</i>	At Risk – Naturally Uncommon
Cran's bully	<i>Gobiomorphus basalis</i>	At Risk – Naturally Uncommon
Tuna hinahina/shortfin eel	<i>Anguilla australis</i>	Not Threatened
Common bully	<i>Gobiomorphus cotidianus</i>	Not Threatened
Kōura/freshwater crayfish	<i>Paranephrops planifrons</i>	Not Threatened

No habitat suitable for native freshwater fish spawning was identified during surveys within the impacted stream reaches in either the Puhinui and Papakura catchments. The Fish Spawning Indicator Tool indicated that approximately 1 km downstream of S03, S04 and S05, redfin bully (*Gobiomorphus huttoni*) spawning habitat is present (MPI, 2022). However, it is not anticipated that any of the works will impact directly or indirectly on these spawning habitats.

No suitable habitat for Kākahi (freshwater mussel) was identified within the Project footprint.

3 PRE-STREAMWORKS ACTIVITIES

The streamworks required to construct the Project will be undertaken incrementally as the Project progresses. It is anticipated that staging will be undertaken across a number of years. The specific staging of the streamworks has not yet been undertaken and consequently the specific sites and timing of streamworks are not known.

Prior to works occurring at each impacted stream or wetland, a pre-streamworks site visit and team meeting must be undertaken by the Project Ecologist and members of the Project Team (i.e. the Site Manager and/or the Environmental Manager) to discuss and confirm the streamworks. This site visit should discuss and confirm, but is not limited to, the following:

- The upper and lower extent of the streamworks.
- The proposed timing of the streamworks and protocols for implementation in the event of adverse weather.
- The proposed method of streamworks.
- The proposed method of fish salvage, which should be consistent with this Plan, and its implementation.
- The use of any temporary diversion channels.

- The proposed areas of relocation and any access arrangements.
- Monitoring methods and reporting requirements.

The pre-streamworks site visit and associated Project Team meeting to establish the above points will inform the Relocation Event Fish Salvage Plan.

3.1 Relocation Event Fish Salvage Plan

Given the diversity of stream habitats, freshwater fauna, and streamworks methods across the Project, the implementation of the salvage and relocation methods set out in this Plan will be tailored to the site-specific conditions encountered at each salvage location. Streamworks staging will be developed through detailed design and construction sequencing, and stream habitat characteristics may change over time.

Prior to the commencement of streamworks at any of the identified salvage locations (refer to Table 2-1), the Project Ecologist shall prepare a Relocation Event Fish Salvage Plan, confirming fish and kōura salvage and relocation methods for each specific relocation event. As a minimum, the Relocation Event Fish Salvage Plan shall include the following details:

- Proposed location(s), including GPS locations, and length of stream and/or wetland area where works are to occur.
- Proposed streamworks and the use of any diversions, temporary or permanent, including drawings (where applicable).
- Site preparation methods.
- Fish and kōura salvage methods.
- Dewatering methods.
- Details of relocation site(s), including general habitat, suitability for expected species, and access arrangements.
- Storage and transport methods for salvaged fish and kōura.
- Details of personnel implementing the plan and their associated experience and any permits required to undertake the work.
- Reporting requirements, including recording of the species and abundance of all fauna relocated or euthanised.

A Relocation Event Fish Salvage Plan may address multiple stream reaches/areas of streamworks where fish salvage may be undertaken concurrently or consecutively. However, the specified information shall be provided for each streamworks reach or area covered by the Plan. Relocation Event Fish Salvage Plans must be consistent with this NFCRP.

4 FISH AND KŌURA SALVAGE METHODS

4.1 Overview

Aquatic fauna salvage must be undertaken prior to the commencement of any streamworks activities at the salvage locations identified in Table 2-1.

To successfully salvage as many fish, kōura from watercourses as practicable, a combination of netting and channel dewatering is likely to be required. The best combination of methods for each salvage location will be determined prior to streamworks by the Project Ecologist dependent on the habitat present at the time of salvage. However, each fish salvage operation should plan to include the following stages:

- Site preparation (including reach isolation using exclusion nets or other method);
- Net setting for fish salvage (fyke and G-minnow traps); and
- Stream dewatering.

Further detail of each stage is outlined in the below sections.

The Project Freshwater Ecologist must be given as much notice of upcoming streamworks as possible. The successful implementation of this Plan and the Relocation Event Fish Salvage Plans is weather dependent and resource heavy and requires as much lead in time as possible. The execution of the Plan should be undertaken as close as practicable to the proposed streamworks, preferably finishing within 48 hours of the commencement of streamworks, to limit the possibility of fish re-entering the stream. Salvage operations should not take place during periods of high rainfall, or where high rainfall is forecast. Weather forecasts and stream water levels should be monitored regularly, and salvage activities avoided during periods of elevated stream flow.

The methods described in this NFCRP are considered approved and appropriate practice for fish and kōura salvage (Ministry for the Environment, 2021). Specific salvage methods for each salvage location will be confirmed in the applicable Relocation Event Fish Salvage Plan (refer to Section 3.1 of this NFCRP) and must be implemented by/or under the guidance of the Project Ecologist and/or the Technical Lead Ecologist(s) with the associated permits and approvals required to safely undertake the work.

4.2 Salvage Timing

Successful fish salvage is dependent on weather conditions and the staging of streamworks activities for the Project. Generally, water levels within streams are lower during summer months and there is a reduced frequency of high rainfall events. These conditions make it easier to navigate streams and reduces the chance of damage to exclusion nets used to isolate streamworks areas. Intermittent streams may be dry during the summer months, which can reduce potential impacts on fish and facilitate a more efficient fish salvage process.

The Project Ecologist shall determine the programme for salvage following the development of streamworks staging during detailed design and construction sequencing.

4.3 Site Preparation

Prior to the start of fish salvage, the reaches identified for streamworks or wetland area must be isolated upstream and downstream to prevent the movement of fish species into or out of the salvage location. The site may be isolated using fish exclusion nets, or by constructing temporary earth bunds or sandbag dams at the upstream and downstream extents of the site, depending on the stream and the water depth at the time of fish salvage.

