REPORT

Tonkin+Taylor

Resource consent application and assessment of effects on the environment

Maintenance of highly modified and natural rivers and streams

Prepared for
Greater Wellington Regional Council Flood Protection

Prepared by
Tonkin & Taylor Ltd

Date
June 2022

Job Number
1018683 v2

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Document control

Title: Resource consent application and assessment of effects on the environment					
Date	Version	Description	Prepared by:	Reviewed by:	Authorised by:
28/06/22	1	Draft for review	S Bevin	R Calland	P Roan
30/06/22	2	Final for lodgement	S Bevin	R Calland	P Roan

Distribution:

Greater Wellington Regional Council Flood Protection	1 electronic copy
Greater Wellington Regional Council Environmental Regulation	1 electronic copy
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Schedule 4 Requirements

Schedule 4 of the RMA sets out the information required in an application for a resource consent. All relevant matters required to be included have been addressed in the assessments and descriptions in this AEE. The following table provides a summary of the information required in Schedule 4 and a quick reference to its location in this report.

Schedule 4 Item	Location within report
A description of the activity	Section 3
A description of the site at which the activity is to occur	Section 2
The full name and address of each owner or occupier of the site	Section 1.3 and Table 1.1
A description of any other activities that are part of the proposal to which the application relates	N/A
A description of any other resource consents required for the proposal to which the application relates	N/A
An assessment of the activity against the matters set out in Part 2	Section 6.1.1
An assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b). This must include: · Any relevant objectives, policies, or rules in a document · Any relevant requirements, conditions, or permissions in any rules in a document · Any other relevant requirements in a document (for example, in a national environmental standard or other regulations)	Section 6.1
An assessment of the activity's effects on the environment that includes the following information: · If it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity. · An assessment of the actual or potential effect on the environment of the activity. · If the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use. · If the activity includes the discharge of any contaminant, a description of— - The nature of the discharge and the sensitivity of the receiving environment to adverse effects; and - Any possible alternative methods of discharge, including discharge into any other receiving environment. · A description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect.	Section 5
· Identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted.	Section 6.4 and Section 7

Schedule 4 Item	Location within report
· If the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved.	
An assessment of the activity's effects on the environment that addresses the following matters: · Any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects. · Any physical effect on the locality, including any landscape and visual effects. · Any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity. · Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations. · Any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants. · Any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.	Section 5

1 Introduction

1.1 Overview of proposed activity

This Assessment of Effects on the Environment (AEE) report has been prepared on behalf of Greater Wellington Regional Council Flood Protection Flood Protection Group to support a resource consent application to authorise the ongoing maintenance of highly modified rivers and streams and natural rivers/streams across the Kāpiti Coast District and the Wairarapa area for flood protection purposes. These highly modified rivers and streams and natural rivers/streams are collectively described as watercourses throughout this report.

The watercourses that are the subject of this report silt up over time, and the adjacent bank edges and channels become overgrown with weeds and other plants, limiting the hydraulic carrying capacity and overall flood operability of the network. Ongoing maintenance of watercourses is required to ensure that they continue to operate effectively for flood conveyance. Over the duration of this consent, GWRC will seek to reduce the frequency of both mechanical and manual clearance activities through other means, such as increased riparian management.

This report has been prepared in fulfilment of section 88 of the Resource Management Act 1991 (RMA), and in accordance with Tonkin & Taylor Ltd's (T+T) letter of engagement dated 21 October 2021.

1.2 Background

GWRC maintains various watercourses throughout the Wellington Region, including a network of watercourses across the Kāpiti Coast and Wairarapa areas for flood management purposes. These watercourses convey water drained from inland areas, and in some cases carry intermittent stormwater flows. The Kāpiti Coast District Council (KCDC) also maintains a network of watercourses within the KCDC district.

The watercourse schemes were established by the Wairarapa and Manawatu catchment boards under the Land Drainage Act 1908, and the Soil Conservation and Rivers Control Act 1941. The purpose of the schemes was to reduce flooding and improve the production of farmland. Responsibility for the schemes was inherited by GWRC after the Local Government Act 1974, which disestablished the catchment boards. The schemes were established to enable the efficient management of watercourses across land largely in private ownership to an appropriate standard.

1.3 Applicant and property details

Table 1.1: Applicant and property details

Applicant	Greater Wellington Regional Council
Owner/occupier of application site	Various – across the Kāpiti and Wairarapa areas
Site address / map reference	Various
Site area	Not applicable
Legal description	Various
Certificate of Title reference	Various
District Council / Plans	Kāpiti Coast District Plan, Combined Wairarapa District Plan
Regional Council / Plans	Proposed Natural Resources Plan

Address for service during consent processing	Tonkin + Taylor, PO Box 2083, Wellington 6140 Attention: Sarah Bevin Phone: 04 806 4905 / 027 511 4877 Email: sbevin@tonkintaylor.co.nz
Address for service during consent implementation and invoicing	Greater Wellington Regional Council, 100 Cuba Street, PO Box 11646, Wellington Attention: Jacky Cox Phone: 027 255 8636 Email: jacky.cox@gw.govt.nz

We attach copies of the application forms in Appendix A and plans of the application area in Appendix B.

1.4 Overview of resource consent requirements

Rule 121B of the Proposal Natural Resources Plan (PNRP) provides for the removal of aquatic vegetation and/or accumulated sediment from the bed of a highly modified river or stream or a stream used to convey stormwater by a local authority, as a restricted discretionary activity. The maintenance activities envisaged by this application require resource consent under this rule.

1.5 Consent duration

Resource consent is sought for a duration of 35 years.

2 Environmental setting

2.1 Site location and description

The watercourses subject to this application cover areas within both the Kāpiti Coast District and across the Wairarapa. Plans showing the general extent and location of the network of watercourses maintained by GWRC are provided in Appendix B to this report.

The watercourses cross a variety of areas across the districts, from urban areas to rural farmland. Often, these watercourses are located on land that is privately owned. Photographs 1-4 below provide examples of typical highly modified rivers and streams in the Wairarapa.

Photograph 1: Manaia Road

Photograph 2: Battersea

Photograph 4: Works undertaken to unblock a culvert during rain

Photograph 3: Duddings Line

2.2 Ecology

A comprehensive ecology report has been prepared to support the application and this is provided in Appendix C to this report. The below information is a summary only and should be read in conjunction with the full ecology assessment. The assessment discusses and assesses both watercourses classified as highly modified rivers and streams and those classed as natural rivers/streams. The ecology assessment provides a high-level desktop review of the ecological information available to assign ecological values to the areas subject to this application.

2.2.1 Freshwater ecology

2.2.1.1 Kāpiti Coast

The majority of watercourses subject to the application are located around the Ōtaki township, both north and south of the Ōtaki River, while the Waimeha Stream is located in the Waikanae township. These watercourses are classed as both highly modified rivers and streams and natural rivers/streams in the PNRP.

Overall, there is wide variation in the quality of aquatic habitat present in the watercourses subject to the application. Many of the watercourses have low habitat diversity, limited riparian vegetation and lack of instream structure. The natural watercourses have higher values mainly due to their more natural meandering form.

Eight of the watercourses have previously been assessed using rapid habitat assessments, which noted that the watercourses are degraded, with deposited sediment covering a lot of the stream bottoms and few hydraulic components (pools, runs). The sites assessed had low levels of bank failure, with few sites experiencing active erosion on the banks. Vegetation along the banks is generally limited to grazed exotic pasture, long grasses or shrubs, some tree cover and exotic forestry. Riparian width was also limited, with the majority of sites having less than 2 m of riparian margin. Invertebrate habitat and diversity was assessed as low, although fish cover diversity and abundance was variable across sites, with some areas having woody debris, boulders, and cobbles, providing habitat.

Freshwater fauna habitat is generally better in the natural rivers/streams than the highly modified rivers and streams, with a number of natural watercourses identified as significant natural ecosystems, providing habitat for various species.

Limited information is available on water quality in most of the watercourses subject to this application. Two sites within the wider application area are State of the Environment (SoE) reporting sites, which are both located on the Mangapouri Stream, and the results from these sites shows that water quality there is generally poor. The macroinvertebrate community present in waterways provide an ecological indicator of water quality and in the watercourses subject to this application, the macroinvertebrate community scores (MCI) of the Mangapouri Stream indicated a moderate level of pollution and fair habitat quality.

Eight wetland areas and one potential significant natural wetland were identified within 500 m of the watercourses subject to this application, with some of the watercourses draining into these wetland areas. It is also noted that other lower value wetland areas may also be present around the proposed watercourses.

Fish surveys were undertaken by GWRC in December 2020 and January 2021 and these surveys detected six species present in five of the watercourses subject to this application. Inanga and shortfin eels were present at all eight sites subject to the survey and longfin eels at seven of the surveyed sites. Common bullies, giant bullies and kokopu were present in some watercourses.

2.2.1.2 Wairarapa

There are approximately 145 km of highly modified watercourse networks in the Wairarapa, in the lower Ruamāhanga River Catchment. These watercourses are classed as highly modified rivers and streams in the PNRP. The watercourses are channelised and soft- bottomed with moderate to high levels of aquatic macrophytes. Throughout the network, the water flows, wetted width, water velocity and clarity vary, and riparian vegetation is limited. Several watercourses are located on roadsides within the road reserve, areas which undergo regular maintenance and spraying.

The Onoke Drainage Scheme, one of the watercourses subject to the application, is part of the network of GWRC monitoring sites (Ref RAN032). The monitoring results from this location generally show a low Rapid Habitat Assessment score, with fine sediment covering the entire channel. Not surprisingly, invertebrate habitat abundance and diversity were also low. The riparian vegetation is also generally grasses, and of narrow width. Fish habitat diversity was also low, with only two habitat types present. Nonetheless, fish habitat availability was higher, with 60% of the stream containing suitable fish habitat. The stream also had very low erosion rates.

Water quality is typically poor in the drains, with low oxygen concentrations limiting fish colonisation. The Onoke Drainage Scheme received an MCI score that indicates probably moderate pollution and fair water quality. Six significant natural wetlands are located within 500 m of the watercourses subject to this application. Some of these wetlands are located adjacent to the watercourses subject to this application and others are located nearby such that they may be affected by maintenance activities. Three of the wetland sites that may be affected form part of the Wairarapa Moana. Additional, lower value wetlands may also be present in the wider area.

A review of the New Zealand Freshwater Fish Database and fishing records from 2013 found 13 species of fish and one invertebrate species associated with the Wairarapa watercourses. In general, the fish community in the Wairarapa is less diverse than that of the Kāpiti Coast. A survey undertaken in 2013 found that the watercourses support both native and exotic freshwater fauna. Overall fish diversity was low, and shortfin eels the most common species, found in 80% of the watercourses. Other native fauna included koura, longfin eel, common bully, upland bully inanga, banded kokopu and others. A number of sites contained brown mudfish. The exotic fish species found included brown trout, perch, rudd and goldfish.

2.2.2 Terrestrial ecology

2.2.2.1 **Kā**piti Coast

Ground cover in the areas of the highly modified rivers and streams is a mix of exotic grassland, with some urban areas, parkland and open space, and short rotation cropland.

A number of surveys have been undertaken by the Department of Conservation (DoC) to detect long-tailed bats in the Kāpiti Coast area, and these surveys did not detect bats within the vicinity of the watercourses covered by this application. In addition, there are very few records for lizards near the areas subject to this application, however records show that the copper skink has been recorded in the area, and other species may be present in the vegetation near the watercourses. These include the ornate skink, barking gecko, and southern bell frog.

A review of the records of bird sightings found that a number of inland and coastal birds are present in the area of the watercourses. In particular, the nearby river mouths provide significant and important coastal habitat for a variety of species. A total of 24 wetland and coastal bird species have been recorded on or near the watercourses subject to this application. It is noted that terrestrial birds are unlikely to be affected by the proposed activities and have therefore been excluded from the assessment.

2.2.2.2 Wairarapa

Land cover in the Wairarapa is mostly high producing exotic grassland with some areas of short rotation cropland. A network of culturally significant wetlands and rivers are located west of the network of highly modified rivers and streams known as the Wairarapa Moana.

Very few surveys of long-tailed bats have been undertaken on the Plains or lowlands. Bats have been recorded in areas of indigenous forest on the hills, some distance from the sites subject to this application. The Ruakawa gecko has been recorded at the Battersea Drain Maintenance Scheme. Other species found nearby that may be present in the application area include the common skink, spotted skink, barking gecko, ngahere gecko and the copper skink. Southern bell frogs have also been identified at three locations around the shoreline of Lake Wairarapa. These records include the Onoke Drainage Scheme, the nearby Te Hopai Drainage Scheme and the Battersea Drain Maintenance Scheme.

Records show a number of bird species present within and nearby the Wairarapa drainage schemes. A total of 18 riverine and wetland bird species have been recorded on or near the drainage schemes. Terrestrial birds including the kingfisher, welcome swallow, swamp harrier, fantail and kereru are present, although unlikely to be affected by the proposed maintenance activities.

2.2.3 Summary of ecological value

The ecological value of the highly modified rivers and streams has been assessed as low to high in the ecological assessment. While the macroinvertebrate data is scarce, it does indicate poor water quality, as shown by the MCI score of 66 (moderate). The stream habitat is modified, and the stream banks are often actively managed. The high ecological score for some watercourses is driven by the presence of At-Risk species including mud fish, longfin eel and inanga.

The ecological value of the natural rivers/streams is assessed as moderate to high. Although water quality and habitat of these watercourses is degraded, it is slightly better than the highly modified rivers and streams. The MCI values fall within the moderate and high scoring bands. The main reason the report scores some of the natural watercourses as high value is their significance as inanga spawning sites and the high diversity of indigenous fish species.

Several receiving environments downstream of the watercourses subject to this application have been assessed as having high ecological value. The Wairarapa Moana includes several hectares of wetland and several kilometres of river having very high ecological value.

Generally, the watercourses have limited vegetation due to regular spraying, mowing and maintenance actions. The ecological value of the riparian vegetation is considered to be low or very low depending on the specific species present. Vegetation that is not frequently disturbed is likely to have higher ecological value, as it is able to provide habitat. Riparian planting has occurred along sections of the watercourses in the Kāpiti Coast, and some of these areas have been assessed as having moderate ecological value. Overall, the riparian vegetation has between low and moderate value.

The value of the freshwater and terrestrial fauna varies depending on the location. At some sites the value will be negligible, and at others may have very high value due to the presence of threatened native species.

3 Description of proposed works

3.1 Proposed works

The applicant seeks resource consent to continue to maintain the watercourses it has responsibility for throughout the Kāpiti Coast District and in the Wairarapa. These watercourses are shown in the plans provided in Appendix B. This work includes the removal of unconsolidated fine sediment that has been deposited on the bed of the watercourse since it was last cleared, and the removal of weeds and overgrown plants. The deepening and/or widening of the watercourse beyond the original cross-section is not intended as part of these works. The watercourses will be maintained on an as required basis, and no more than is required to maintain flows and the flood conveyance capacity of the network.

All works are supervised by a suitably qualified person approved by GW.

3.1.1 Methodology

The works are undertaken using a mechanical excavator or other mechanical means, a weed boat, or by using hand tools. The works are generally undertaken as follows:

- Machinery is operated from the banks of the watercourse rather than within it wherever possible.
- Disturbance to the banks is limited to one side of the watercourse (although this may vary from side to side).
- Works will commence at the upstream end of the works site, and progress downstream, unless this is not practical, i.e.
  - The works are to clear isolated blockages
  - Manual clearing is being undertaken, where the upstream vegetation is entangled with the downstream
  - Any restrictions in times of access to parts of the drain, i.e. Traffic Management requirements.
- A self-draining ‘weed bucket’ is used in gravel bedded watercourses. This provides for easy drainage of water as well as the release of any trapped fish.
- A conventional bucket is used in watercourses with large volumes of sediment.
- Various types of sediment traps are utilised as required and as suited to the specific watercourse, including the following options:
  - silt fences,
  - haybales, or
  - retaining a section of undisturbed vegetation downstream.
- Excavated bed material is placed on the bank in a suitable location so that it does not re-enter the watercourse, while also being located to allow stranded fish/eels to make their way back to the watercourse.
- Alternatively, the excavated material may be removed from the site and disposed of appropriately.
- Where works occur in areas of limited space such as roadsides, the material is removed and placed nearby, i.e. a paddock, where the material is then searched for any fish, and any found are returned to the watercourse.
- Material placed on roadside areas such that it is prevented from washing back into the watercourse may be removed as required, usually every few years.