4.3.1 Fish Exclusion Nets

Fish exclusion nets can be installed by or under the guidance the Technical Lead Ecologist prior to fish salvage to prevent the movement of fish, while still allowing the flow of water. Exclusion nets must be installed at the upstream and downstream extents of the proposed streamworks. When installing a fish exclusion net, it's construction should include:

- Waratahs at 0.5m intervals to withstand potential high flows.
- Permeable mesh with aperture size less than 5 mm.
- Extra deep footing (400 mm below bed and 400 mm above water surface) that is secured to the streambed using rocks, sandbags, or pins.
- Footings at each end extended 400 mm into bank and pinned.

The exclusion nets should be inspected daily to ensure they have not failed or been damaged. If high rainfall is forecast while the exclusion nets are in place, the nets must be inspected prior to and following the rainfall event. If water has overtopped the exclusion nets, or they have been damaged, the Project Ecologist or Technical Lead shall determine whether the salvage operation will need to start again. This decision will depend on the stage the salvage operation is at and the extent of the fish exclusion breach.

4.3.2 Bunding

Site isolation and fish exclusion can also be achieved through earth bunding or damming using sandbags. If the stream is too deep or otherwise unsuitable for fish exclusion nets, earth bunds or sandbags of sufficient size to prevent any water breaching over, through, or around, may be used.

The use of bunding prevents the flow of water through the isolated reach. Depending on the duration of the streamworks, and the nature of the site, water may need to be diverted downstream past the isolated reach. The need for a temporary diversion will be determined by the Project Ecologist and the Project Team, depending on the stream habitat, season and weather conditions, and the nature of the streamworks at the salvage location. A clean water diversion channel, or the use of pump and overland piping such as novacoil may be used to divert flows around the site. Any pump must be fitted with a fish exclusion rose, or covered in shade cloth with an aperture of no more than 5 mm.

When bunding is used, it is essential that the area of salvage operation has cool, oxygenated water flowing through the channel for any fish that may be present within.

Water levels at the bund should be monitored and the bund inspected daily to ensure water has not breached the bund. If water has overtopped the bund, or the bund has been damaged, the Project Ecologist shall determine whether the salvage operation will need to start again. This decision will depend on the stage the salvage operation is at and the extent of the breach.

4.4 Fish and Koura Salvage

4.4.1 Netting: Fyke and G-Minnows

Netting for fish capture uses a combination of baited fyke nets and G-Minnow traps. The total number of nets and/or traps will depend on the site and will be determined at the time of deployment. Netting should follow the following method:

- Nets should be set at regular intervals within the isolated reach. All nets should be baited and set with an 'air gap' and left overnight.
- Channels with high macrophyte growth may require the creation of 'capture pits'. These pits are large pits made in the channel using an excavator. They create clear areas in the channel within which fyke nets can be set. They also provide refugia for fish during the final dewatering process allowing efficient capture.
- Nets should be checked the morning following setting. Any fish captured are to be identified and transferred to a large fish bin prior to relocation.
- If large numbers of fish are captured, fish may need to be released prior to the checking of all nets to minimise time spent within the fish bins (see Section 4.4.4 for storage details).

If fish are captured, the nets shall be inspected for any damage, rebaited and redeployed for consecutive nights, until either:

- the total catch is less than 20% of the first night's catch, or
- up to a maximum of four nights.

It is recommended that fish salvage commences on a Monday to enable salvage to occur more easily over four consecutive nights, if required. If very high numbers of fish are still being captured after the fourth consecutive night, the Project Ecologist shall determine if further netting is required.

If no fish are captured within the nets¹ (for any nights of fish salvage), then the nets do not need to be redeployed, and the netting component of the salvage operation is considered complete. Fish salvage can then proceed to the next stage (Section 4.4.3).

¹ No fish must be captured in all nets for this to apply.

4.4.2 Dewatering

Once netting activities are completed the isolated reach can be dewatered. The following methods should be followed:

- Dewatering should occur as soon as practical following completion of fishing, to minimise the risk of fish exclusion barriers failing.
- The upstream source of water must be stopped, either through the blocking and diversion of the upstream reach to a new channel, or through pumping the water over or around the isolated reach.
- If not already in place, an earth bund or sandbags may be used to stop water entering the isolated reach at the upstream and downstream ends. These must be placed within the fish exclusion nets. Similarly, if the water is to be pumped, the pump head must be located within the fish exclusion nets to prevent any fish entering the pump.
- Once the source of water has been stopped the isolated reach can be sufficiently drained either naturally or through use of a pump. The Project Ecologist may require capture pits² to be dug if they were not created earlier.
- A SQEP must supervise the dewatering. A hand net should be used to capture any fish that are observed. If suitable, and subject to agreement from Mana Whenua, electrofishing may be undertaken within the channel or capture pits.

4.4.3 Storage and Transport of Freshwater Fauna

Any fish and/or kōura captured will be held in a large fish bin prior to relocation. The fish bin will have an aquarium air pump, some vegetation, and will be placed in a shaded spot.

Smaller fish species (e.g. Galaxiidae or Gobiidae species) are to be kept separate from eels. Kōura should be kept on their own. Large eels will be separated and kept within mesh bags within fish bins.

While contained, fish and kōura will be monitored for signs of stress, with water to be changed regularly.

Transportation of captured fish may be undertaken by foot or vehicle depending on the selected relocation site. Preferentially fish should be transported to their relocation site through walking, generally to accessible locations containing suitable habitat just downstream of the salvage reach.

Fish will be transported in fish bins, or buckets. When transporting the bins or buckets to the relocation site the lids must be securely fastened. Where practicable, bins should be transported at low speeds to minimise the movement of water within the fish bins.

Fish must not be held overnight in fish bins.