3.2 Fish management and salvage

The following measures and practices will be utilised to manage works undertaken in the watercourses that have the potential to affect fish:

- When fish are observed in the extraction area, the digger operator keeps the bucket submerged at the end of each cut to give any fish an opportunity to escape.
- Material removed from the watercourse will be visually checked for fish following its removal from the waterway. Any stranded fish will be returned to the watercourse at a site unaffected by the clearance activities (i.e. upstream) as soon as practicable.
- At least one observer (in addition to the machinery operator) will be present for the works, to assist with finding, capturing and relocating trapped fish.
- Any fish within the watercourse exhibiting obvious signs of distress (e.g. surface breathing, loss of equilibrium from the channel) will be recovered and relocated by the operator to clear water upstream of the works.
- Any pest species found are excluded from the actions above, and will be disposed of appropriately and humanely.

3.3 Aquatic plant management

Approximately 10% of aquatic vegetation, as determined by the activity manager, will be retained to assist with the re-colonisation of aquatic organisms and plants to provide refuge for aquatic fauna. This 10% is spread along the work site or grouped into discrete lengths. In addition:

- Any significant patches of native or valued (e.g. watercress) macrophytes are identified and included within the 10% of aquatic vegetation retained. If the valued macrophytes covers more than 10%, then the percentage of area retained may be more than 10%. Where greater areas are retained, vegetation on the edges will be retained in preference to vegetation in the watercourse, which can cause blockages.
- Selected ecological refuge areas are left in the channel at intervals to assist in re-colonisation of the invertebrate and fish populations present in the watercourse.
- Instream woody debris are not removed, except where they pose a flood or erosion risk, or a hazard to recreational users.
- Where works are proposed within areas of known mahinga kai value, and where possible, local iwi are advised of the upcoming works, so that any mahinga kai can be gathered before the works occur.

3.4 Other actions and mitigation measures

In addition to the above, other actions will be used during works, including but not be limited to:

- Requirements (including setbacks) regarding the refuelling of machinery and any storage of hazardous substances (such as fuel).
- The use of sediment and erosion control measures during earthworks.
- The protocol to be followed in the event of an accidental discovery of archaeological material.

3.5 Duration and timing

The watercourses will be maintained on an as required basis and no more than is required to maintain flows and the flood conveyance capacity of the network. Works are timed in consideration of spawning season and other limitations, although some work is reactive to particular circumstances (i.e. to clear localised blockages). The trigger for works being required is either an

inspection undertaken by GWRC, or a report by the landowner to confirm vegetation growth or sediment levels are at or approaching a level that is affecting the performance of the watercourse.

3.5.1 Vegetation removal

In the Wairarapa area, vegetation in the watercourses is removed using manual methods. In a typical year less than 5% of the network by length would be subject to vegetation clearance. The aspiration is to undertake these works using a machine every 5-6 years, i.e. 15% - 20% length per year average.

In the Kāpiti district, weed boats are used and in the wider and deeper channels, the aspiration is to operate the weed boat twice a year. Approximately 80% of the remainder of the watercourses, typically in rural areas, are machine cleaned each year, mainly with a weed bucket.

3.5.2 Sediment removal

In the Wairarapa, sediment removal is generally only undertaken on an as required basis. This activity does not occur often and is undertaken on less than 5% of the average length of drain annually.

Sediment removal is not undertaken often in the Kāpiti district, generally once every 10 years.

3.6 Monitoring

As required by Schedule X of the PNRP, GWRC has prepared a draft Vegetation and Sediment Removal Management Plan to support the application. This Plan is provided as Appendix D to this report. This Plan includes measures to manage and monitor the removal activities.

3.7 Consideration of alternatives

In considering the alternatives for undertaking this activity and the nature of the works, it is recognised that the discharge associated with the works is generally unavoidable as the works are within the water, and the sediment being removed is located within the water itself. However, various management practices can be employed when undertaking the works to minimise the extent of sediment disturbance within the area, along with methods to capture sediment discharge, including silt fences, haybales and other mechanisms. The option to do nothing was discounted due to the essential nature of the works, to maintain the carrying capacity of the watercourses, to assist in preventing flooding the adjacent land.

4 Resource consent requirements

The requirements for resource consents are determined by the rules in the PNRP. The rules which apply are determined by the zoning of the site, any identified notations in the plan and the nature of the activities proposed.

4.1 Proposed Natural Resources Plan

Table 4.1: Resource consents required

Proposed activity	Rule	Assessment	Activity status
Removal of aquatic vegetation and/or accumulated sediment from the bed of a highly modified river or stream	Rule R121B: The removal of aquatic vegetation and/or accumulated sediment by a local authority from the bed of a highly modified river or stream and other streams used to convey stormwater in an urban area to manage the hazard risk of flooding to people, property, infrastructure and communities, or to maintain the efficiency of water races, including any associated: a disturbance of the bed, and b deposition on the bed, and c diversion of water, and d discharge of sediment to water is a restricted discretionary activity, provided the following condition is met: e the resource consent application includes a vegetation and sediment removal management plan in accordance with Schedule X (Vegetation and sediment removal plan).	Rule R121B provides for the removal of aquatic vegetation and/or accumulated sediment and associated activities by a local authority from the bed of highly modified rivers or streams to manage the hazard risk of flooding as a restricted discretionary activity provided that a 'Vegetation and Sediment Removal Management Plan' prepared in accordance with Schedule X is provided with the application. This management plan is attached in Appendix D of this application. Therefore, the activity is a restricted discretionary activity pursuant to Rule 121B of the PNRP.	Restricted discretionary activity

Under Rule 121B the Council has restricted its discretion to the following matters:

- *The contents and implementation of the vegetation and sediment removal management plan in accordance with Schedule X.*
- *Management of adverse effects, including cumulative effects, on aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use.*

- *Management of adverse effects on sites identified in Schedule A (outstanding water bodies), Schedule C (mana whenua), and Schedule F (indigenous biodiversity).*
- *The benefits of flood risk mitigation.*

Where a rule of a proposed Plan has not been appealed as is the case with Rule 121B, in accordance with Section 86F it must be treated as operative (and any previous rule as inoperative). Therefore, no analysis of the Regional Freshwater Plan has been undertaken.

4.2 Existing resource consents

Greater Wellington does not hold any existing resource consents for this activity as it was previously a permitted activity under the Regional Freshwater Plan.

4.3 Other consents and approvals required

No other consents or approvals are required.

5 Assessment of effects on the environment

5.1 Introduction

The following assessment identifies and assesses the types of effects that may arise from the proposed works. This assessment also outlines the measures that the applicant proposes to avoid, remedy or mitigate any potential adverse effects on the environment, as prescribed by the matters listed in Rule R121B. The below assessment is limited to these matters.

The actual and potential effects on the environment identified are limited to those as including:

- Positive effects, including flood risk mitigation;
- Effects on ecosystem health and mahinga kai;
- Effects on contact recreation and Māori customary use;
- Cumulative effects; and
- Content and Implementation of the Plan prepared under Schedule X

5.2 Positive effects

The maintenance activities have a number of positive effects. The watercourses subject to this application are all located in areas of identified and modelled flood hazard. The properties which the schemes service may be put at risk if the watercourses are not maintained. The properties are mainly farmland, and contain many dwellings and other private property, roads and infrastructure.

Weed and sediment removal assists in maintaining the flood carrying capacity of the channel. Reduced capacity elevates water levels in the watercourse, increasing flooding of the adjacent land. Increased watercourse 'roughness' due to weed growth also slows flows, extending the time taken for the land to drain again after a flood event, while also encouraging the deposition of sediment. This slow drainage can cause increased damage of land and other property. Removal of vegetation can also improve the levels of dissolved oxygen in the watercourse, providing a more appropriate habitat for aquatic life. Maintenance can also help control pest plant species.

Maintaining the watercourses reduces the potential for blockages and clears existing blockages caused by sediment or vegetation. In a flood event, excess vegetation can become dislodged in situ and cause blockages downstream. These blockages often occur at culverts, bridges and weirs, and can redirect the water causing damage to that structure as well as accessways, fences, and other infrastructure and property.

By allowing for free drainage, the schemes maintain lower groundwater levels to minimise pasture damage. Consequently, higher yields in livestock and cropping farms, can be achieved. If the schemes were not maintained the land would likely return to its pre-development state, reducing production. The exact economic benefit of each scheme is not understood. However, for the schemes in the lower Wairarapa valley, the benefit is estimated at $600,000 per annum, which includes $200,000 private benefit to the landowners (Source: Report from Sapere Research Group titled Flood, drainage and erosion protection benefits of Lower Wairarapa Valley Development Scheme, 2015).

5.3 Effects on ecosystem health and mahinga kai

The ecological assessment provided in Appendix C discusses the actual and potential effects in detail and this section is provided as a summary only. The report acknowledges the watercourses as an already modified environment and addresses the effects as such.

In general, the potential adverse effects expected to occur include a short-term reduction in water quality in the area of works, a loss and simplification of aquatic habitat, removal and direct mortality of macroinvertebrates and fish during the works, disturbance of riparian vegetation, the removal of instream food sources, the spread of pest plants via machinery, the discharge of sediment, the disturbance of bird habitat, changes to hydrology in adjacent areas, and effects on indigenous terrestrial fauna.

Increased suspended sediment results in less light penetration and visual clarity in the water column, smothering of plants and reducing food availability, the clogging of fish and invertebrate gills, and disruption to fish passage, among other effects. The maintenance of watercourses by mechanical means has been known to result in large spikes in suspended sediment, which decrease upon completion of the works. The timing and extent of works (i.e. length of works undertaken at any time) is determined by the operator trained in the required procedures, following an assessment protocol outlined in the Vegetation and Sediment Removal Management Plan provided in Appendix D, to manage the level of effect from the disturbance of sediment, and retaining a section of undisturbed area, or employing other sediment control measures such as silt fences or haybales.

Sediment disturbance usually also causes low dissolved oxygen in the water column, due to amounts of decomposing organic matter within the sediment. Low dissolved oxygen can have effects on fish as it is essential for respiration, causing stress, surface respiration and changes in behaviours due to stress. Low dissolved oxygen already present in the watercourse can cause mortality in some species, well before the increase in sediment load would do so.

Long term works have the potential to affect the ultimate receiving environment, which many have different ecological characteristics. While the watercourses themselves are relatively tolerant of the conditions, the receiving environments may not be. Sediment suspension has been known to release nutrients into the water, which may affect a receiving environment such as a lake or wetland, which tend to accumulate these nutrients.

The removal of vegetation from the watercourses results in the loss of vegetation cover and spawning vegetation for fish, freshwater crayfish and mussels, and invertebrates present in the watercourse. The works would also result in the removal of habitat and food sources for benthic invertebrates and fish, including for spawning. Evidence has shown that habitat recovery is relatively rapid, with species relocating up undisturbed areas before returning to the area within one to three years following the disturbance. As the watercourses subject to this application are a network maintained over time, the cumulative effects of this ongoing disturbance have been recognised in the ecological assessment.

The maintenance activities have the potential to result in a range of effects on freshwater fauna, in addition to those discussed above. The effect from direct mortality is considered to be high, as many macroinvertebrates will be either attached to vegetation or within the sediment removed, or in the water column itself. Procedures undertaken during the works to manage the effects on fish and invertebrates, including inspections of the watercourse prior to works commencing, and appropriate use of the bucket during works, assists in minimising these effects. The capacity of fauna to recover from the effects of the maintenance activities is likely to be a result of their existing tolerance to poor habitat conditions and an ability to recolonise the disturbed areas.

Effects on terrestrial fauna are likely to occur from noise dust and vibration from the use of machinery associated with the works. Given the nature of the location of these works, and the populations of fauna present, the effects are considered to be low.

Managing the adverse effects identified in the ecology report will generally occur through the management procedures already in place for the works and described in Section 3. In addition, an assessment of the requirement for works should be undertaken for each site, as described in the Vegetation and Sediment Removal Management Plan provided in Appendix D. Further refinement of

the good practices should be undertaken over time to further manage the effects of the activity on the ecosystem health of the watercourses.

Overall, given the proposed management procedures in place for the works, the effects on ecosystem health are considered to be minor.

5.4 Effects on contact recreation and Māori customary use

The majority of watercourses are located within private property and therefore not accessible to the public. Where the watercourses are on public land (i.e. a roadside) they are accessible to the public and in theory could be used for contract recreation, although given the nature of the watercourses (roadside drains) it is considered unlikely that such use of these watercourses would occur.

Where works are proposed within areas of known mahinga kai value, and where possible, the applicant contacts local iwi to inform them of the proposed works, prior to the works occurring, so that any mahinga kai (fish, watercress etc) can be gathered before the works occur. Overall, the effects are considered to be minor.

5.5 Cumulative effects

The frequency and location of the works has the potential to result in cumulative adverse effects on the watercourses, and these are described in the ecological assessment provided in Appendix C. The management of the watercourses is subject to the schemes as operated, and as such works are prioritised and scheduled throughout the year. As noted in Section 3.5, the activities sometimes do not occur for a number of years. Given the frequency of works and the extent of reach subject to works at any one time, any such cumulative effects are able to be managed to ensure that the overall cumulative effects are minor.

5.6 Management Plan adequacy

The Vegetation and Sediment Removal Management Plan has been prepared in consultation with the operations staff and the project ecologist, to adequately cover all aspects as required by Schedule X of the PNRP. This document is intended to be a living document which will be updated as procedures and maintenance regimes are adapted over time.

5.7 Summary

Overall, following the assessment above, which covers the required effects, it is considered that the maintenance of watercourses will have a minor effect on the environment.

6 Statutory assessment

6.1 RMA assessment

Section 104 of the RMA sets out the matters to which a consent authority must have regard to, subject to Part 2 of the RMA, when considering an application for resource consent. These are:

- Any actual and potential effects on the environment of allowing the activity (refer Section 5 above);
- Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity;
- Any relevant provisions of:
  - a national environmental standard
  - other regulations
  - a national policy statement
  - a New Zealand coastal policy statement
  - a regional policy statement or proposed regional policy statement
  - a plan or proposed plan
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

6.1.1 Part 2 of the RMA

Part 2 of the RMA sets out the purpose and principles of the Act. The purpose of the RMA, as described in section 5, is to promote the sustainable management of natural and physical resources. This application is consistent with the purpose of the Act as it will enable the ongoing sustainable management of the existing physical resource, being the network of highly modified rivers and streams. This network promotes the appropriate use of the surrounding land for various activities including urban and rural uses.

In addition, the most relevant Part 2 matters are as follows:

6(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

6(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

6(g) the protection of protected customary rights:

6(h) the management of significant risks from natural hazards.

7(b) the efficient use and development of natural and physical resources:

7(c) the maintenance and enhancement of amenity values:

7(d) intrinsic values of ecosystems:

7(f) maintenance and enhancement of the quality of the environment:

8 The principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

Potential adverse effects of the proposal have been assessed in Section 5 above. For the reasons outlined in that assessment, it is considered that the proposal is consistent with the relevant Part 2

matters, and that the proposed in-built mitigation measures recognise and provide for, or have regard to, those matters as appropriate. The proposal is considered to meet the tests of sustainable management and will allow the applicant to provide for the social and economic well-being of the community.

6.1.2 National environmental standards

The National Environmental Standard for Freshwater Management (NESFM) came into effect on 3 September 2020. These standards regulate activities within and in proximity to wetlands, which are defined in the RMA as permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions. The NES refers to the RMA definition and further defines natural wetlands as a wetland that is not constructed by artificial means, a geothermal wetland, or areas of improved pasture dominated by exotic species and subject to temporary rain-derived water pooling.

The ecological assessment prepared to support the application relies on published information and data and does not include an assessment or determination on the presence of wetlands within the area of the watercourse network subject to this application and therefore consent requirements under the NESFM. The network of watercourses subject to the application is considered 'specified infrastructure' as prescribed in section 3.21 of the NPS FM, under (c) of this definition, being any public flood control, flood protection or drainage works carried out by (i) a local authority (GW) and (ii) for the purpose of drainage. Therefore Clause 46 of the NESFM is relevant and provides for vegetation clearance, earthworks or land disturbance associated with the maintenance and operation of specified infrastructure within 10 m of a wetland as a permitted activity.

There are no other National Environmental Standards relevant to this proposal.

6.1.3 National Policy Statements

The National Policy Statement for Freshwater Management (NPSFM) (2020) sets objectives and policies for freshwater management. The RMA directs NPSs must be given effect to in lower order statutory planning documents such as Regional Policy Statements (RPS) and regional / district plans.

The NPSFM sets objectives for water quality, water quantity and the management of water resources and encourages regional councils to develop objectives for freshwater bodies and set resource limits to meet objectives. The fundamental concept underpinning the NPSFM is 'Te Mana o te Wai' which refers to the fundamental importance of water, recognising that the health of freshwater in turn protects the health of the wider environment. It is about the balance between the water, the wider environment and the community. The hierarchy of obligations in Te Mana o te Wai prioritises the health and well-being of water bodies and freshwater ecosystems first. The second priority is the health needs of people (including drinking water) and the third priority is the ability of people and communities to provide for their social, economic, and cultural wellbeing, now and in the future.

The activity is undertaken in order to maintain a network of watercourses which provide protection to properties from flood hazards, while also considering the integrated catchment management in accordance with Policy 4, the potential effects on river values in accordance with Policy 7, and the habitat of indigenous species in accordance with Policy 9. The activity also ensures consistency with Policy 15 which enables communities to provide for the social, economic and cultural well-being, through enabling the productive use of land and management of flood hazard. Overall, the activities are consistent with the NPSFM.

6.1.4 Regulations

There are no regulations relevant to this proposal.

6.1.5 Regional policy statement

The Regional Policy Statement (RPS) for the Wellington Region sets out an integrated resource approach to promoting sustainable management of natural and physical resources within the region. An assessment of the relevant objectives and policies of the Regional Policy Statement in relation to the proposed activity is provided in Table 6.1 below. Overall, the proposal is consistent with the RPS.

Table 6.1: RPS Policy assessment

Objective/Policy	Comment
Objective 12 The quantity and quality of fresh water: (a) meet the range of uses and values for which water is required; (b) safeguard the life supporting capacity of water bodies; and (c) meet the reasonably foreseeable needs of future generations.	The effects on the quality of freshwater contained within these watercourses will be appropriately managed through the mitigation and management measures and procedures proposed in this application and as undertaken by the GW contractors. The activity is consistent with this objective.
Policy 40: Safeguarding aquatic ecosystem health in water bodies – consideration	The health of the ecosystem will be safeguarded through the mitigation and management measures and procedures proposed in this application and as undertaken by the GW contractors. The activity is consistent with this policy.
Objective 19 The risks and consequences to people, communities, their businesses, property and infrastructure from natural hazards and climate change effects are reduced.	The watercourses subject to this application have an important role in managing the flood hazard across the surrounding area, assisting in the prevention of flooding of productive rural land. The activity is consistent with this objective.
Objective 26 Mauri is sustained, particularly in relation to coastal and fresh waters.	The maintenance of these watercourses will be undertaken to minimise the potential adverse effects on water quality and ecosystem health, thereby sustaining the mauri of the watercourses, consistent with this policy.
Policy 49: Recognising and providing for matters of significance to tangata whenua – consideration	A number of the watercourses are identified as scheduled areas in the Proposed Natural Resources Plan as being of significance to Mana Whenua, and Mana Whenua have been consulted in relation to this application.

6.1.6 Regional plan assessment

This section assesses the proposed works against the relevant objectives and policies of the Proposed Natural Resources Plan (Appeals Version).

6.1.6.1 Objectives and policies assessment

This section assesses the proposed works against the relevant objectives and policies of the applicable plans.

Table 6.2: Objectives and policies assessment

Objective/Policy	Comment
Objective O2 The importance and contribution of air, land, water and ecosystems to the social, economic and cultural well-being and health of people and the community are recognised in the management of those resources.	The watercourses subject to this application are an established network which provides drainage to surrounding rural and urban land, thereby protecting it from flooding while also enabling its productive use. The activity is consistent with this objective.
Objective O3 Mauri particularly the mauri of fresh and coastal waters is sustained and, where it has been depleted, natural resources and processes are enhanced to replenish mauri.	The maintenance works are undertaken in accordance with a suite of procedures to assist in maintaining the health of the watercourse over time. The activity is consistent with this objective.
Objective O14 The relationships of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga are recognised and provided for, including: (a) maintaining and improving opportunities for Māori customary use of the coastal marine area, rivers, lakes and their margins and natural wetlands, and (b) maintaining and improving the availability of mahinga kai species, in terms of quantity, quality and diversity, to support Māori customary harvest, and (c) providing for the relationship of mana whenua with Ngā Taonga Nui a Kiwa, and including by maintaining or improving Ngā Taonga Nui a Kiwa so that the huanga identified in Schedule B are provided for, and (d) protecting sites with significant mana whenua values from use and development that will adversely affect their values and restoring those sites to a state where their characteristics and qualities sustain the identified values.	Tangata whenua have been engaged with in respect of this application and their feedback sought. Ongoing discussions will assist in ensuring that iwi are able to undertake customary use and gather mahinga kai as required. Particular regard will be had for those sections of watercourse that are identified as Scheduled areas in the PNRP as Ngā Taonga Nui a Kiwa. Overall, the activities are considered consistent with this Objective.
Objective O20 The hazard risk and residual hazard risk, from natural hazards and adverse effects of climate change, on people, the community, the environment and infrastructure are acceptable.	The watercourses were established and are in place to provide protection for people and the community against flooding and high water flows for rural and urban land. The activities are considered consistent with this Objective.
Objective O24 Rivers, lakes, natural wetlands and coastal water are suitable for contact recreation and Māori customary use, including by: (a) maintaining water quality, or (b) improving water quality in: (i) significant contact recreation fresh water bodies and sites with significant mana whenua values and Ngā Taonga Nui a Kiwa to meet, as a minimum, the primary contact recreation objectives in Table 3.1, and (ii) coastal water and sites with significant mana	The watercourses subject to this application, while highly modified, can contain aquatic life that is suitable for Māori use and also for contact recreation. The works will be managed to maintain water quality and where possible improve it. Therefore, the activities are considered consistent with this Objective.

Objective/Policy	Comment
whenua values and Ngā Taonga Nui a Kiwa to meet, as a minimum, the primary contact recreation objectives in Table 3.3, and (iii) all other rivers and lakes and natural wetlands to meet, as a minimum, the secondary contact recreation objectives in Table 3.2.	
Objective O25 Biodiversity, aquatic ecosystem health and mahinga kai in fresh water bodies and the coastal marine area are safeguarded such that: (a) water quality, flows, water levels and aquatic and coastal habitats are managed to maintain biodiversity, aquatic ecosystem health and mahinga kai, and (b) where an objective in Tables 3.4, 3.5, 3.6, 3.7 or 3.8 is not met, a fresh water body or coastal marine area is improved over time to meet that objective.	The ecology assessment prepared to support the application provides a comprehensive assessment of the values of the watercourses, and the effects of the maintenance activities. Overall, the management of the maintenance activities is considered appropriate manage the aquatic habitats present in the watercourses, and therefore is consistent with this Objective.
Policy P1: Ki uta ki tai and integrated catchment management Air, land, fresh water bodies and the coastal marine area will be managed recognising ki uta ki tai by using the principles of integrated catchment management. These principles include: (a) decision-making using the catchment as the spatial unit, and (b) applying an adaptive management approach to take into account the dynamic nature and processes of catchments, and (c) coordinated management, with decisions based on best available information and improvements in technology and science, and (d) taking into account the connected nature of resources and natural processes within a catchment, and (e) recognising links between environmental, social, cultural and economic sustainability of the catchment.	The watercourses subject to this application are an established network within various catchments in both Kāpiti and the Wairarapa. The watercourse network is managed as a whole, with works progressing across the network over time, sometimes years. The use of an adaptive management approach will occur over time through the use of the Management Plan prepared for the works and provided in Appendix D. The activity is consistent with this policy.
Policy P10: Contact recreation and Māori customary use Use and development shall avoid, remedy or mitigate any adverse effects on contact recreation and Māori customary use in fresh and coastal water, including by: (a) providing water quality and, in rivers, flows suitable for contact recreation and Māori customary use, and (b) managing activities to maintain or enhance contact recreation values in the beds of lakes and rivers, including by retaining existing swimming holes and maintaining access to existing contact recreation locations, and (c) encouraging improved access to suitable	The watercourses subject to this application, while highly modified, can contain aquatic life that is suitable for Māori use and also for contact recreation. The works will be managed to maintain water quality and where possible improve it. Therefore, the activities are considered consistent with this Policy.

Objective/Policy	Comment
swimming and surfing locations, and (d) providing for the passive recreation and amenity values of fresh water bodies and the coastal marine area.	
Policy P17: Mauri The mauri of fresh and coastal waters shall be recognised as being important to Māori and is sustained and enhanced, including by: (a) managing the individual and cumulative adverse effects of activities that may impact on mauri in the manner set out in the rest of the Plan, and (b) providing for those activities that sustain and enhance mauri, and (c) recognising and providing for the role of kaitiaki in sustaining mauri.	The maintenance works are undertaken in accordance with a suite of procedures to assist in maintaining the health of the watercourse over time. The activity is consistent with this Policy.
Policy P18: Mana whenua relationships with Ngā Taonga Nui a Kiwa The relationships between mana whenua and Ngā Huanga o Ngā Taonga Nui a Kiwa identified in Schedule B (Ngā Taonga Nui a Kiwa) will be recognised and provided for by: (a) having particular regard to the values and Ngā Taonga Nui a Kiwa huanga identified in Schedule B (Ngā Taonga Nui a Kiwa) when applying for, and making decisions on resource consent applications, and developing Whaitua Implementation Programmes, and (b) informing iwi authorities of relevant resource consents relating to Ngā Taonga Nui a Kiwa, and (c) recognising the relevant iwi authority/ies as an affected party under RMA s95E where activities risk having a minor or more than minor adverse effect on Ngā Huanga o Ngā Taonga Nui a Kiwa or on the significant values of a Schedule C site which is located downstream, and (d) working with mana whenua, landowners, and other interested parties as appropriate, to develop and implement restoration initiatives within Ngā Taonga Nui a Kiwa, and (e) the Wellington Regional Council and iwi authorities implementing kaupapa Māori monitoring of Ngā Taonga Nui a Kiwa.	Tangata whenua have been engaged with in respect of this application. Ongoing discussions will assist in ensuring that iwi are able to undertake customary use and gather mahinga kai as required. Particular regard will be had for those sections of watercourse that are identified as Scheduled areas in the PNRP as Ngā Taonga Nui a Kiwa. Overall, the activities are considered consistent with this Policy.
Policy P31: Biodiversity, aquatic ecosystem health and mahinga kai Manage the adverse effects of use and development on biodiversity, aquatic ecosystem health and mahinga kai to: Hydrology (a) maintain or where practicable restore natural flow characteristics and hydrodynamic processes and the natural pattern and range of water level fluctuations in rivers, lakes and natural wetlands, and	The ecology assessment prepared to support the application provides a comprehensive assessment of the values of the watercourses, and the effects of the maintenance activities on ecosystem health. Overall, the management of the maintenance activities is considered appropriate manage the aquatic habitats present in the watercourses, and therefore is consistent with this Policy.

Objective/Policy	Comment
Water quality (b) maintain or improve water quality including to assist with achieving meet the objectives in Tables 3.4, 3.5, 3.6, 3.7 and 3.8 of Objective O25, and Aquatic habitat diversity and quality (c) maintain or where practicable restore aquatic habitat diversity and quality, including: (i) the form, frequency and pattern of pools, runs, and riffles in rivers, and (ii) the natural form of rivers, lakes, natural wetlands and the coastal marine area, and (d) where practicable restore the connections between fragmented aquatic habitats, and Critical habitat for indigenous aquatic species and indigenous birds (e) maintain or where practicable restore habitats that are important to the life cycle and survival of indigenous aquatic species and the habitats of indigenous birds in the coastal marine area, natural wetlands and the beds of lakes and rivers and their margins that are used for breeding, roosting, feeding, and migration, and Critical life cycle periods (f) minimise avoid, minimise or remedy adverse effects on aquatic species at times which will most affect the breeding, spawning, and dispersal or migration of those species, including timing the activity, or the adverse effects of the activity, to avoid times of the year when adverse effects may be more significant, and Riparian habitats (g) maintain or where practicable restore riparian habitats, and Pests (h) avoid the introduction, and restrict the spread, of aquatic pest plants and animals.	
Policy P45: Managing adverse effects on sites with significant mana whenua values Sites with significant mana whenua values identified in Schedule C shall be protected and restored by managing use and development of these sites in the following manner: (a) in the first instance, avoid locating activities within sites listed in Schedule C, and (b) require any more than minor adverse effects of activities on the significant mana whenua values of the site to be evaluated through a cultural impact assessment undertaken by the relevant mana whenua as identified in Schedule C, and (c) significant adverse effects of an activity on the significant values of the site shall be avoided, and (d) other adverse effects shall be managed in accordance with tikanga and kaupapa Maori	Tangata whenua have been engaged with in respect of this application. Ongoing discussions will assist in ensuring that the adverse effects on Schedule C sites located with the watercourse networks, are able to be managed appropriately, in conjunction with iwi. Overall, the activities are considered consistent with this Policy.

Objective/Policy	Comment
responding to recommendations in the cultural impact assessment to: (i) avoid more than minor adverse effects on the significant values of the site, and (ii) where more than minor adverse effects cannot be avoided, minimising them, and (iii) where more than minor adverse effects cannot be avoided and/or minimised, they are remedied, and (e) where more than minor adverse effects on significant mana whenua values identified in Schedule C (mana whenua) cannot be avoided, minimised, or remedied, the activity is inappropriate. Offsetting of effects on sites with significant mana whenua values is inappropriate, except where provided for in Policy P45A, and (f) the relevant mana whenua as identified in Schedule C shall be considered to be an affected party under RMA s95E for all activities which require resource consent within a Schedule C site where the adverse effects are minor or more than minor, unless the application is publicly notified.	
Policy P66: National Policy Statement for Freshwater Management requirements for discharge consents When considering any application for a discharge the consent authority shall have regard to the following matters: (a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water, and (b) the extent to which it is feasible and dependable that any more than minor adverse effects on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided, and (c) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their contact with fresh water, and (d) the extent to which it is feasible and dependable that any more than minor adverse effects on the health of people and communities as affected by their contact with fresh water resulting from the discharge would be avoided. This policy applies to the following discharges (including a diffuse discharge by any person or animal): (a) a new discharge, or (b) a change or increase in any discharge of any contaminant into fresh water, or onto or into land in circumstances that may result in that	The maintenance of watercourses will result in the discharge of sediment to water, as a result of both the removal of vegetation, and the removal of sediment itself. The proposed management procedures in place for the works will assist in ensuring that the amount of sediment discharged is minimised where possible, and the location of works is not disturbed more than necessary. Overall, the activity is consistent with this policy.

Objective/Policy	Comment
contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water.	
Policy P103A: Removal of aquatic vegetation and/or accumulated sediment The benefits of the removal of aquatic vegetation and/or accumulated sediment from the bed of a river to manage the hazard risk of flooding to people, property, infrastructure and communities are recognised and those activities are provided for, and shall be managed so that: (a) the extent and frequency of this activity is minimised over time, and (b) the activity occurs at times of the year when adverse effects on aquatic species may be less significant, and (c) the Good Practices for the Mechanical Management of Highly Modified Waterways guidance document is implemented where practicable, and (d) the entrapment and stranding of fish, kōura and kākahi is avoided as far as possible, and recovery and return is conducted, and (e) the effects on aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use are monitored and an adaptive management approach is used to address any adverse effects, including cumulative adverse effects, that are more than minor in order to contribute to a catchment-wide improvement in these values within defined timeframes.	The removal of aquatic vegetation and accumulated sediment is essential for the ongoing operation of the network of highly modified watercourses across Kāpiti and the Wairarapa. As discussed in this report, this activity maintains the carrying capacity of the watercourse to carry waters away from productive land and urban areas. The management plan prepared to support this application outlines the process and procedures for undertaking the activity, including frequency. Overall, the activity is considered consistent with this policy.