4.5 Relocation Sites

During the pre-streamworks site visit (refer to Section 2 of this NFCRP), the relocation sites for each salvage reach must be identified and inspected. Locations downstream of the subject streamworks area, on the same reach, generally provide the best relocation opportunities. Relocation sites must contain suitable, stable habitats for the species being salvaged and transferred. If high numbers of fish are captured, the carrying capacity of relocation sites must be considered, and multiple relocation sites may be required.

The following relocation sites will be utilised:

- Tōtara Park – numerous restored streams are available through the park.
- Puhinui Gully – fish salvaged from the two diversions within the gully will be relocated downstream and, if required, into adjacent tributaries within the Significant Ecological Area (SEA).
- Papakura pastoral streams – numerous streams located alongside the Project area are available for relocation.

² For the purpose of pooling remaining water and concentrating fish for further capture.

Native fish will be relocated to suitable habitats within the same stream catchment with similar hydrological conditions and similar, or better habitat. Relocation sites must allow for movement and migration (i.e. sites must not be separated by natural or man-made barriers). The Relocation Event Fish Salvage Plan should detail the location of the relocation site(s) and any necessary access arrangements should be made prior to implementation of the Relocation Plan.

4.6 Data capture

The species, size and general health must be recorded for all fish caught, including native and non-native or pest species, alive or dead. The relocation site for all fauna transferred (excluding pest species) must also be recorded.

The final methods undertaken at each salvage location must be recorded and included in the Summary Report for each relocation event (see Section 6 of this NFCRP).

4.7 Diseased or Pest Fish

Any diseased or pest fish captured during fish salvage shall be humanely euthanised. The preferred method is to add clove oil (50 ml per 10 L water) or AQUI-S (175 mg/L) to a container holding the fish. Likely pest fish at the Project salvage locations include mosquito fish (*Gambusia affinis*) and grass carp (*Ctenopharyngodon idella*).

4.8 Biosecurity

Any pest fish species captured shall be humanely euthanised using either AQUI-S solution or clove oil and disposed of to landfill.

Two species of exotic freshwater clams (*Corbicula*) have been found in the Waikato Region, and it is imperative to stop their spread. The two species, *Corbicula fluminea* and *Corbicula australis* have been given the legal status of an Unwanted Organism under the Biosecurity Act. Specific Controlled Area Notices (CANs) are in force and have specific rules to follow for equipment that has been used within the area. No nets or associated equipment that have been used in a CAN area are to be used for any purposes within the Project area.

5 PERMITS AND APPROVALS

The following permits and approvals are required to undertake this work³:

- Fisheries New Zealand Special Permit pursuant to section 97 of the Fisheries Act 1996 for investigative research (section 97 (1) (a) (ii)), and to allow persons or agencies to take aquatic life and relocate it to a suitable habitat where this is necessary or required to mitigate adverse effects of habitat modification on the aquatic life (section 97(1) (c)).
- Fisheries New Zealand Authorisation pursuant to section 26ZM (2) (a) of the Conservation Act 1987 to:
 - Transfer from: Any freshwater waterbody (as defined in the Conservation Act 1987) in the North Island of New Zealand.
 - Release to: Appropriate freshwater waterbodies in the same catchment as the capture/transfer site.
 - The following: Any native freshwater aquatic life.
- Fish & Game New Zealand authorisation to take sports fish from the Auckland/Waikato Fish and Game Region pursuant to Regulation 4A (1)(a) of the Freshwater Fisheries Regulations 1983 and sections 26ZR and 26 ZI 2 of the Conservation Act 1987.

³ The permits and approvals were required at the time of writing and may change prior to implementation of the plan.

All conditions specified within the above permits and approvals must be adhered to, and notification and reporting requirements must be undertaken within the specified timeframes therein.

All fish salvage and relocation activities shall be undertaken by the Project Freshwater Ecologist/SQEP, who shall also be present during dewatering activities to identify, capture and relocate any fish remaining within the isolated work area.

The SQEP must have demonstrated experience in fish salvage and relocation of freshwater fish and be experienced with fish capture methodology outlined in the New Zealand Fish Sampling Protocols (Joy et al., 2013).

6 REPORTING

Following the implementation of each salvage and relocation event, a Summary Report will be prepared and provided to Auckland Council. For all species the following will be recorded:

- Date, time, location, and method of capture.
- Species, size, and health.
- Location and general habitat of relocation site.
- Details of species released at each site.

The results of any aquatic fauna captured (i.e. species, numbers, and location) will be uploaded into NIWA's Freshwater Fish Database. Results will also be provided to the Ministry of Primary Industries, Fish and Game, and the Department of Conservation as a requirement of the required Permits (Section 5) held by ecologist for the purpose of taking and handling of indigenous fish.

7 REFERENCES

Auckland Council. (2025). Auckland Unitary Plan Operative. <https://unitaryplan.aucklandcouncil.govt.nz/>

Joy, M., David, B & Lake, M. (2013). New Zealand Freshwater Fish Sampling Protocols. Wadable Rivers and Streams. Massey University, Palmerston North. ISBN 978-0-473-23437-9

APPENDIX A Stream Site Photos

Table A- 1 Photos and site description of streams within the Puhinui catchment, including S01, S02, and S03

Description: S01 Stream S01 is a permanent stream within the Puhinui catchment. This stream is likely to be impacted by stormwater scour protection.	
Description: S02 Stream S02 is an intermittent stream within the Puhinui catchment. This stream is likely to be impacted by stormwater scour protection. The gully was avoided following road realignment and reduction of the earthwork's footprint.	
Description: S03 Stream S03 is an intermittent stream within the Puhinui catchment. This stream is likely to be impacted by stormwater scour protection. The gully was avoided following road realignment and reduction of the earthwork's footprint.	

Table A- 2 Photos and site description of streams within the Puhinui catchment, including S04, S05, and DS04

Description: S04 Stream S04 is an intermittent stream within the Puhinui catchment. The transitional zone between ephemeral and intermittent sections of the stream are to be culverted and the adjacent raingarden shall discharge at the true left bank of the stream.	
Description: S05 Stream S05 is an intermittent stream within the Puhinui catchment.	
Description: DS04 Stream DS04 is an intermittent stream within the Puhinui catchment. This stream is located within Watercare bush (SEA) and will be subject to culverting at the ephemeral/intermittent transitional zone.	

Table A- 3 Photos and site description of streams within the Puhinui catchment, including S11, DS03, and S12

Description: S11 Stream S11 is an intermittent stream at the headwaters of Puhinui catchment (within SEA), the connected ephemeral tributary is to be culverted.	
Description: DS03 Stream DS03 is an intermittent stream that transitions into ephemeral at the headwaters of the Puhinui catchment (Within SEA). The stream is not directly impacted from works.	
Description: S12 Stream S12 is a permanent stream within the Puhinui catchment (within SEA). The stream will be diverted and bridged.	

Table A- 4 Photos and site description of streams within the Puhinui and Papakura catchment, including S13, S14A, and S14

Description: S13 Stream S13 is a permeant stream within the Puhinui catchment (within SEA). The stream will be diverted and bridged.	
Description: S14A Stream S14A is an intermittent stream within the Papakura catchment. This stream is likely to be impacted by stormwater scour protection.	
Description: S14 Stream S14 is an intermittent stream within the Papakura catchment (Within SEA). The stream will be bridged which may lead to a riparian loss.	

Table A- 5 Photos and site description of streams within the Papakura catchment, including DS05, S16, and S17

Description: DS05 Stream DS05 is a small intermittent/ephemeral stream within the Papakura catchment. The stream is not directly impacted.	
Description: S16 Stream S16 is an intermittent stream within the Papakura catchment. This stream will be diverted to avoid culverting the entirety of the channel.	
Description: S17 Stream S17 is an intermittent stream within the Papakura catchment. This stream will be diverted to avoid culverting the entirety of the channel.	

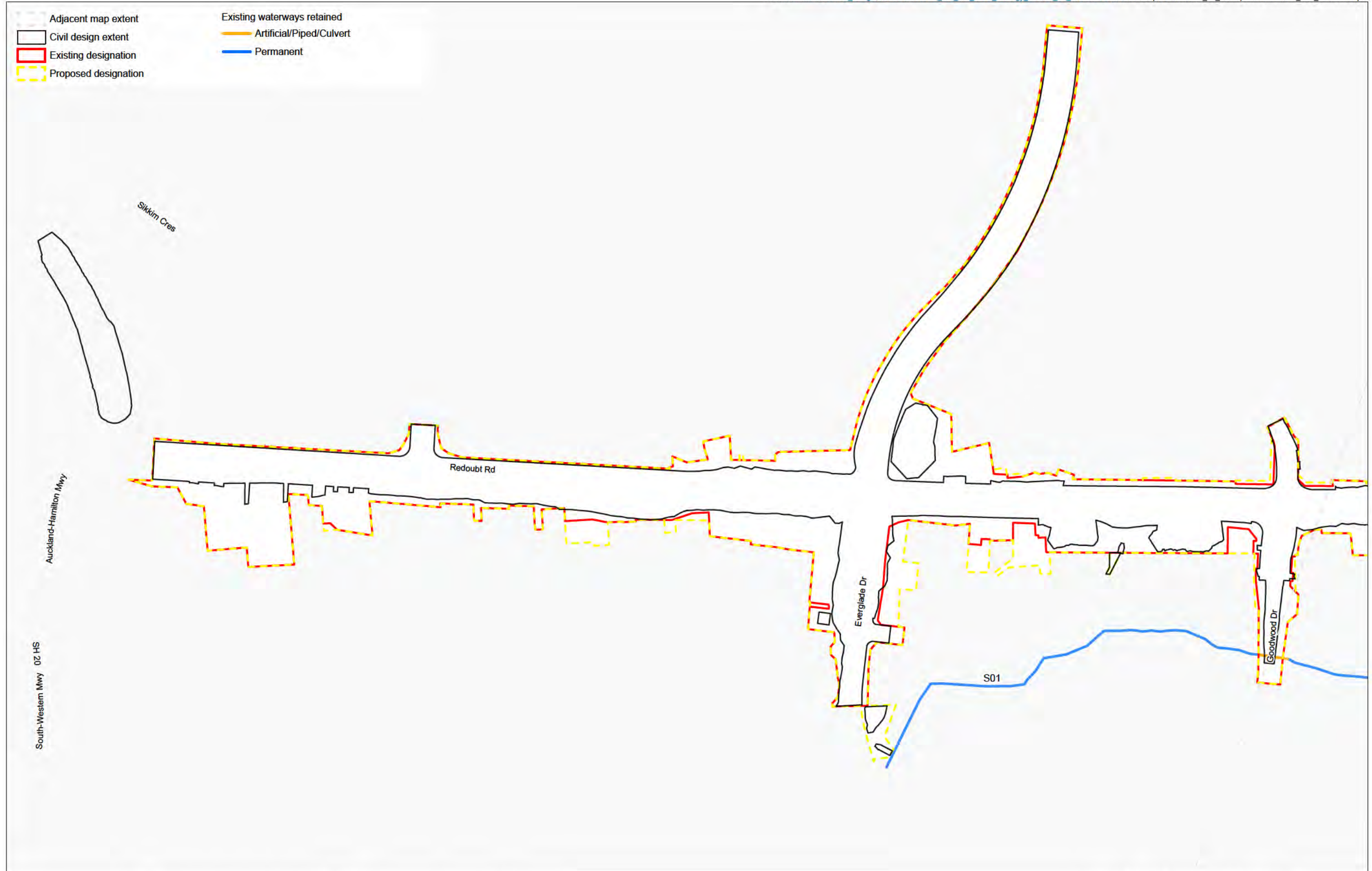
Table A- 6 Photos and site description of streams within the Papakura catchment, including S18, and S19

Description: S18 Stream S18 is an intermittent stream within the Papakura catchment. This stream will be diverted to avoid culverting the entirety of the channel.	
Description: S19 Stream S19 is an intermittent stream within the Papakura catchment. The stream is dominated by exotic wetland vegetation throughout the channel. This stream is located downstream of the Alfriston Roundabout and at the fork of S10 and S21.	