6.1.6.2 Assessment criteria

Under Rule 121B of the PNRP the maintenance of highly modified watercourses activity proposed is a restricted discretionary activity and is assessed against the criteria listed under that rule, as shown in Table 6.3 below.

Table 6.3: Assessment criteria

Relevant Criteria	Assessment
1. The contents and implementation of the vegetation and sediment removal management plan in accordance with Schedule X.	The Plan has been prepared in accordance with the requirements of Schedule X of the PNRP, and in consideration of the Guidance document prepared by GWRC on this matter.
2. Management of adverse effects, including cumulative effects, on aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use.	The management of these effects is adequately managed through the proposed works methodology and ongoing consultation with iwi/hapu groups.
3. Management of adverse effects on sites identified in Schedule A (outstanding water bodies), Schedule C (mana whenua), and Schedule F (indigenous biodiversity).	The management of these effects is adequately managed through the proposed works methodology, and consideration of the characteristics of these scheduled areas as required.

Relevant Criteria	Assessment
4. The benefits of flood risk mitigation.	The maintenance of these highly modified rivers and streams ensures that their capacity is maintained and the overall network operates appropriately. The operation of these schemes assists the ongoing use of both farm and urban land.

6.2 Sections 105 and 107

Sections 105 and 107 are relevant to applications for discharges under section 15. Section 105 requires the consent authority to have regard to the nature of the discharge and the sensitivity of the receiving environment, the applicant's reasons for the proposed choice and possible alternative methods of discharge. These matters have been addressed throughout this report, particularly in Section 2 which describes the receiving environments, Section 5 which assesses the effects on the environment, and Section 3.7 which addresses potential alternatives.

Section 107 restricts the granting of discharge permits in certain circumstances, namely if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:

- The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
- Any conspicuous change in the colour or visual clarity;
- Any emission of objectionable odour;
- The rendering of fresh water unsuitable for consumption by farm animals; and
- Any significant adverse effects on aquatic life.

The effects of the discharge associated with the vegetation clearance and sediment removal are considered in Section 5 above. The assessment undertaken, including a comprehensive ecological assessment conclude that the effects of the activity are minor. Overall, it is concluded that the discharge would meet the tests set out in section 107(1)(c) to (g).

6.3 Other matters

There are no other matters relevant to this proposal.

6.4 Notification assessment

6.4.1 Public notification

Section 95A of the RMA is relevant when a consent authority is considering whether a consent application should be considered with or without public notification.

Section 95A identifies a four-step process. In relation to these steps we note the following:

- The applicant does not request public notification of the application;
- Rule R121B of the PNRP precludes public notification of the application;
- An assessment of effects on the environment is provided in Section 5 of this AEE report. This assessment concludes that the adverse effects on the environment are minor;
- The application is not for any of the activities identified in section 95A(5)(b) (i.e. a controlled activity, subdivision of land or a residential activities, a boundary activity, or an activity prescribed in section 360H(1)(a)(i));

- No special circumstances are considered to exist in relation to the application.

Based on this assessment, we consider that this proposal meets the tests of the RMA to be processed without public notification.

Based on the assessment set out above, public notification is precluded and this application must be processed without public notification.

6.4.2 Limited notification

For applications that are not publicly notified, under section 95B, the consent authority must determine whether to give limited notification of an application to any affected parties. Section 95B identifies a four step process. In relation to these steps we note the following:

- The application does not need to be notified to any parties under section 95B(4). The proposed change will not affect any customary rights;
- The proposed activity is not on or adjacent to, or does not affect, land that is the subject of a statutory acknowledgement;
- There are no applicable rules or national environmental standards precluding limited notification; and
- No special circumstances are considered to exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification.

In terms of section 95E(3), a consent authority must not consider a person affected if they have provided written approval to the activity. No parties have provided their written approval to this application.

Section 95E(1) states that a consent authority must consider a person to be an affected person if the activity's adverse effects on the person are minor or more than minor (but not less than minor). Taking into account the short-term nature of the works, the management and mitigation of any effects, no parties are considered to be affected by this application.

Based on this assessment, we consider that this proposal meets the tests of the RMA to be processed without limited notification.

6.4.3 Section 95 conclusions

Following the steps set out in sections 95A and 95B, we consider that the application should be processed without public or limited notification.

7 Consultation

A letter was sent to all landowners which are part of the network, to inform them of the need to obtain resource consent for the ongoing maintenance of these highly modified rivers and streams. A copy of this letter is provided as Appendix E to this report.

The relevant iwi groups have been advised of the upcoming consent application and provided with a summary of the works involved. GWRC intends to continue this consultation as the application is progressed. Copies of consultation documents are provided in Appendix E.

8 Conditions of consent

The applicant has proposed a number of draft consent conditions for this application, and these are shown below, in draft:

X. The consent holder shall be responsible for all contracted operations related to the exercise of this resource consent, and shall ensure contractors are made aware of the conditions of this resource consent relevant to their work area and ensure compliance with those conditions.

X. The consent holder shall appoint a representative(s) prior to the exercise of this resource consent that shall be the Manager - Environmental Regulation's primary contact in regard to matters relating to this resource consent. The consent holder shall inform the Manager - Environmental Regulation of the representatives' name and how they can be contacted within 2 weeks of this resource consent being granted. Should that person(s) change during the term of this resource consent, the consent holder shall within two weeks inform the Manager - Environmental Regulation and shall also give written notice of the new representative's name and how they can be contacted.

X. The consent holder shall ensure that all machinery used in the exercising of this consent is cleaned prior to being transported to any individual site of works so that all seed and/or plant matter has been removed

X. Prior to works being undertaken within any one drainage reach all vehicles used for the works should be cleaned in accordance with Ministry of Agriculture and Forestry and Biosecurity NZ cleaning methods for machinery using water from an uncontaminated water supply (http://www.biosecurity.govt.nz/pests/didymo/cleaning-specific#machinery).

X. The consent holder shall provide the Manager - Environmental Regulation with a proposed annual works programme prior to 20 November each year over the term of this consent. The proposed annual works programme shall address, but not be limited to, the following:

a. Details of scheduled works authorised by this resource consent that are to be carried out for the proceeding 12 months including;

i) A description of the nature of the works and receiving environment;

ii) Scale of the works;

iii) Identification of any known archaeological sites; waahi tapu; heritage sites; listed trees; significant natural features/areas; significant ecological areas and threatened species which may be potentially affected by the proposed works

iv) Comments from parties consulted and how issues raised by those parties have been addressed;

v) An outline of any measures proposed to avoid, remedy or mitigate effects on aquatic and terrestrial life and riparian habitat.

vi) Works supervisors' names and how they can be contacted

b. For unprogrammed works that are not identified in the proposed annual works programme but are required to be carried out, notice describing those additional works shall be provided in writing to the Manager - Environmental Regulation

X. Any works associated with the exercise of this resource consent shall not cause the deepening of the invert level of any waterway subject to this consent, including any located within 200 m of the legal property boundary of any wetland listed in the Proposed Natural Resources Plan.

9 Conclusion

This AEE report has been prepared on behalf of Greater Wellington Regional Council Flood Protection Group to accompany a resource consent application to Greater Wellington Regional Council for the maintenance of watercourses. The activity requires resource consent from Greater Wellington Regional Council as a restricted discretionary activity under Rule 121B of the Proposed Natural Resources Plan.

This AEE report draws the following conclusions:

- The works are consistent with Part 2 of the Resource Management Act 1991;
- The works are consistent with the relevant objectives and policies of the NPSFM, Regional Policy Statement and the Proposed Natural Resources Plan and
- The activity will have a minor effect on the environment.

Accordingly, we respectfully request that this resource consent application be granted on a non-notified basis, subject to fair and reasonable conditions. We would appreciate the opportunity to comment on draft conditions prior to any consent being granted.

10 Applicability

This report has been prepared for the exclusive use of our client Greater Wellington Regional Council Flood Protection, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that Greater Wellington Regional Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:

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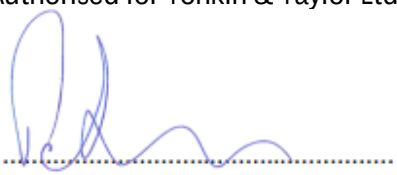
Sarah Bevin
Principal Planner

Authorised for Tonkin & Taylor Ltd by:



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Peter Roan
Project Director

Technical review undertaken by Romae Calland, Principal Planner

30-Jun-22
\\ttgroup.local\corporate\wellington\tt projects\1018683\issueddocuments\drain maintenance rc project\20220630 1018683 aee for drain maintenance lodgement final.docx

Appendix A Consent application forms

Form 1: Application for resource consent

All sections must be completed in full and accompanied by the initial fixed application fee (see section 12) and the relevant activity form (see section 7). Failure to do so may result in your application not being accepted and/or returned. If you are applying to change/cancel a resource consent condition(s), use form 1c.

The information you provide with your application is official information and available to the public. It will be used to process your application and, together with other official information, assist in the management of the region's natural and physical resources. Access to information held by Greater Wellington Regional Council is administered in accordance with the Local Government Official Information and Meetings Act 1987, and Privacy Act 1993. Your information may be disclosed in accordance with the terms of these Acts. It is therefore important you advise Greater Wellington Regional Council if your application includes trade secrets and/or commercially sensitive material.

You can lodge your application in any of the following ways:

- **By post to PO Box 11646, Wellington or PO Box 41, Masterton**
- **In person at our Wellington office (100 Cuba Street, Wellington Central) or Masterton office (Departmental Building 35-37 Chapel Street)**
- **By email to notifications@gw.govt.nz (a signed PDF copy is required)**

1. Applicant's details

Applicant(s) name(s) and address ie, whose name will be on the consent. Note if a private or family trust is the applicant, all the trustees are required to provide contact details and sign the application form (see 4. below)

Name/Organisation:	Greater Wellington Regional Council	Landline:		Mobile:	
Postal address:	PO Box 11646, Manners Street, Wellington				
Contact person:	Jacky Cox	Email:	jacky.cox@GW.govt.nz		

Please note that all correspondence and documents will be sent by email only unless instructed otherwise.

The applicant is the:

Owner ☑ Occupier ☑ Lessee ☐ Prospective Purchaser ☐ The Crown ☐

Network Utility Operator ☐ Other ☐ Please specify:

2. Agent's details

Agent's name and address Please note that all correspondence will be sent to the Agent (via email) as the first point of contact during the application process, unless instructed otherwise

Name/Organisation:	Tonkin + Taylor	Landline:	048034905	Mobile:	0275114877
Postal address:	PO Box 2083, Wellington 6140				
Contact person:	Sarah Bevin	Email:	sbevin@tonkintaylor.co.nz		

3. Property owner's details (if different from above)

Name/Organisation:	Various, see AEE for landowners list	Landline:		Mobile:	
Postal address:					
Contact person:		Email:			

If your proposed activity will take place on land not owned by the applicant, the written approval of the property owner must be provided on a **completed and signed form 1B**

4. Partnership/unincorporated entity details

For partnerships or unincorporated entities (such as private trusts or unincorporated bodies or societies) you **must** provide details of all authorised partners, trustees or members. Any consent granted will then include these names, and all individuals will be legally responsible for the consent and any associated costs. Should these persons change, then you must notify us.

Full name of person:

Signature | Status (eg, partner, trustee):

Email address: | Phone:

Full name of person:

Signature | Status (eg, partner, trustee):

Email address: | Phone:

Full name of person:

Signature | Status (eg, partner, trustee):

Email address: | Phone:

Full name of person:

Signature | Status (eg, partner, trustee):

Email address: | Phone:

Full name of person:

Signature | Status (eg, partner, trustee):

Email address: | Phone:

Include details of any further partners/trustees/members on a separate page if necessary

5. Details of proposed activity

Description of activity eg, to undertake earthworks, to construct a bore, to take water from a stream

Maintenance of highly modified watercourses. See information in attached AEE

Location address and/or description of location of activity

Various locations in the Kapiti and Wairarapa

Include the name of any relevant stream, river or other waterbody to which the application may relate, proximity to any well known landmark, etc. (Note: a location map is required in your activity form.)

Map reference: NZTM: | **Valuation reference [from rates]:**

Legal description [from rates notice] [eg, Lot 9 DP58809 Block XI]

Various

6. Consents from the Greater Wellington Regional Council – activity forms you need to fill in

Consent(s) being applied for. You will need to fill in an activity form for each of the following activities: Make sure you attach the forms for your activity.

Water:

- Dam/Divert (Form 2a) ☐
- Take and use surface water (Form 2b) ☐
- Take and use groundwater (Form 2c) ☐
- Transfer water from site to site (Form 2d) ☐

Discharge to Land:

- General discharges (Form 3a) ☐
- Agricultural discharge (Form 3b) ☐
- On-site wastewater (Form 3c) ☐

Discharge to Water:

- General discharges (Form 4a) ☑

Discharge to Air:

- Air discharge (Form 5a) ☐

Land Use:

- General river/stream works (Form 6a) ☑
- Bore/well construction (Form 6b) ☐
- Geotechnical bores in Lower Hutt (Form 6b(i) ☐
- Bridge/culvert/pipe (Form 6c) ☐
- Erosion protection structures (Form 6d) ☐
- Soil disturbance (Form 6e) ☐
- Forestry (Form 6f) ☐

Coastal:

- General coastal (Form 7a) ☐
- Boatshed (Form 7b) ☐

7. Consents from local authorities

Territorial authority in which land is situated:

- Wellington City Council ☐
- Hutt City Council ☐
- Upper Hutt City Council ☐
- Porirua City Council ☐
- Kapiti Coast District Council ☐
- Masterton District Council ☐
- South Wairarapa District Council ☐
- Carterton District Council ☐

Do you require any other resource consents from your local council? Yes ☐ No ☑

If yes, please list:

Have these consents been applied for? Yes ☐ No ☑

8. Other documentation

Please list any documents in addition to your application forms that form part of your application. Note: if multiple other documents exist, please attach a separate sheet of paper.

- ☐ No other documents
- ☑ Reports: AEE, Ecological Assessment
- ☑ Plans: Watercourse location plan, Management Plan
- ☐ Other documents:

9. Pre-application advice

Please list any pre-application meetings or advice (verbal and/or written) you have had with GWRC below:

☑ Meeting(s) – with who and when?	Environmental Regulation (Nicola and Will)
☐ Verbal advice – from who and when?	
☐ Written advice – from who and when?	
☐ Other (eg, submitted draft application/AEE)	

10. Consultation and written approval of affected persons

Consultation with all persons potentially affected by your activity prior to lodging your application may result in considerable time and cost savings.

Non-notified applications

Non-notified consents are for activities which have minor effects on the environment. For your activity to be considered on a non-notified basis you must consult and obtain written approval from all persons potentially affected by your activity (eg, neighbours, iwi, Fish and Game Council, Department of Conservation). If you are unsure who may be an affected party, please call us. Non-notified consents are significantly cheaper and quicker to process.

Limited notified and fully notified applications

Notified consents (either limited notified or fully notified consents) are for activities which do not meet requirements in the RMA for processing on a non-notified basis.

Please provide any consultation details in the space provided below.

Consultation details

Have you consulted with iwi? Yes ☑ No ☐

If so, who did you consult?	Rangitane and Ngati Kahungunu
Who else have you consulted?	A letter was sent to property owners advising of the upcoming consent application
What was their response?	Communications are ongoing
How have you addressed any concerns they may have had?	Ongoing

Written approval of affected parties

If you have identified any affected person(s) please provide the approval(s) on form 1B**.**

11. Non-notified initial fixed application fees (incl. GST)

Discharge permit	☐ Land $2,616.25	☑ Water (other) $3,858.25	☐ Land/Water (earthworks) $3,858.25	☐ Air $1,684.75
Water permit	☐ Take (new) $2,305.75	☐ Take (renewal) $1,374.25	☐ Transfer from site to site $ 1,374.25	☐ Dam/Divert $1,219.00
Land use consent	☐ Forestry/soil disturbance $1,995.25	☐ River Works $1,296.63	☐ Bore (standard) $ 908.50	☐ Bore (non-standard) $ 675.63
Coastal permit	☐ Other (incl. new boatshed) $1,995.25	☐ Boatshed (existing) $ 908.50	Most bores are standard. The non-standard bore fee only applies to sand traps, bore spears and geotechnical bores	

Notes:
1. Where there is more than one application required for the same proposal, an initial fixed application fee is required for each application
2. The initial fixed application fee is the average cost of processing an application type. Final processing costs are based on actual and reasonable time and disbursements spent processing your application. Contact GWRC for information about notified application fees

How will your application fee(s) be paid? Internal Charge: 101544 (FP Resource Consent Project)

Amount paid: $ 3,858.25

☐ **Internet banking**: Greater Wellington Regional Council – ANZ account 06-0582-0104781-00

Date of payment: _____ Reference details used: _____ Note: Please quote "Consents" and the applicant name

☐ **Cash/Eftpos** (to be made at Wellington or Masterton office)

☐ **By invoice** (only with purchase order reference): _____

Who is a paying the initial fixed application fee(s)

☑ Applicant (from question 1) ☐ Agent (from question 2)

If consent processing costs exceed the initial fee, who will be any additional fee(s)?