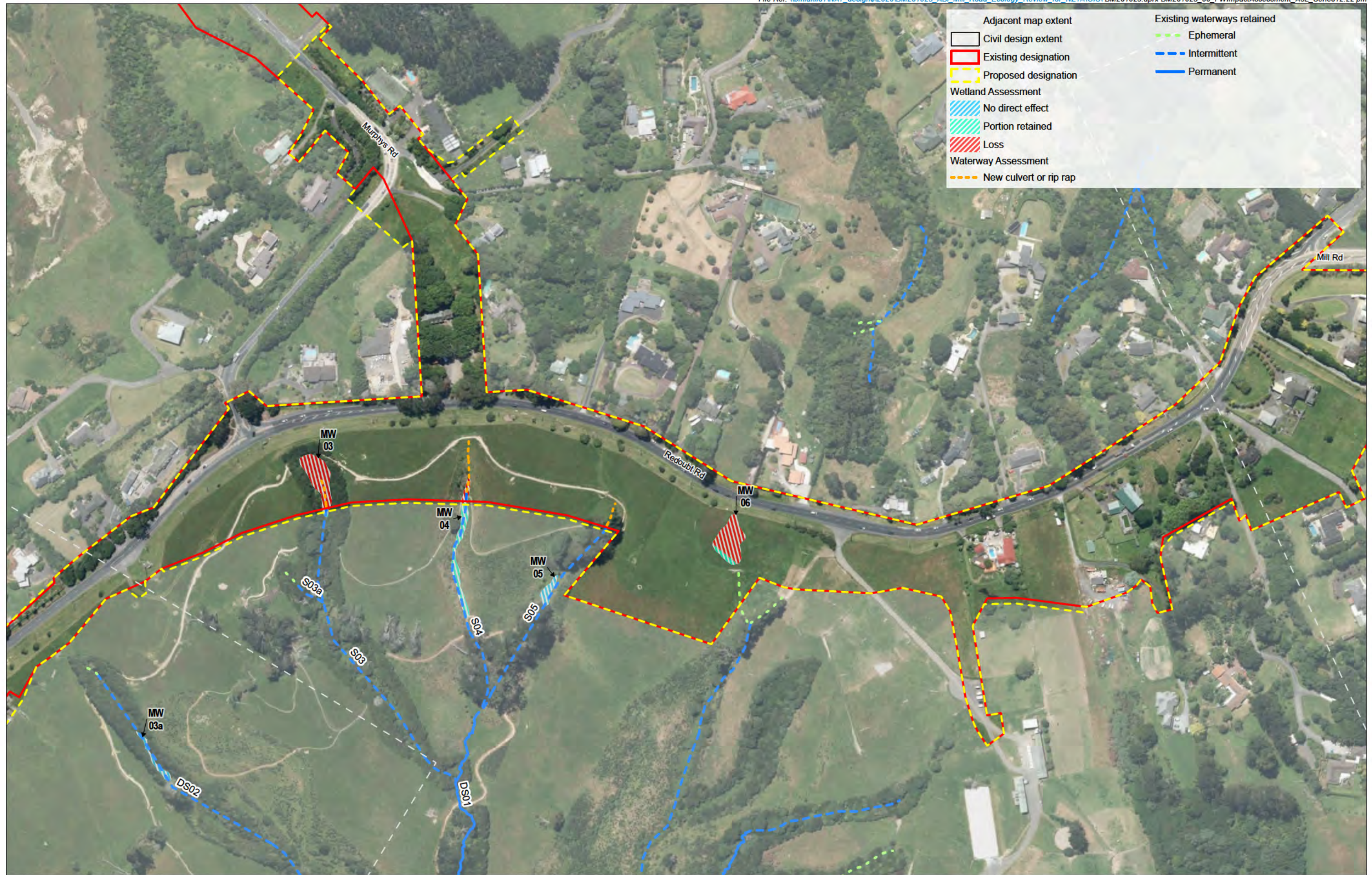
Table A- 7 Photos and site description of streams within the Papakura catchment, including S20, S21, and S22