☑ Applicant (from question 1) ☐ Agent (from question 2)

12. Consent monitoring charges

If your resource consent application is approved, consent monitoring charges apply to most resources consents

Who will be paying for any consent monitoring charges? (if your application is approved)

☑ Applicant (from question 1) ☐ Agent (from question 2)

If a reference (eg, purchase order) is required on your consent monitoring charge please specify below:

13. Applicant's declaration

I/we hereby certify that, to the best of my/our knowledge and belief, the information given in this application is true and correct.

I/we understand that the Council may charge me/us for all costs actually and reasonably incurred in processing this application and, if granted, for any subsequent monitoring charges. Subject to my/our rights under sections 357B and 358 of the RMA to object to any costs, I/we undertake to pay all and future processing costs and monitoring costs incurred by the Council. Without limiting the Council's legal rights, if any steps, including the use of debt collectors, are necessary to recover unpaid costs, I/we agree to pay all costs associated with recovering those costs. If this application is made on behalf of a trust (private or family), a society (incorporated or unincorporated) or a company in signing this application I/we are binding the trust, society or company to pay all the above costs and guaranteeing to pay all the above costs in my/our personal capacity.

Full name: Graeme Campbell, Manager, Flood Protection Date: 30 June 2022

Applicant's signature: _____

(or person authorised to sign on behalf of the applicant)

Appendix B Plans of application area

Ngatotara Drain (Lagoon)

Ngatotara Drain (Siphon)

Ngatotara Drain (North Branch)

Mangapouri Stream (Downstream of Convent Rd)

Ngatoko Stream

06b

04b

Rangiuru Stream

Ngatotara Drain (South Branch)

05b

Katihuku Drain

Te Awahohonu Drain (East of Freemans Road)

Mangapouri Stream (Upstream of Convent Rd)

03b

Powles Drain

Pahiko Drain

Te Awahohonu Drain (Freemans Road)

Mangaone Stream

02b

Walkers Drain

Mangaone Stream (Walkers Corner)

Pukemanu Drain

Sages Drain

Waimeha Stream (Natural Stream)

01b

Waimeha Stream (Residential Section)

SHEET REFERENCE

GWRC Maintained (HIGHLY MODIFIED, NATURAL & UNCLASSIFIED) Rivers and Streams

STREAM CLEARING METHOD

- HAND
- MACHINE
- WEED BOAT
- Other Watercourse (Maintained by GW)

REFER ALSO O-214/01 to 04 FOR GWRC MAINTAINED WATERCOURSES

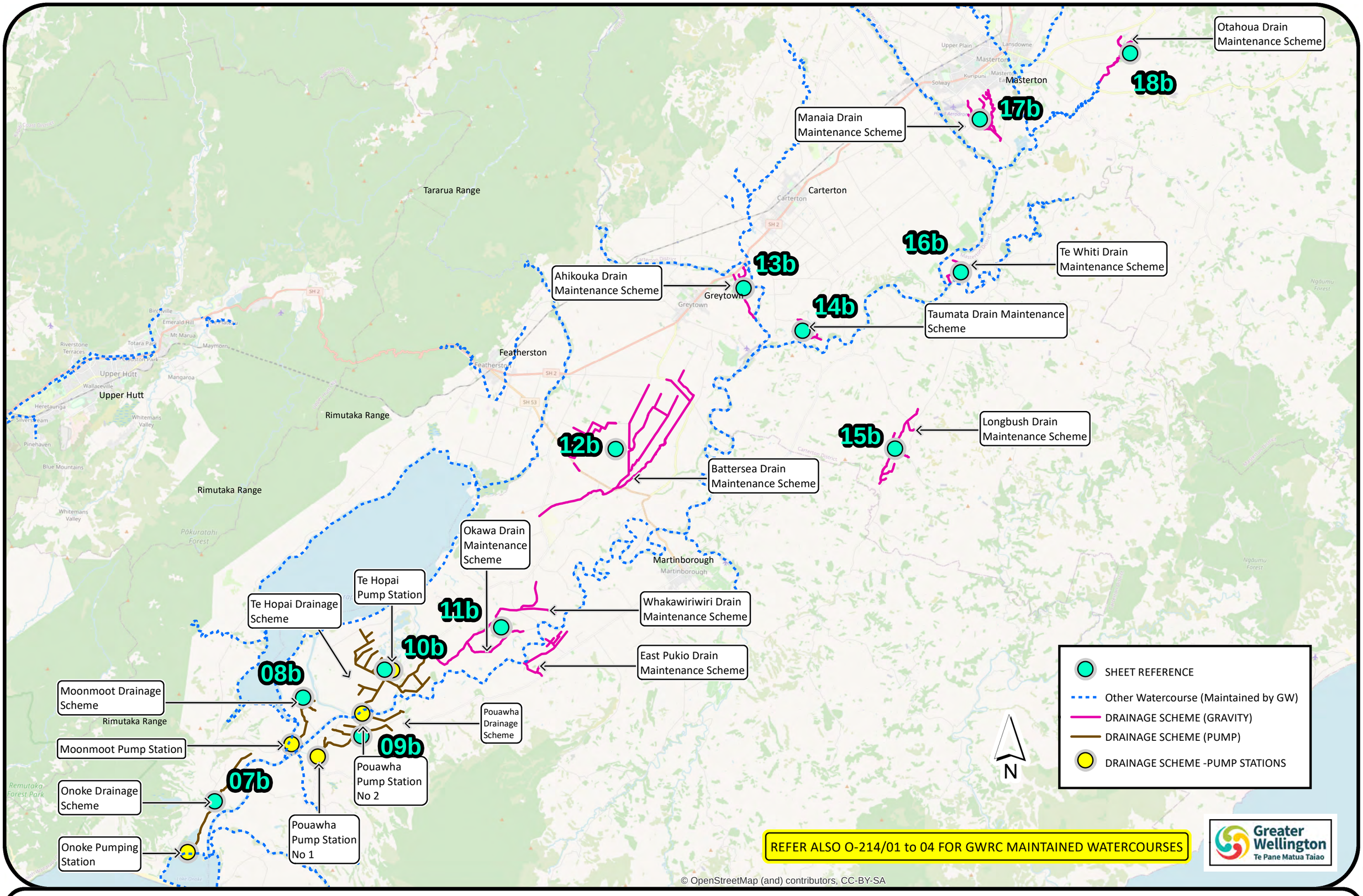
WEED CLEARING OF STREAMS/DRAINS MAINTAINED BY GWRC (PNRP Schedule a, b, c & f)

SHEET LAYOUT (Kapiti)

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent - Layout (Kapiti) - PNRP.mxd
Plotted 1:38:03 PM, 31/05/2022

0 0.5 1 2 Kilometers

A3 Scale : n.t.s.



WEED CLEARING OF STREAMS/DRAINS MAINTAINED BY GWRC (PNRP Schedule a, b, c & f)

SHEET LAYOUT (Wairarapa)

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - Layout (Wai) - PNRP.mxd
Plotted 1:36:22 PM, 31/05/2022

0 1.25 2.5 5 Kilometers

A3 Scale : n.t.s.

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

Tutere Street
Heperi Street
Field Way
Konini Crescent
Titoki Road
Atua Street
Ngapaki Street
Hona Street
Huiawa Street
Hemara Street
Rauparaha Street
Rangihiroa Street
Ono Street
Waimea Road
Lavinia Grove
Fairway Oaks Drive
Isabel Street
Mirek Street
Te Ara Kawaka
Ara Hereke
Te Moana Road
Alexander Street
Park Avenue
Rosebank Grove
Walton Avenue
Bush Road
Pigeon Grove
Pukeko Street
North Bay
N

OTAKI SCHEME (Waimeha Stream) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 01b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 12:56:27 PM, 31/05/2022

0 60 120 240 Metres
A3 Scale : n.t.s.

NOTES / DISCLAIMER:
1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Sims Road
Sea Road
Rodney Avenue
Dixie Street
Gawler Street
Pukenamu Road
Harakeke Road
Te Waka Road
Te Horo Beach Road
Mahurenga Lane
Puruaha Road
State Highway 1
Gear Road

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values
- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

- Watercourse (Maintained by GW)
- Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values
- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies
- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance
- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

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Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Mangaone Drains) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 02b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 12:57:45 PM, 31/05/2022

0 100 200 400 Metres
A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Haraleke Road

Swamp Road

Te Waka Road

Addington Road

Sandown Road

Mangaone Stream

N

OTAKI SCHEME (Mangaone Drains) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 03b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 12:58:41 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
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3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

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Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Ngatoko & Rangiuru Sream) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 04b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 12:59:36 PM, 31/05/2022

0 100 200 400 Metres
A3 Scale : n.t.s.

Te Rauparaha Street
Te Wiremu Lane
Lupin Road
Tasman Road
Main Street
Raukawa Street
Te Awahohonu Drain - Freemans Road
Rangiuru Road
Rangatira Street
Iti Street
Carkeek Drive
Anzac Road
Domain Road
Mill Road
Temuera
Hinau Street
Riverbank Road Extension
Knights Grove
Aotaki Street
Dunstan Street
State Highway 1
Dittmer Street
Greenwood Boulevard
Cobb Place
Te Manuao Road
Waitohu Valley Road
County Road
Renata Road
Ludlam Way
Speranza Avenue
Brandon Street
Freemans Road
Rahui Road
Te Waka Road
Riverbank Road

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

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Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Mangapouri Stm / Te Awahohonu Drain) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 05b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:00:34 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Taylors Road

Ngatotara Drain - Lower

Ngatotara Drain - Middle

Ngatotara Drain - North Branch

Ngatotara Drain - South Branch

Old Coach Road North

Convent Road

Bennetts Road

Lawlors Road

State Highway 1

N

Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Ngatotara Drain) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 06b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:01:36 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

East West Access Road

Raho Ruru Road

Western Lake Road

Onoke Drainage Scheme

Lake Ferry Road

McDougalls Road

Beach Road

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - ONOKE DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 07b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:03:16 PM, 31/05/2022

0 275 550 1,100 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Parera Road

Te Hopai Drainage Scheme

Wairio Road

Te Hopai Road

Moonmoot Drainage Scheme

Kumenga Road

East West Access Road

Pouawha Drainage Scheme

Pouawha Road

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - MOONMOOT DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 08b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:04:49 PM, 31/05/2022

0 250 500 1,000 Metres

A3 Scale : n.t.s.

Moonmoot Drainage Scheme

Te Hopai Road

Te Hopai Drainage Scheme

Kāhutara Road

East West Access Road

Kumenga Road

Moonmoot Drainage Scheme

Pouawha Drainage Scheme

Clarkes Road

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Road

NOTES / DISCLAIMER:
1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - POUAWHA DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 09b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:05:59 PM, 31/05/2022

0 200 400 800 Metres
A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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Parera Road

Judds Road

Kahutara

Te Hopai Drainage Scheme

Whakawiriwiri Drain Maintenance Scheme

Elgars Road

Wairio Road

Moonmoot Drainage Scheme

Te Hopai Road

East West Access Road

Pouawha Drainage Scheme

Moonmoot Drainage Scheme

Kumenga Road

Pouawha Road

Clarkes Road

Lake Ferry Road

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - TE HOPAI DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 10b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:07:05 PM, 31/05/2022

0 250 500 1,000 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Whakawiriwiri Drain Maintenance Scheme

Pukio West Road

Pahautea Road

Kahutara Road

Okawa Drain Maintenance Scheme

Bulcks Road

East Pukio Drain Maintenance Scheme

Pukio East Road

Chisholms Road

Parera Road

Whakawiriwiri Drain Maintenance Scheme

Elgars Road

Te Hopai Drainage Scheme

East Pukio Drain Maintenance Scheme

Lake Ferry Road

Te Hopai Drainage Scheme

N

Greater Wellington
Te Pane Matua Taiao

GRAVITY DRAINAGE SCHEME - OKAWA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 11b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:07:53 PM, 31/05/2022

0 255 510 1,020 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

Moroa Road

Settlement Road

Battersea Road

Cross Line

Fabians Road

Bidwills Cutting Road

Glenmorven Road

Kanuka Way

Riverside Road

Moiki Road

No 1 Line

Pharazyns Road

Phillips Line

Duddings Line

State Highway 53

Fenwicks Line

Wards Line

Kahutara Road

Bicknells Road

Bidwills Road

Te Maire Road

Battersea Drain Maintenance Scheme

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

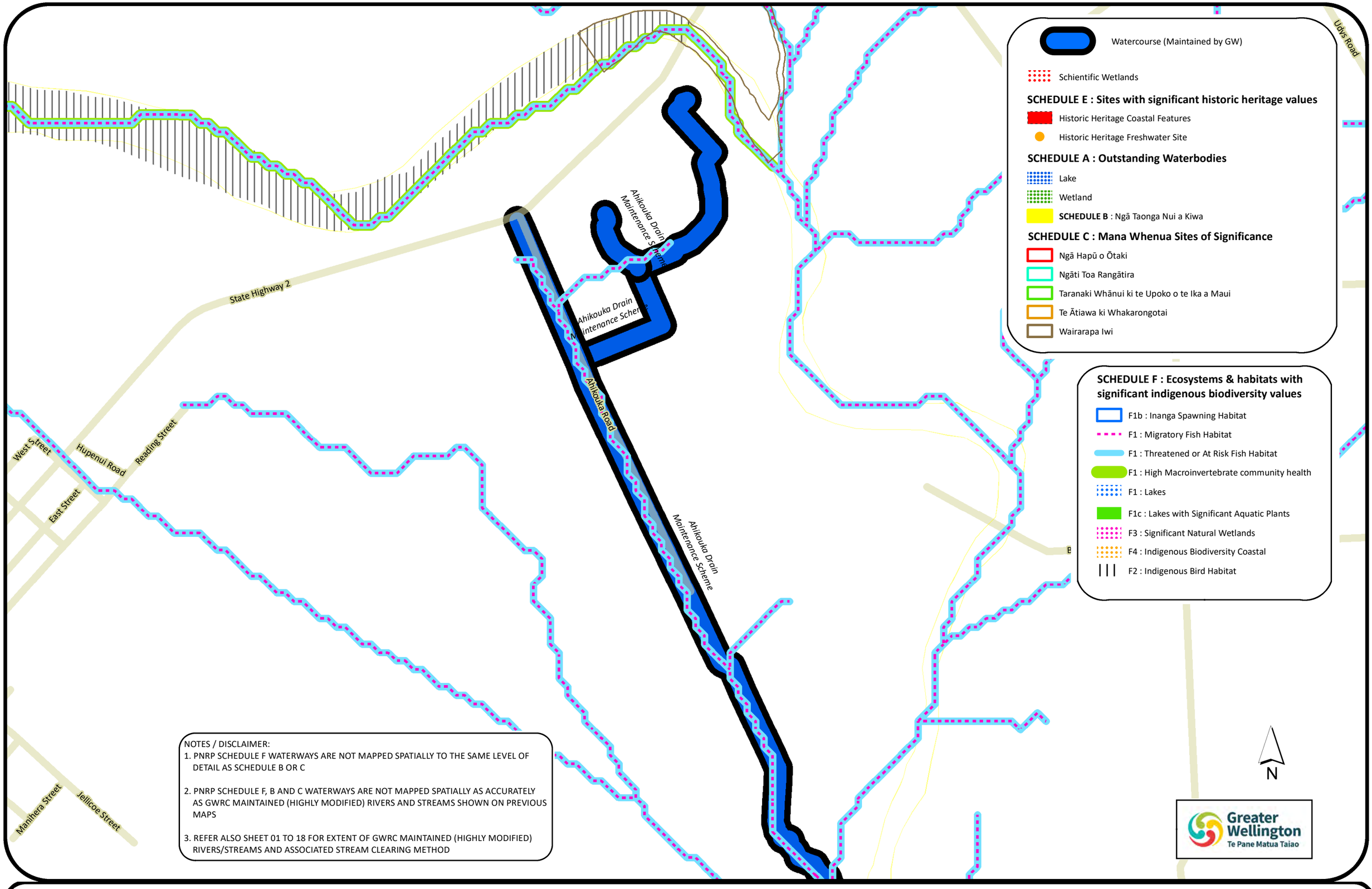
GRAVITY DRAINAGE SCHEME - BATTERSEA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 12b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:08:59 PM, 31/05/2022

0 350 700 1,400 Metres

A3 Scale : n.t.s.