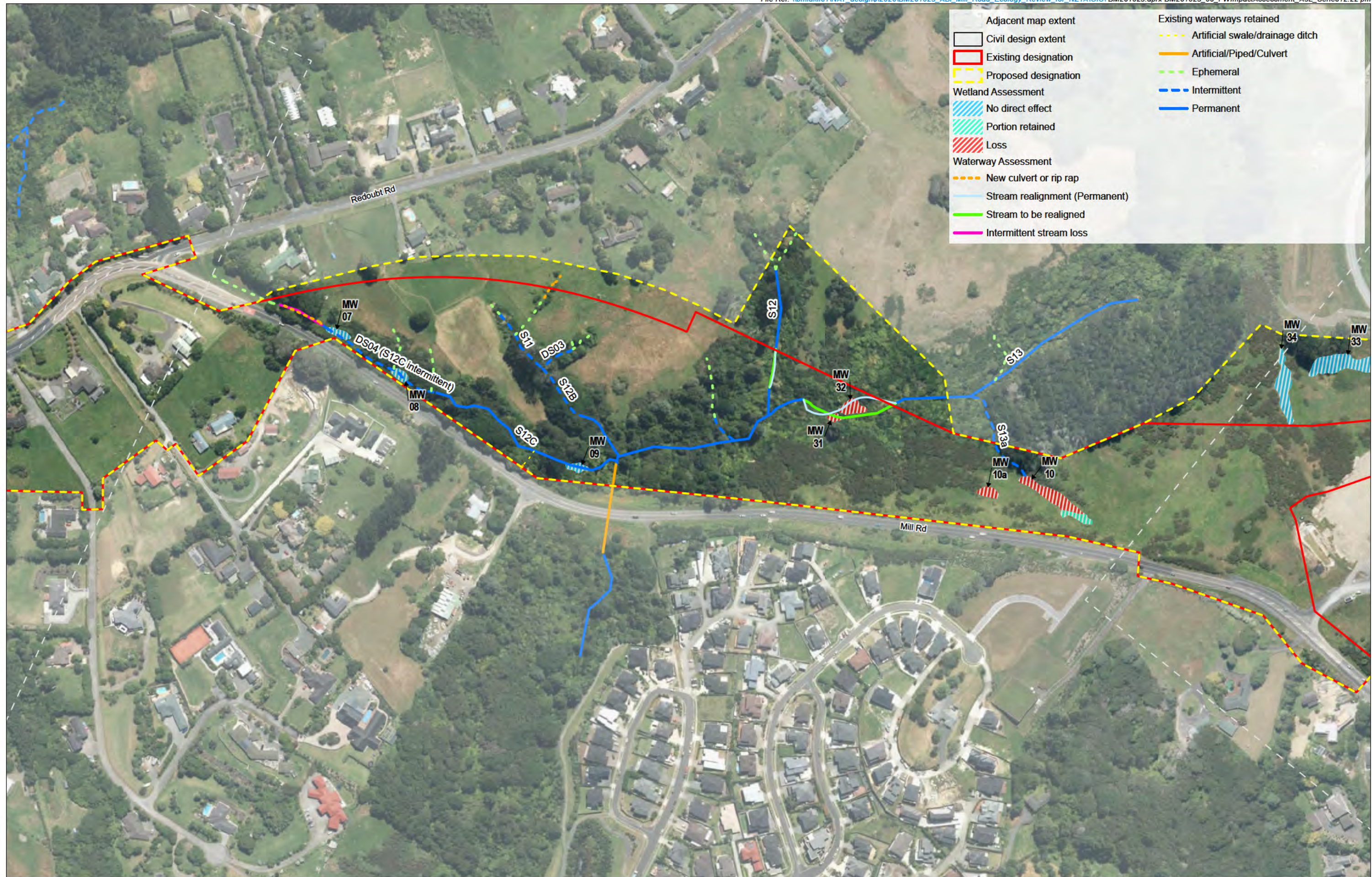
Description: S20 Stream S20 is an intermittent stream within the Papakura catchment. The stream is dominated by wetland vegetation throughout the stream bed. This stream shall be diverted and culverted to accommodate the road alignment.	
Description: S21 Stream S21 is an intermittent stream within the Papakura catchment. This stream shall be culverted to accommodate the road alignment.	
Description: S22 Stream S22 is an intermittent stream within the Papakura catchment. Effects include culvert upgrades to facilitate fish passage and the road alignment.	