GRAVITY DRAINAGE SCHEME - AHIKOUKA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 13b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:10:14 PM, 31/05/2022

0 120 240 480 Metres
A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Island Road

Waihakeke Road

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

GRAVITY DRAINAGE SCHEME - TAUMATA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 14b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:11:04 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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N

Greater Wellington
Te Pane Matua Taiao

GRAVITY DRAINAGE SCHEME - LONGBUSH PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 15b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:23:38 PM, 31/05/2022

0 220 440 880 Metres

A3 Scale : n.t.s.

Dakins Road

Te Whiti Drain Maintenance Scheme

Te Whiti Drain Maintenance Scheme

Gladstone Road

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

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3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

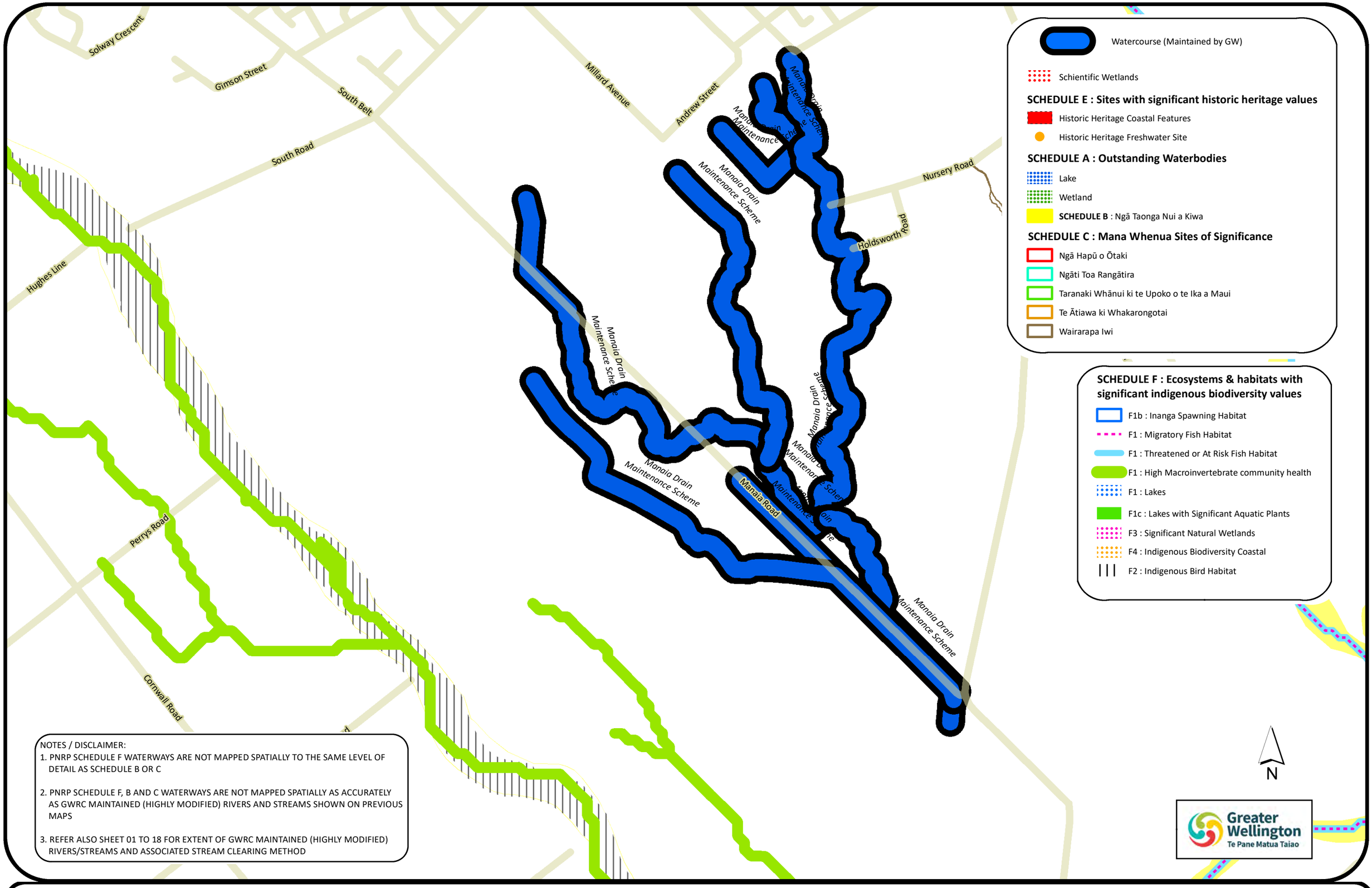
GRAVITY DRAINAGE SCHEME - TE WHITI PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 16b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:24:28 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.



NOTES / DISCLAIMER:

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2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

GRAVITY DRAINAGE SCHEME - MANAIA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 17b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:27:33 PM, 31/05/2022

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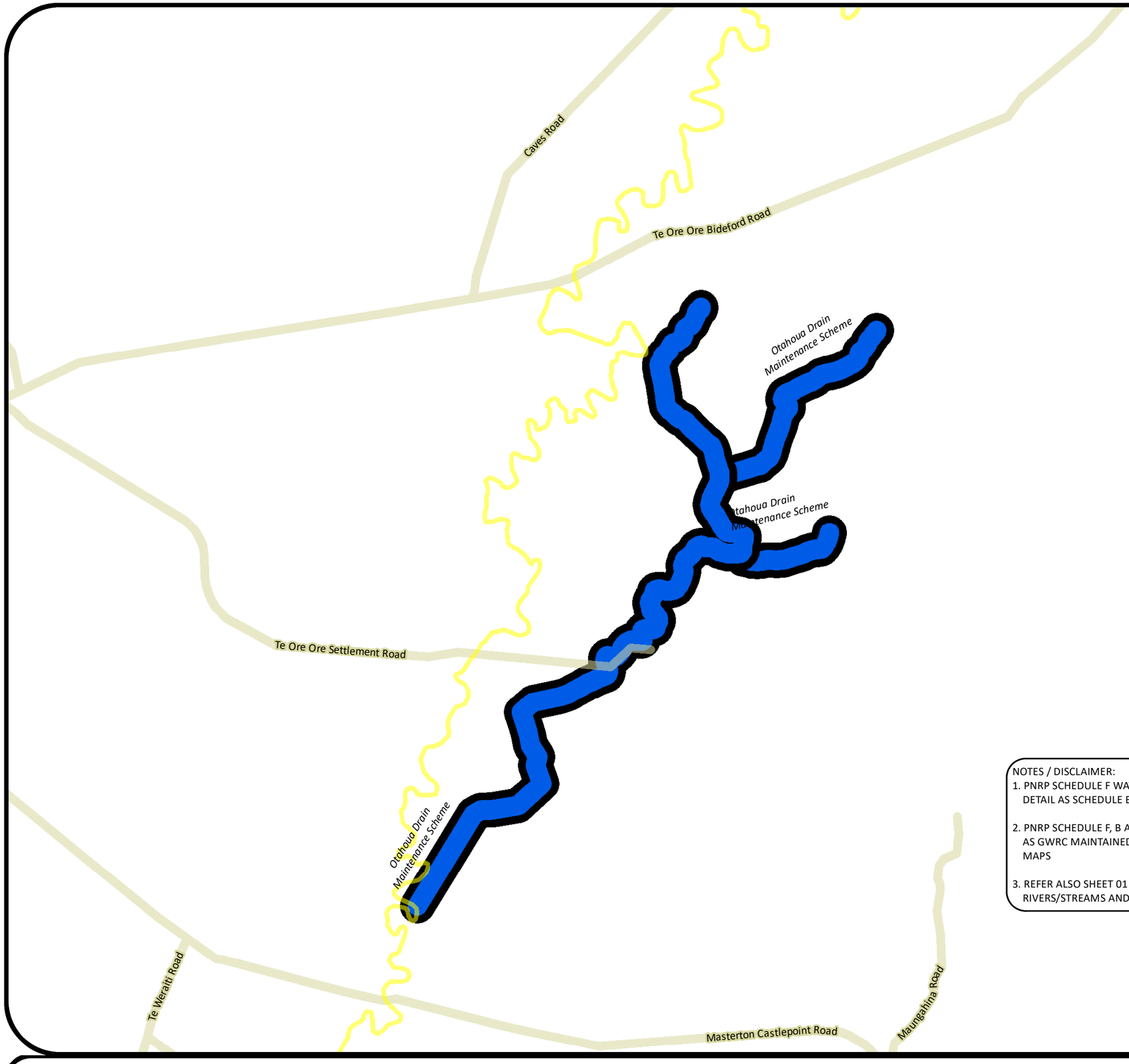
A3 Scale : n.t.s.



Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

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3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

OGRAVITY DRAINAGE SCHEME - TAHOUA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 18b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:28:58 PM, 31/05/2022

0 180 360 720 Metres

A3 Scale : n.t.s.

Appendix C Ecological assessment

REPORT

Tonkin+Taylor

Ecological Effects Assessment for the Maintenance of Highly Modified and Natural Watercourses

Greater Wellington Regional Council Drainage Schemes

Prepared for
Greater Wellington Regional Council
Prepared by
Tonkin & Taylor Ltd
Date
June 2022
Job Number
1018683.1000 v2

Together we create and sustain a better world
www.tonkintaylor.co.nz

Document control

Title: Ecological Effects Assessment for the Maintenance of Highly Modified and Natural Watercourses					
Date	**Version**	**Description**	**Prepared by:**	**Reviewed by:**	**Authorised by:**
23/06/2022	1	Report draft	M Lake L Francis	Dean Miller	Peter Roan
30/06/2022	2	Report final	M Lake L Francis	Dean Miller	Peter Roan

Distribution:

Greater Wellington Regional Council	1 electronic copy
Tonkin & Taylor Ltd (FILE)	1 electronic copy

Table of contents

Executive summary

Tonkin & Taylor Ltd (T+T) has been engaged by Greater Wellington Regional (GWRC) to undertake an ecological assessment of activities associated with ongoing maintenance of highly modified and natural watercourses in the Kāpiti Coast and Wairarapa regions. This report presents the Assessment of Ecological Effects (AEcE) to accompany resource consent applications.

Our assessment of ecological effects broadly follows the Ecological Impact Assessment Guidelines (EcIAG) (Roper-Lindsay et al, 2018), with some adaptation to allow for the scale of the activity and type of ecological disturbance that will occur. Using a standard framework and matrix approach such as this provides a consistent and transparent assessment of effects and is considered to be good industry practice. The EcIAG framework provides structure but needs to incorporate sound ecological judgement to be meaningful. The guidelines include for a three-step assessment:

1 The level of ecological value of the existing environment. This was determined using existing information, which was very limited for most drainage sub-catchments.

2 The magnitude of ecological effect from the proposed activity on the environment.

3 The overall level of effects to determine if mitigation is required.

The ecological baseline used for assessing effects was considered to be the typical condition of affected watercourses immediately prior to maintenance works being undertaken. This baseline was used because all of the watercourses have experienced a long history of maintenance, stretching back to when the catchments were developed to support agriculture.

Freshwater ecological values

Watercourses in the Kāpiti Coast and Wairarapa vary in ecological value and this is generally reflected in their classification under the Proposed Natural Resources Plan (PNRP). Natural watercourses tended to have higher ecological values, than highly modified and artificial drains but even artificial drains could support high ecological values if species of conservation concern are present. Higher ecological value was assigned to natural watercourses as they tended to support more diverse fish communities, had high value downstream receiving environments (e.g. estuaries and coastal wetlands) and marginally better water quality. Water quality and habitat data was obtained for some of the Kāpiti Coast and Wairarapa watercourses from state of the environment (SOE) monitoring data and GWRC monitoring sites. Most of the watercourses are soft-bottomed with little riparian vegetation. Overall, the habitat and water quality within the watercourses is generally poor. Even given the low habitat and water quality, fish diversity was high with several fish species being recorded in or near the Kāpiti Coast and Wairarapa watercourses.

Terrestrial ecological values

Riparian vegetation along the stream margins may also be impacted as a result of watercourse maintenance, and the effects on terrestrial ecology are briefly considered. Most of the vegetation along watercourses is exotic rank and mown grasses. There are also areas of streambank that support exotic and indigenous shrubs and trees. Rank grasses, shrubs and trees along the watercourses may be providing habitat for lizards, birds and long-tailed bats. Many species of ingenious lizards (skinks and geckos) and birds have been recorded nearby watercourses in the Kāpiti Coast and Wairarapa regions. While many bird species were present in the landscape, mallard ducks were considered the most likely species of bird to be affected by watercourse maintenance. It is very unlikely that long-tailed bats are utilising trees as roosting habitat along the watercourses, with no records for bats near any of the watercourses. The overall ecological value of the riparian habitat for indigenous species is considered **low** (for rank grasses) to **moderate** (for habitat supporting shrubs and trees).

Potential ecological effects

Actual and potential effects arising from the proposed watercourse upgrades have been assessed using the EcIAG and are summarised below:

Actual adverse effects (expected to occur)

- Decreases in water quality at site.
- Loss and simplification of aquatic habitat when macrophytes and other structures are removed.
- Removal and direct mortality of macroinvertebrates and fish.
- Disturbance of existing riparian vegetation.

Potential adverse effects (may occur under some circumstances)

- Potential removal of food for instream fauna and wetland birds.
- Spread of pest plants via fragments remaining on machinery.
- Discharge of sediment to receiving environments.
- Disturbance of native wetland birds game birds and nesting habitat.
- Potential changes in hydrology of adjacent wetland habitats.
- Potential adverse effects to indigenous terrestrial fauna.

Potential positive effects

- Improved dissolved oxygen conditions.
- Increased open water habitat.

The activity of periodically removing weed, and associated silt from watercourses essentially creates a disturbance regime that constantly resets the ecological conditions of those watercourses to below the baseline state. In doing so it also causes direct loss of aquatic freshwater fauna by physically removing them from the channel. Effects are relatively short term with recovery to the baseline state of maintained watercourses likely to occur within a year. Longer term cumulative effects, mainly sediment and nutrient loading, may occur in receiving environments.

Measures to manage these effects were identified in accordance with the mitigation hierarchy. The development of and adherence to best management practices were identified as an effective mechanism to minimise and, in some instances avoid, effects. It is recommended that the best management practices be captured within Vegetation and Sediment Removal Management Plan (VSRMP) for each of the drainage sub-catchments so that ecological values and operational constraints and opportunities for each sub-catchment can be captured.

When measures to avoid, remedy or mitigate effects are taken into account, we have assessed that the maintenance of Kāpiti Coast and Wairarapa watercourses will generally have low to moderate effects provided the effect management actions outlined in Section 7 are implemented. However, greater effects are expected where more sensitive environments such as natural watercourses, wetlands or lakes are at risk (Table 1).

Further effects management is generally required for residual effects when any overall level of effects is **moderate** or above and therefore, further measures may be required to address ecological effects. We recommend that a programme of ecological enhancements be developed as a compensation package to manage residual effects of the proposed works. The compensation package should focus on managing those effects that have the greatest potential to cause permanent declines in the ecological condition of receiving environments including high value wetlands and lakes.

Table 1: Ecological value, magnitude and overall level of effect with effects management applied of the proposed watercourse maintenance. Category definitions are provided in Appendix C.