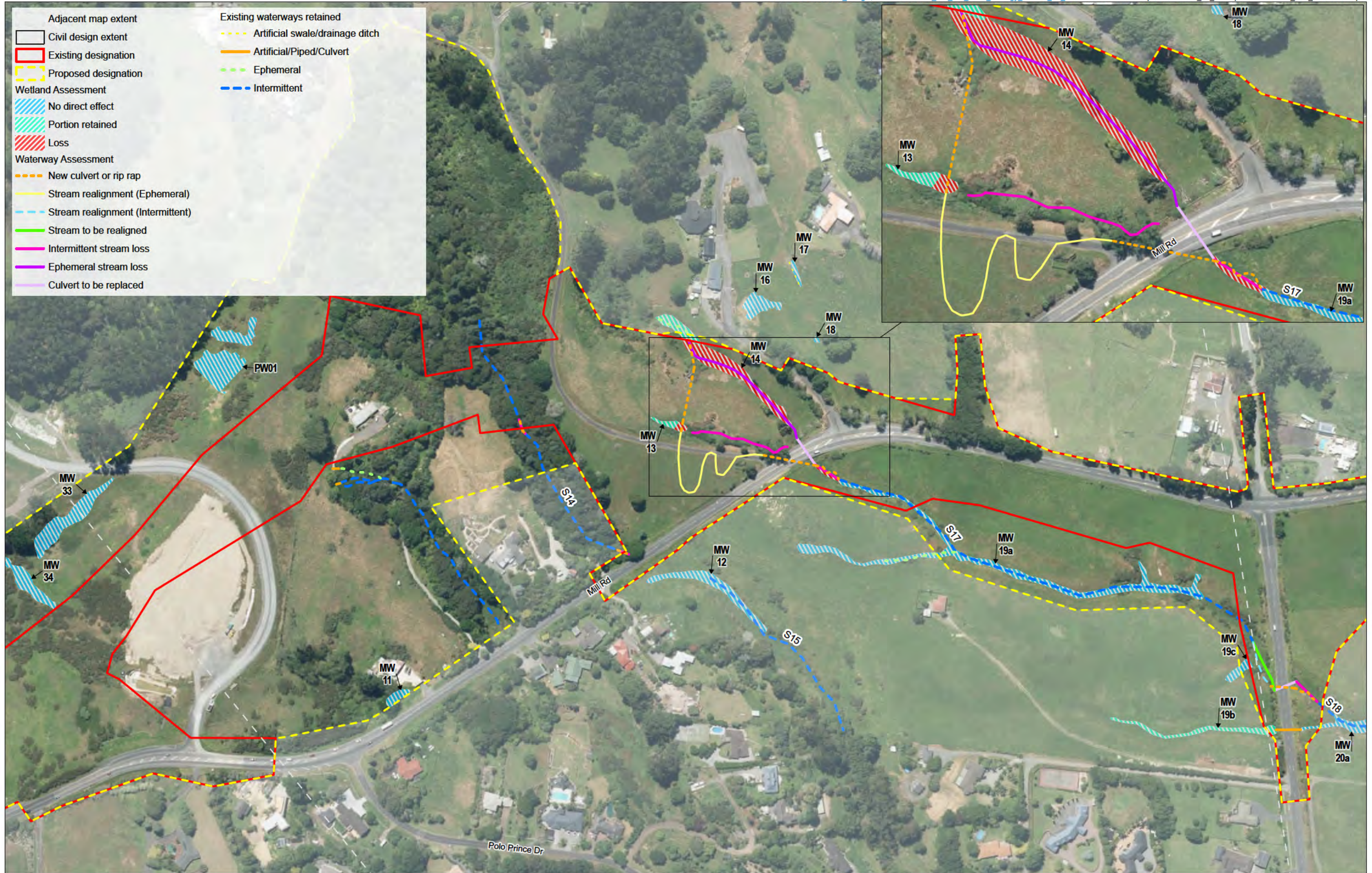
APPENDIX B Site Maps

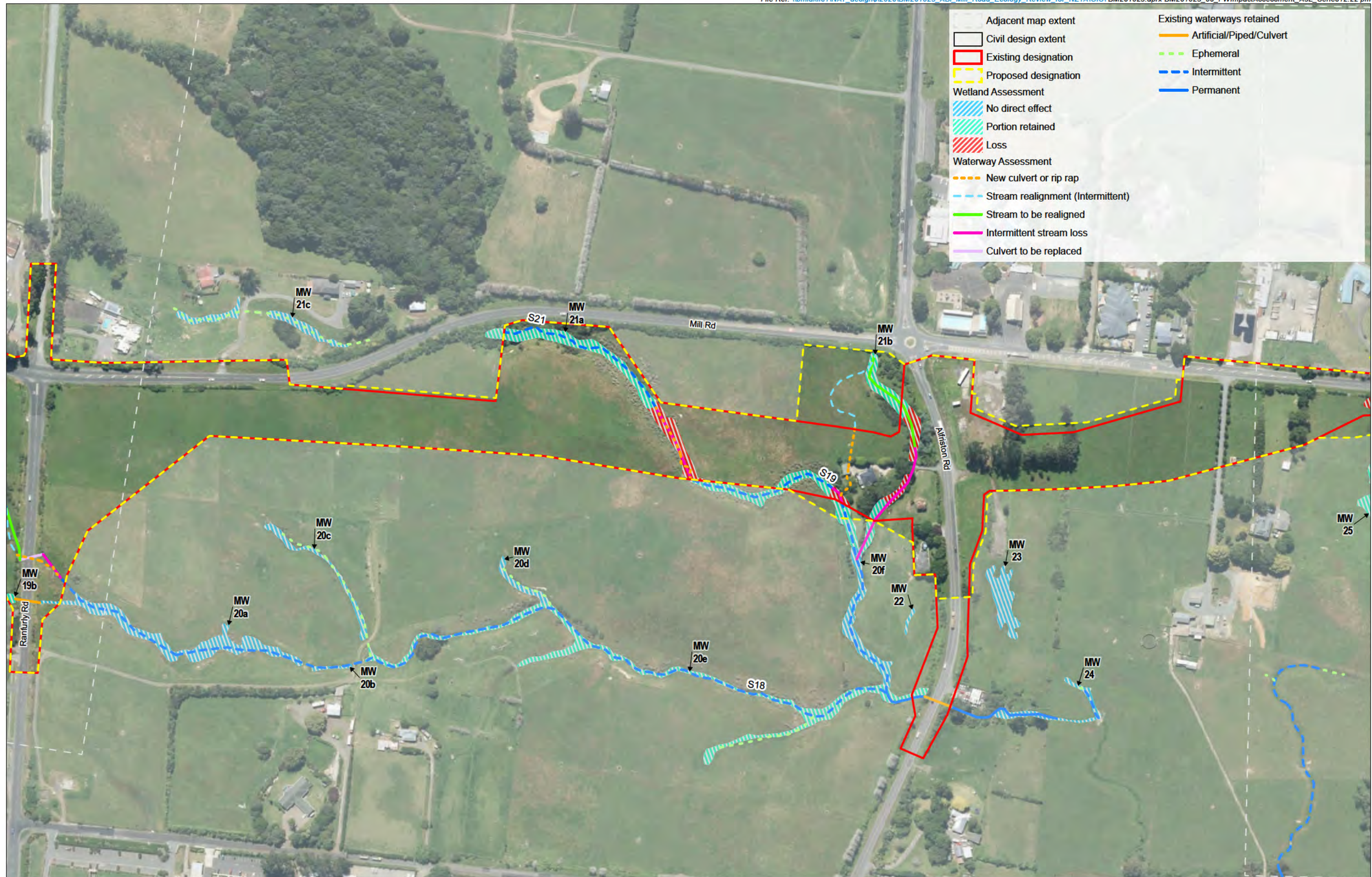




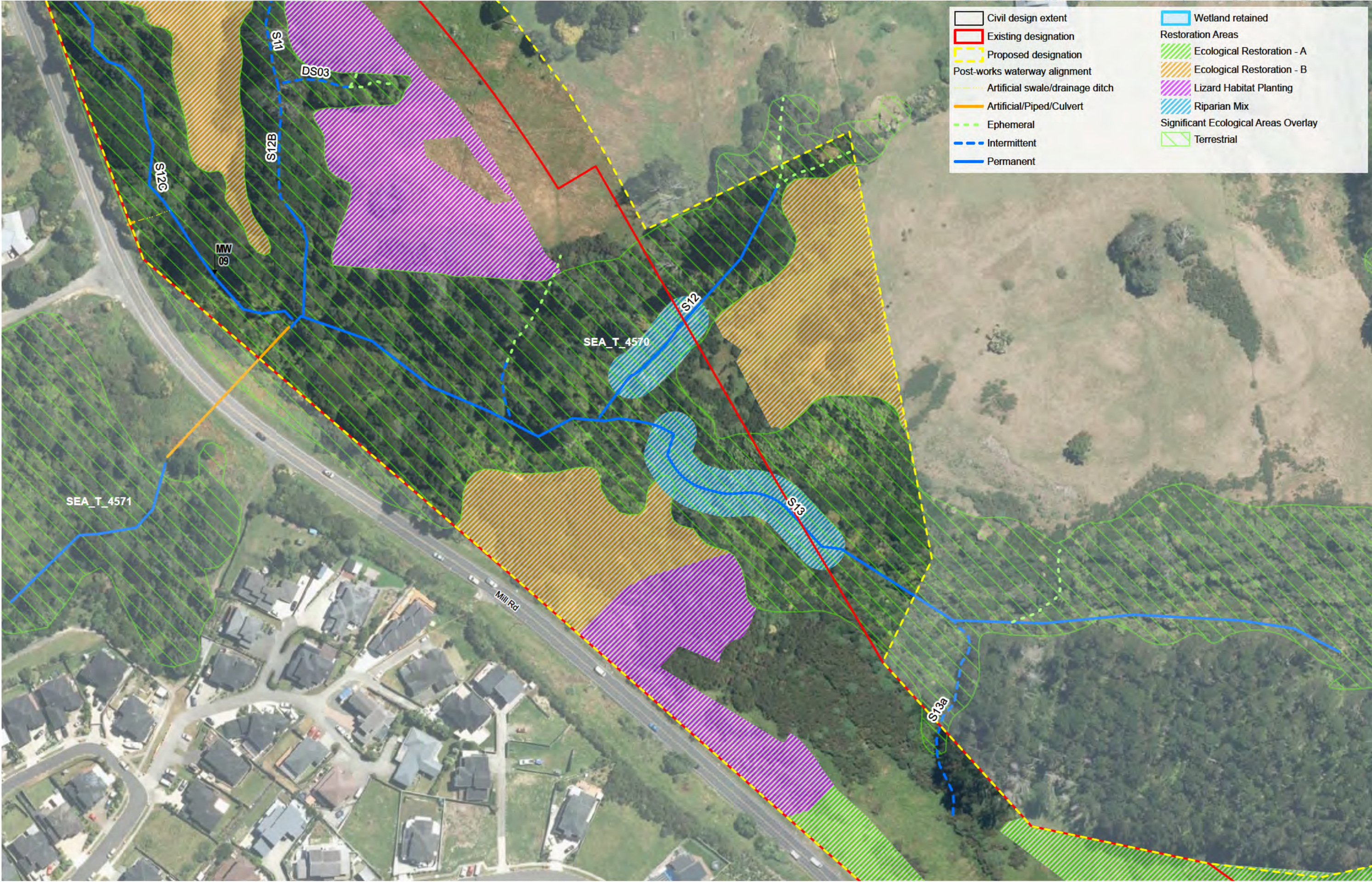


















APPENDIX C Fish Survey Results from EclA

Fish populations were inferred from eDNA surveys⁴, the NZFFD and historical electrofishing survey data⁵ (Table 3-2).

Six native fish species, and two native invertebrate species were recorded in streams within the Project Area or ZOI (Table 3-2). Of these, two have a conservation status of At Risk – Declining, and two of At Risk – Naturally Uncommon. The remaining two species are considered to be Not Threatened. The pest fish species mosquito fish (*Gambusia affinis*) were recorded at stream sites S01, S02, and S22, and may be present within stream sites.

The NZFFD contained two records relevant to the Project Area, downstream of the streams within Totara Park, on the Puhinui Creek, near the confluence with the tributary that flows from the Puhinui Gully, is a record from 2010 (Table 3-2). This included observations for the At Risk Kākahi/ freshwater mussel. While the upstream intermittent reaches impacted by the Project are not suitable for their habitation, they are sensitive to fine sediments and contaminants within the water, with juveniles particularly at risk. At the same location longfin eel were also recorded. A record from 2020, located on S13 within the Puhinui Gully, just upstream of Mill Road, recorded At Risk banded kōkopu, redfin bully, and longfin eel, amongst others (Table 3-2).

Table 3-1 Native freshwater fish species present within the Project stream sites

Species	Scientific Name	Conservation Status (Dunn et al. 2018)	Ecological value	Stream Reaches