Ecological Component	Ecological Value	Magnitude of effect with effects management applied	Overall level of effect with effects management applied
Artificial drains	Low-High	Low	Very Low - Low
Highly modified watercourses	Low-High	Low	Moderate
Natural watercourses	Moderate - High	Moderate	Moderate - High
Wetlands and lakes	High – Very High	Very High	Very Low - Very high
Riparian vegetation	Low to Moderate	Low	Very low to Low
Freshwater fauna	Negligible to Very high	Low	Very low to Moderate
Terrestrial fauna	Negligible to Very high	Low	Very low to Low*

*Low magnitude effects on very high values result in an overall level of effects of moderate. In this instance the highest terrestrial value was assigned to longtail bats but effects on that species are considered negligible, hence a low overall level of effect.

1 Introduction

Tonkin & Taylor Limited (T+T) has been engaged by Greater Wellington Regional Council (GWRC) to prepare an Assessment of Ecological Effects (AEcE) to accompany a resource consent application to the regulatory section of GWRC to continue maintenance of highly modified and natural watercourses in Kāpiti Coast and Wairarapa drainage schemes.

Highly modified watercourses are defined by the Greater Wellington Region's Proposed Natural Resources Plan (PNRP) Rule 121 as being:

> "*A highly modified river or stream is one which has been modified and channelled for the purpose of land drainage and has the following characteristics:*
>
> - *it has been channelled into a single flow, and*
> - *the channel has been straightened, and*
> - *the channel is mechanically formed with straight or steeply angled banks, and*
> - *it exhibits these characteristics for at least its entire length through a property, and*
> - *it is not managed as part of a stormwater network and is not a water race."*

This report has been prepared in accordance with our Contract for Services dated 3 June 2022[1].

1.1 Report scope

The scope of this report is to:

- Provide a high-level description of the freshwater and terrestrial ecological characteristics and values associated with scheme watercourses.
- Assess the actual and potential freshwater and terrestrial ecological effects resulting from the proposed activities.
- Provide recommendations to manage actual and potential ecological effects.

1.2 Project description

GWRC is seeking a comprehensive resource consent to undertake maintenance of the Kāpiti Coast and Wairarapa drainage schemes. We understand that the consent was initially intended to be limited to highly modified watercourses. However, the drainage scheme spatial layers provided by GWRC indicate works covered by the consent includes natural streams and rivers (all within the Kāpiti Coast area), which are streams and rivers that do not meet the above PNRP definition of a highly modified watercourse. There are also watercourses in the Kāpiti Coast drainage scheme that are yet to be classified as either highly modified or natural. Maintenance works are also undertaken in drains[2], and while not considered to be "rivers" under the Resource Management Act they may still support high ecological values.

Maintenance will include the removal of aquatic macrophytes and removal of fine sediment build-up. In brief, GWRC has advised us that the project includes the following activities relevant to the assessment of ecological effects:

- Removal of aquatic macrophytes, either by hand, excavator or use of a weed boat.

[1] T+T reference 1018683.1000

[2] As defined in the Guidance Note - How to determine whether a watercourse is a river, ephemeral watercourse, highly modified river or stream or artificial watercourse (May 2021) as "any artificial watercourse, designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes"

- Mechanical removal of fine accumulated fine sediment with use of an excavator. This will be conducted in a way that is not intended to widen and deepen watercourses.

1.3 Project areas

There are two project areas where watercourse maintenance is proposed. The first is the Kāpiti Coast, which is located in the Kāpiti Coast District (Figure 1, Appendix A). The second project area is the Wairarapa, which spans across the South Wairarapa District, Carterton District, and Masterton District (Figure 2, Appendix A). The project areas are discussed below.

1.3.1 Kāpiti Coast

The project area includes several watercourses that spanning the Kāpiti Coastline, in the Foxton Ecological District (ED). Most of the watercourses are located in and around the Ōtaki township, both north and south of the Ōtaki River. These fall within the Ōtaki River and Waitohu River Catchments. Another watercourse, the Waimeha Stream, is located approximately 8 km south in the Waikanae township and forms part of the Waikanae River Catchment. Watercourses that require periodic maintenance include both classified 'natural rivers/streams' and 'highly modified rivers or streams' under Rule R121 of the Proposed Natural Resources Plan (refer to Appendix B Table 1). Most of these watercourses flow out to sea either directly (e.g. the Mangaone Stream to Te Horo Beach), or via the Ōtaki River.

GWRC has assigned watercourses within the Wellington Region one of six 'river classes', based on the Freshwater Ecosystems of New Zealand Classification (Greater Wellington Regional Council, 2020a). It takes into account the relationship between river and stream biota, and natural environmental variables (Greater Wellington Regional Council, 2020a). The majority of the watercourses are classed as Class 6 streams which are low-gradient, small streams. The main channel of the Mangaone Stream is classified as Class 5 which is a low gradient, large stream (Greater Wellington Regional Council, 2020a).

Landcover near the Ōtaki River mouth is predominately high producing exotic grassland, with smaller areas of urban build-up, urban parkland/open space, exotic forest, and short-rotation crop land. The Waimeha Stream in Waikanae is situated in predominately high producing exotic grassland, and urban parkland/open space (LRIS, 2015). There are several significant natural wetlands along the Kāpiti Coast, which are typically small.

1.3.2 Wairarapa

The Project area includes several drainage maintenance schemes that span an area from Masterton in the north to Lake Onoke in the south. Most of the project area is located in the Wairarapa Plains ED, with one watercourse (Otahoua Drain Maintenance Scheme) located in the Eastern Wairarapa ED. The watercourses are all classified as 'highly modified rivers or streams' (Appendix B Table 1) and are situated in the Ruamāhanga River Catchment. In terms of GWRC 'river classes', most of the watercourses are classified as Class 6 streams which are low-gradient, small streams. A section of the Onoke Drainage Scheme is a Class 5 stream, which is a low gradient, large stream, draining plains and eastern Wairarapa (Greater Wellington Regional Council, 2020a).

Landcover in the Wairarapa Plains is almost entirely high producing exotic grassland, with smaller areas of 'pond or lake' and short-rotation cropland. Large areas of indigenous forest remain on the slopes in the surrounding forest parks (e.g. Remutaka Forest Park, Aorangi Forest Park).

There is a large network of culturally significant wetlands (10,547 ha) and rivers located west of the highly modified drains, known as the Wairarapa Moana. The Wairarapa Moana is listed as an internationally significant wetland under the Ramsar convention. The wetland complex includes freshwater lakes Lake Wairarapa and Lake Onoke, several marshes and swamps as well as coastal

marches and coastal shore habitats. The Wairarapa Moana is home to several rare and At Risk species, including freshwater fish and wetland birds (Ramsar Sites Information Service, 2020). Nutrient accumulation from land use, invasive species and earthquakes are considered the biggest threats to the Wairarapa Moana (Ramsar Sites Information Service, 2020). Lake Wairarapa is in very poor condition being a super eutrophic lake, with a Trophic Level Index Score (TLI) of between 4.8 and 5.9 between 2002 and 2020 (0-2 indicates very good water quality) (Land and Water Aotearoa, 2022a). Lake Onoke that receives water from Ruamāhanga River Catchment is also in poor condition, with the TLI score of 4.6 in 2020 (Land and Water Aotearoa, 2022b).

2 Methods

2.1 Watercourse locations

GWRC undertake channel maintenance of minor watercourses and drains across 182.6 km of natural, highly modified and unclassified streams and rivers in the Kāpiti Coast and Wairarapa areas. This includes 35 km of watercourses on the Kāpiti Coast comprising 13.6 km of natural streams and rivers, 14.8 km of highly modified streams and rivers, and 6.6 km of unclassified stream and rivers, and 147.5 km of highly modified streams and rivers in Wairarapa. Watercourses are listed along with classifications, lengths and clearance methods in Table 2.1 and Table 2.2 below and are presented graphically on the figures in Appendix A.

Table 2.1: Names, lengths and clearance methods of watercourses that require maintenance in Kāpiti Coast drainage schemes.

Watercourse	Scheme	Rule R121	Length (km)	Clearance method
Katihuku Drain	Ōtaki River Scheme	Highly Modified	0.783	Hand
			1.454	Machine
Mangaone Stream	Mangaone Drainage Scheme	Highly Modified	0.493	Machine
			0.994	Weed Boat
		Natural	0.495	Machine
			0.657	Weed Boat
Mangaone Stream - Walkers Corner	Mangaone Drainage Scheme	Highly Modified	0.668	Machine
	Mangaone Drainage Scheme	Natural	0.591	Machine
Mangapouri Stream - Downstream of Convent Road	Ōtaki River Scheme	Natural	0.685	Hand
			0.478	Machine
			1.136	Weed Boat
		Unclassified	0.021	Hand
Mangapouri Stream - Upstream of Convent Road	Ōtaki River Scheme	Natural	0.972	Hand Machine
		Unclassified	0.103	
Ngatoko Stream	Ōtaki River Scheme	Natural	1.702	Machine
Ngatotara Drain - Lagoon	Ōtaki River Scheme	Natural	1.029	Machine
Ngatotara Drain - North Branch	Ōtaki River Scheme	Highly Modified	0.064	Machine
		Unclassified	0.701	
Ngatotara Drain - Siphon	Ōtaki River Scheme	Highly Modified	0.435	Machine
		Unclassified	0.894	
Ngatotara Drain - South Branch	Ōtaki River Scheme	Highly Modified	0.142	Machine
		Unclassified	0.371	
Pahiko Drain	Ōtaki River Scheme	Highly Modified	3.186	Machine
		Unclassified	0.347	
Powles Drain	Mangaone Drainage Scheme	Highly Modified	1.413	Machine

Watercourse	Scheme	Rule R121	Length (km)	Clearance method
Pukenamu Drain	Mangaone Drainage Scheme	Highly Modified	1.890	Machine
Rangiuru Stream	Ōtaki River Scheme	Natural	1.226	Weed Boat Machine
		Unclassified	2.714	
Sages Drain	Mangaone Drainage Scheme	Highly Modified	1.465	Machine
Te Awahohonu Drain - East of Freemans Road	Ōtaki River Scheme	Unclassified	0.277	Hand
Te Awahohonu Drain - Freemans Road	Ōtaki River Scheme	Natural	1.864	Hand
		Unclassified	1.033	
Waimeha Stream	Waikanae River Scheme	Highly Modified	0.237	Hand
		Natural	1.867	Weed Boat
Waimeha Stream - Residential Section	Waikanae River Scheme	Highly Modified	0.302	Hand
		Natural	0.898	
		Unclassified	0.054	
Walkers Drain	Mangaone Drainage Scheme	Highly Modified	1.308	Machine
		Unclassified	0.083	

Table 2.2: Names and lengths of watercourses that require maintenance in the Wairarapa drainage schemes

Drainage scheme name	Drainage scheme type	Pump stations if present	Rule R121 definition	Length (km)	Plan No.
Otahoua Drain Maintenance Scheme	Gravity		Highly Modified	5.557	D 536
Manaia Drain Maintenance Scheme	Gravity		Highly Modified	12.161	D 87 / 1
Te Whiti Drain Maintenance Scheme	Gravity		Highly Modified	2.929	No data
Ahikouka Drain Maintenance Scheme	Gravity		Highly Modified	4.383	D 526
Taumata Drain Maintenance Scheme	Gravity		Highly Modified	4.620	D / 466
Longbush Drain Maintenance Scheme	Gravity		Highly Modified	9.200	D 16B

Drainage scheme name	Drainage scheme type	Pump stations if present	Rule R121 definition	Length (km)	Plan No.
Battersea Drain Maintenance Scheme	Gravity		Highly Modified	40.592	D 239
Whakawiriwiri Drain Maintenance Scheme	Gravity		Highly Modified	13.612	No data
Okawa Drain Maintenance Scheme	Gravity		Highly Modified	2.457	D 504
East Pukio Drain Maintenance Scheme	Gravity		Highly Modified	7.168	D 546
Te Hopai Drainage Scheme	Pump	Te Hopai Pump Station	Highly Modified	20.435	D 471
Pouawha Drainage Scheme	Pump	Pouawha Pump Station No 1, Pouawha Pump Station No 2	Highly Modified	11.811	2A / 150 / 208
Moonmoot Drainage Scheme	Pump	Moonmoot Pump Station	Highly Modified	5.217	D 472A
Onoke Drainage Scheme	Pump	Onoke Pumping Station	Highly Modified	7.102	D 527

2.2 Identification of ecological values

A high-level desktop information review was undertaken to assign ecological values to watercourses. Information sources searched as part of the review are listed in Table 2.3 below. No ecological surveys were undertaken. There are therefore gaps in our understanding of values associated with many of the watercourses where maintenance works occur.

Table 2.3: Information reviewed to assess ecological value

Report/database	Items reviewed
Greater Wellington Regional Council ArcGIS - Regional Environmental Information	Layers used: • Catchments • Ecological Sites (Greater Wellington Regional Council, 2022a)
State of Environment (SOE) factsheets and water quality data	Wairarapa Valley sub-region factsheet (Greater Wellington Regional Council, 2012a) Kāpiti Coast sub-region factsheet (Greater Wellington Regional Council, 2012b) Water quality data for SOE sites nearby watercourses
New Zealand Threat Classification Series	Bats (O'Donnell *et al.*, 2017) Birds (Robertson *et al.*, 2017) Fish (Dunn *et al.*, 2018) Reptiles (Hitchmough *et al.*, 2021)

Report/database	Items reviewed
New Zealand Government – Data layers	PNRP - River Classes PNRP - Schedule F2 - Indigenous Bird Habitat PNRP - Schedule F3 - Significant Natural Wetlands Singers Forest Classification - Current Forest Extent PNRP - Schedule F1b - Inanga Spawning Habitat
LRIS Portal	Land Cover in the general area (LRIS, 2015)
Land Air Water Aotearoa (LAWA)	Water quality of rivers and lakes
Department of Conservation – Bat database	Nearby bat records
New Zealand Freshwater Fish Database	Fish records for within the immediate watercourses
Wilderlab explore web-tool	eDNA records for within the immediate watercourses
Department of Conservation – Herpetofauna Atlas	Nearby herpetofauna records
iNaturalist database (iNaturalist.org)	Nearby bird records
Google earth	Aerial imagery
Unpublished GWRC data	Kāpiti Drain surveys (Fish and rapid habitat assessments) Wairarapa Moana Drains fishing data

2.3 Ecological Impact Assessment

We have followed the structure of the Environment Institute of Australia and New Zealand (EIANZ) guidelines for Ecological Impact Assessment (EcIA) developed by Roper- Lindsay *et al.* (2018). The EcIA approach follows the steps outlined below:

Step 1: Ecological value was assigned to natural and highly modified watercourses based on stream characteristics such as water quality and habitat (refer to Appendix C Table 2), as well as the presence of At Risk and Threatened fish species (Appendix C Table 1).

Step 2: The magnitude of effects on local ecological values are assigned a level on a scale of 'Negligible', 'Low', 'Moderate', 'High' or 'Very High' based on criteria set out in the EcIA guidelines (Appendix C Table 3). The 'Magnitude of Effect' assessment was based on:

1 The scale of unmitigated effect per se (i.e. the removal of fish from the channel).
2 The proportion of habitat loss and/or modification versus local availability.
3 The duration of effect (e.g. permanent versus temporary effects (Appendix C Table 4)).
4 The intensity of the effect (i.e. the extent to which habitat loss or modification is complete or partial).

Step 3: The overall level of effect is determined using a matrix based on the combination of ecological values and the magnitude of effects on these values (Appendix C Table 5). Overall level of effect categories include 'Negligible Effect', 'Very Low', 'Low', 'Moderate', 'High' and 'Very High'. We used the overall level of ecological effect to determine if effects management (mitigation) is required. The overall level of effects is assessed with and without any management of effects.

Ecological effects assessments under the EIANZ guideline typically include determining the magnitude of effect both before and after proposed effects management (e.g. avoidance, mitigation, offsetting/compensation) actions have been taken into account. However, for this AEE we have only identified magnitude of effects with effects management in place. This is because the proposed activity will create a long-term regime of disturbance where effects will be highly variable depending

on the location, timing and frequency of works in any given year. Some the most effective effects management tools will include controlling the location, timing and frequency of maintenance activities. Assigning a magnitude of effects before taking into account any effect management approaches would likely to add unnecessary variability and complexity to the effects assessment and management processes.