Common bully	<i>Gobiomorphus cotidianus</i>	Not Threatened	Low	•S13 •^S13, just upstream of Mill Rd
Cran's bully	<i>Gobiomorphus basalis</i>	At Risk – Naturally Uncommon	Low	^Downstream in Puhinui Creek.
Kōkopu/banded kōkopu	<i>Galaxias fasciatus</i>	At Risk – Naturally Uncommon	Low	*S12, *S12C(B), *S14 •^S13, just upstream of Mill Rd
Redfin bully	<i>Gobiomorphus huttoni</i>	At Risk – Naturally Uncommon	Low	^Downstream in Puhinui Creek. •^S13, just upstream of Mill Rd
Tuna hinahina/shortfin eel	<i>Anguilla australis</i>	Not Threatened	Low	*S03, *S04, *S05, *S11, *S12, *S12C, *S12C(b), *S19, *S20, *S22 •^S13, just upstream of Mill Rd
Tuna kuwharuwharu /longfin eel	<i>Anguilla dieffenbachii</i>	At Risk - Declining	High	*S12, *S12C(b) ^Downstream in Puhinui Creek. •^S13, just upstream of Mill Rd
Kākahi	<i>Echydella menziesii</i>	At Risk - Declining ⁶	High	^Downstream in Puhinui Creek.
Kōura/freshwater crayfish	<i>Paranephrops planifrons</i>	Not Threatened ⁹	Low	*S05, *S12 ^Downstream in Puhinui Creek. •^S13, just upstream of Mill Rd

Notes: * = confirmed by eDNA. • = confirmed by electrofishing in 2020 (also in NZFFD). ^ = NZFFD record.

⁴ Sampling of eDNA was undertaken during summer, when many intermittent streams had little flow.

⁵ Electrofishing data was only collected at site S13 in 2020. Mill Road NZUP Summary Report (NZTA, 2021).

⁶ Grainger, N.; Harding, J.; Drinan, T.; Collier, K.; Smith, B.; Death, R.; Makan, T.; Rolfe, J. 2018: Conservation status of New Zealand freshwater invertebrates, 2018. New Zealand Threat Classification Series 28. Department of Conservation, Wellington. 25 p.