3 Current ecological values

3.1 Kāpiti Coast freshwater values

3.1.1 Watercourses

3.1.1.1 Habitat quality

There is wide variation in the quality of aquatic habitat provided by watercourses that will be covered by the proposed consent. Many of the highly modified watercourses typically have low habitat values, are characterised by low habitat diversity, limited riparian vegetation and a lack of instream structure. Natural watercourses, such as many of those along the Kāpiti Coast have higher values due mainly to their more natural meandering channel form.

Rapid habitat assessments[3] have been undertaken at eight sites on five highly modified Kāpiti Coast watercourses between December 2020 and January 2021, and were found to be degraded (Greater Wellington Regional Council, 2021). Watercourses included the Pukenamu Drain, Walkers Drain, Powles Drain, Katihuku Drain and Pahiko Drain, which have all been maintained by GWRC. Aquatic macrophytes in these watercourses are mostly removed by machine, with one small length (0.78 km) of the Katihuku Drain being cleared by hand (refer Table 3.5 in Section 3.1.3 for the location of watercourses). Rapid habitat assessment scoring for the sites ranged between 27 to 50 (average 35.1) out of a possible 100. Deposited sediment and hydraulic heterogeneity scored the lowest at the sites, which is not surprising given the channelised and soft bottom nature of these watercourses. Deposited sediment covered >75% of the streambed at seven of the eight sites, while all sites had a maximum of two hydraulic components (e.g. slow runs, pools). Bank erosion scored the highest at the sites with an average score of 8.4, meaning sites had low levels of bank failure, with around 5% on average of both banks experiencing active erosion.

Bank vegetation was limited, with 50% of the sites scoring a 1 or 2 (out of 10) indicating grazed exotic pastures. The remainder of the sites scored between 3 and 6, indicating the presence of long grasses and/or mature shrubs, sparse tree cover or exotic forestry. Riparian width was also limited, with 6 of the 8 sites having an approximately 2 m riparian buffer either side of the stream. Riparian habitats provided between <5% to 50% shading of the stream channel, with an average of 15% shading at the site. None of the watercourses are located within patches of indigenous forest (Greater Wellington Regional Council, 2020b). There is, however, small areas of ingenious forest near the Waimea Stream-residential site, Mangaone Stream-Walkers Corner, and Mangapouri Stream-Upstream of Convent Road.

Invertebrate habitat and diversity was low, with 7 of the 8 sites containing only 5% of habitat suitable for macroinvertebrate colonisation. Fish cover diversity and abundance was more variable across sites, with sites supporting between 10% and 75% suitable fish cover. Fish cover diversity ranged from containing three substrate types (e.g. woody debris, root mats, macrophytes, boulders, cobbles etc.) to five substrate types that including substrates such as boulders that provided spatial complexity.

Habitat for freshwater fauna tends to be better in the natural streams and rivers than in highly modified watercourses. The Manganoe Stream, Rangiuru Stream, Mangapouri Stream, Waitohu Stream, and Waimeha Stream, have been identified as significant natural ecosystems, providing habitat for indigenous fish species of conservation interest (Greater Wellington Regional Council, 2020c). The river mouths of the Waikanae River, Waimeha Stream, Mangaone Stream, Ōtaki River and Waitohu Stream also provide habitat for īnanga (*Galaxias maculatus*) spawning (Greater

[3] Rapid habitat assessment field sheet https://www.cawthron.org.nz/wp-content/uploads/2022/01/RHA-Field-Recording-Sheet-pdf.pdf

Wellington Regional Council, 2022b). Īnanga are a migratory galaxiid species which lay their eggs in vegetation near the at the coast and have a conservation status of At Risk-Declining (Dunn *et al.*, 2018).

3.1.1.2 Water quality

There is limited information available on water quality in most of the watercourses where maintenance occurs. Two watercourses contain State of the Environment (SOE) sites that are monitored by GWRC. These includes Mangapouri Stream-Upstream of Covent Road (Site RS02, Mangapouri Stream at Bennetts Rd), and the Mangaone Stream (Site RS07, Mangaone Stream at Sims Road Bridge). Both SOE monitoring sites are situated on natural sections of stream (Table 3.1).

The water quality measured at these two SOE sites is generally poor. Mangapouri Stream and Mangaone Stream have median total nitrogen concentrations of 1.61 g/m^3 and 1.63 g/m^3, respectively (Greater Wellington Regional Council, 2022c). These values both fall within the worst 25% of sites for total nitrogen concentrations monitored in New Zealand (Land and Water Aotearoa, 2022c; Land and Water Aotearoa, 2022d). Ammoniacal nitrogen, which is toxic to fish had an annual median value of 0.026 g/m^3 at Mangapouri and 0.04 g/m^3 at Mangaone Stream (Greater Wellington Regional Council, 2022c). These values fall within the B level band in the National Objectives Framework (NOF) of the National Policy Statement for Freshwater Management (NPSFM), meaning that 5% of the more ammonia sensitive species are potentially impacted (New Zealand Government, 2020).

Total phosphorus (TP) and dissolved reactive phosphorus (DRP) were high at the Mangapouri Stream, with median concentrations of 0.08 g/m^3 and 0.032 g/m^3, respectively (Greater Wellington Regional Council, 2022c). The Mangaone Stream had a median TP concentration of 0.059 g/m^3 and a DRP concertation of 0.027 g/m^3 (Greater Wellington Regional Council, 2022c). TP and DRP concentrations for both sites fall within the worst 25% of sites monitored in New Zealand (Land and Water Aotearoa, 2022c; Land and Water Aotearoa, 2022d). Median DRP concentrations at both sites fall also fall within the D band (i.e. below the bottom line) of the NOF meaning ecological communities are likely heavily impacted by the high DRP concentration, including excessive primary production, changes in fish and macroinvertebrates communities and taxa sensitive to hypoxia are lost (New Zealand Government, 2020).

Table 3.1: Water quality variables for two SOE sites on the Kāpiti Coast.

	Mangapouri Stream (Bennets Road)				**Mangaone Stream (Sims Road Bridge)**			
	Number samples	**Min.**	**Median**	**Max.**	**Number samples**	**Min.**	**Median**	**Max.**
Total Nitrogen (g/m^3)	11	0.8	1.61	3.7	11	1.14	1.63	3.8
Ammoniacal nitrogen (g/m^3)	11		0.026*	0.068	11		0.04*	0.065
Total Phosphorus (g/m^3)	11	0.061	0.08	0.12	11	0.044	0.059	0.109
Dissolved reactive phosphorus (g/m^3)	11	0.021	0.032	0.049	11	0.0181	0.027	0.033

	Mangapouri Stream (Bennets Road)				Mangaone Stream (Sims Road Bridge)			
	Number samples	**Min.**	**Median**	**Max.**	**Number samples**	**Min.**	**Median**	**Max.**
Deposited fine sediment (% cover)	11	70	95	100	11	100	100	100
Water clarity (m)	11	0.53	0.92	2.45	11	0.59	1.08	1.95
Dissolved oxygen (mg/L)	11	3.63	6.995	10.43	11	2.59	8.33	9.9
pH	11	6.9	7.1	7.4	11	6.9	7.2	7.6
Electrical conductivity (µs/cm)	11	206.4	209.55	243.8	11	151.9	197.6	210.4

* Annual median value.

While the water quality information is limited to two long term SOE sites, it supports the view that water quality in highly modified watercourses is generally likely to be poor to moderate. Water quality in natural rivers and stream is likely to be better than in modified watercourses, however, given the highly modified condition of their catchments it is not expected to be high.

Macroinvertebrate communities provide ecological indicators of water quality as well as general habitat quality. This is due to certain species sensitivity to organic pollution and nutrient enrichment, with some species being more sensitive than others. Mangapouri Stream had a mean macroinvertebrate community score (MCI)[4] of 81.3 and a quantitative MCI for soft bottomed streams (QMCI-sb)[5] score of 4.55 (Greater Wellington Regional Council, 2022c). With reference to Table 3.2, both the MCI and QMCI scores indicate probable moderate pollution and fair habitat quality. The MCI score also falls in the D band of the NOF indicating severe organic pollution or nutrient enrichment, and the taxa are largely insensitive (New Zealand Government, 2020).

Mangapouri Stream has a 5-year median taxonomic richness score[6] of 20 and 5-year median EPT taxa richness score[7] of 13% (Greater Wellington Regional Council, 2022c). These scores are low and are further evidence of degraded habitat (Land and Water Aotearoa, 2022c). The Mangaone Stream has a 5-year median MCI score of 77.9, which also falls within the D band of the NOF and a QMCI score of 4.36 (Greater Wellington Regional Council, 2022c). It has a 5-year median Taxonomic Richness of 20 and a 5-year median EPT taxa richness score[8] of 3% (Greater Wellington Regional Council, 2022c). All scores indicate severely degraded habitat (Land and Water Aotearoa, 2022d).

[4] MCI-sb is an index for assessing the quality class of a stream using presence or absence of macroinvertebrates

[5] QMCI-sb is similar to MCI-sb but includes a weighting for taxa abundance within the community.

[6] Taxonomic richness is the number of different taxa present in an ecological community identified to the best possible level.

[7] EPT are macroinvertebrate taxa groups known to be sensitive to water pollution. These are Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly). An increased abundance of EPT taxa generally indicates improved long-term water quality.

[8] EPT are macroinvertebrate taxa groups known to be sensitive to water pollution. These are Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly). An increased abundance of EPT taxa generally indicates improved long-term water quality.

Table 3.2: Interpretation of macroinvertebrate community index values from Boothroyd & Stark (2000) (Quality class A) and Stark & Maxted (2007) (Quality class B)

Quality Class A	Quality Class B	MCI & MCI-sb	QMCI & QMCI-sb
Clean water	Excellent	> 119	> 5.99
Doubtful quality	Good	100 – 119	5.00 – 5.99
Probable moderate pollution	Fair	80 – 99	4.00 – 4.99
Probable severe pollution	Poor	< 80	< 4.00

3.1.2 Wetlands and lakes

We identified eight significant natural wetlands and one possible significant natural wetland located within 500 m of Kāpiti Coast watercourses proposed to be included in the comprehensive maintenance consent[9] (Table 3.3) (Greater Wellington Regional Council, 2020d). Some of the watercourses flow directly through the wetlands, while others are located very close by and may be affected by maintenance activities. In addition to wetlands identified in Table 3.3, it is likely that many more lower value wetlands are also present and potentially affected by maintenance activities. While these lower value wetlands may not be considered significant they may still meet the definition of a Natural Inland Wetland under the NPSFM, and will therefore require consideration in this AEcE.

Table 3.3: Size and significance of significant natural wetlands and their position to watercourses (Greater Wellington Regional Council, 2020d).

Wetland	Wetland size (ha)	Significance criteria met	Watercourse name that requires maintenance	Watercourse position to wetland
O te Pua (Pukehou / Pritchard's Swamp)	27.4	Representativeness, Ecological context	Ngatotara Drain North and South Brach, and Ngatotara Drain - Siphon	through/adjacent
Waimanguru Lagoon (Forest Lake)	3.0	Representativeness	Ngatotara Drain - Siphon	nearby (*c.* 320 m north)
K201 Recommended	2.5	Likely to be a natural wetland	Mangapouri Stream - Downstream of Convent Road	nearby (*c.* 120 m south)
Ngātotara Lagoon	8.1	Representativeness, Diversity	Ngatotara Drain - Lagoon	adjacent
Ōtaki River	5.2	Representativeness	Ngatoko Stream and Rangiuru Stream	adjacent
Ōtaki Porirua Trust Board Wetland	2.9	Representativeness	Rangiuru Stream	adjacent
Ōtaki Stewardship Area Wetland	3.8	Representativeness	Rangiuru Stream	nearby (*c.* 88 m north)

[9] This assessment is high level and relies on existing published sources and known wetlands only. It does not comprise an assessment of the wetland provisions of the NES - Freshwater and whether any rules therein are triggered. Site specific assessment will be required to establish whether any NES-Freshwater provisions are relevant to the locations and works.

Wetland	Wetland size (ha)	Significance criteria met	Watercourse name that requires maintenance	Watercourse position to wetland
Ōtaki River Mouth South	10.4	Representativeness	Pahiko Drain	through
Osbourne's Swamp	2.4	Representativeness	Waimeha Stream	Nearby (*c*. 290 m west)

3.1.3 Fish communities

Searches of the New Zealand Freshwater Database (NZFFD) found 15 fish species and two invertebrate species present within and close to Kāpiti Coast watercourses covered by the proposed consent. Fish and invertebrate species along with their threat classification are presented in Table 3.4. Five of the 14 fish species are classified as At Risk and one is Threatened (Dunn *et al.*, 2018). There is also a historic record (1954) for brown mudfish (*Neochanna apoda*; At Risk-Declining) near the Ngatotara Drain–Lagoon.

Table 3.4: List of freshwater fauna found within the vicinity of the Kāpiti Coast watercourses included within the proposed consent (NIWA, 2022)

Common name	Scientific name	Threat conservation status (Dunn *et al.*, 2018; Grainger *et al.*, 2018)
Banded kōkopu	*Galaxias fasciatus*	Not Threatened
Black flounder	*Rhombosolea retiaria*	Not Threatened
Common bully	*Gobiomorphus cotidianus*	Not Threatened
Common smelt	*Retropinna retropinna*	Not Threatened
Freshwater shrimp	*Paratya curvirostris*	Not Threatened
Giant bully	*Gobiomorphus gobioides*	At Risk-Naturally Uncommon
Giant kōkopu	*Galaxias argenteus*	At Risk-Declining
īnanga	*Galaxias maculatus*	At Risk-Declining
Kōura	*Paranephrops planifrons*	Not Threatened
lamprey	*Geotria australis*	Threatened – Nationally Vulnerable
Longfin eel	*Anguilla dieffenbachii*	At Risk-Declining
Rainbow trout	*Oncorhynchus mykiss*	Introduced and naturalised
Redfin bully	*Gobiomorphus huttoni*	Not Threatened
Shortfin eel	*Anguilla australis*	Not Threatened
Torrentfish	*Cheimarrichthys fosteri*	At Risk-Declining
Upland bully	*Gobiomorphus breviceps*	Not Threatened
Yellow eye mullet	*Aldrichetta forsteri*	Not Threatened

Fish surveys were recently undertaken by the GWRC in December 2020 and January 2021. These surveys detected six fish species present across five of the Kāpiti Coast watercourses (eight sites) (Table 3.5). All sites are highly modified watercourses. Fishing was undertaken using the wadable stream trapping protocols (Joy *et al*. 2013). Īnanga (*Galaxias maculatus*) and shortfin eels (*Anguilla australis*) were found at all eight sites, with longfin eels present at seven of the eight sites. Common bully (*Gobiomorphus cotidianus*) were found in all of the watercourses with the exception of the

Katihuku. Giant bullies (*Gobiomorphus gobioides*) and giant kōkopu (*Galaxias argenteus*) were less common, with only one individual of each species caught at the Walkers Drain site and two giant bullies captured at Pahiko downstream.

Table 3.5: Species and numbers of fish captured by the GWRC at eight sites in Kāpiti Coast watercourses during surveys conducted in December 2020 and January 2021.

Sites	Scheme	Common bully	īnanga	Shortfin eel	Longfin eel	Giant bully	Giant kōkopu	Elver (longfin eel)
Pukenamu upstream	Mangaone Drainage Scheme	20	21	27	26	0	0	0
Pukenamu downstream		24	343	74	26	0	0	0
Walkers Drain		1	2014	29	128	1	1	3
Powles Drain		151	24	63	5	0	0	0
Katihuku upstream	Ōtaki River Scheme	0	5	10	0	0	0	0
Katihuku downstream		0	442	27	5	0	0	0
Pahiko upstream		0	1145	12	24	0	0	0
Pahiko downstream		0	274	3	12	2	0	0

3.2 Kāpiti Coast terrestrial values

3.2.1 Long-tailed bats

Several surveys for the Threatened – Nationally Critical long-tailed bat (*Chalinolobus tuberculatus*) have been undertaken in the Kāpiti Coast area (Department of Conservation, 2021). This includes surveys in Ōtaki, Manakau, and Levin. The surveys did not detect bats within the vicinity of watercourses covered by the proposed consent, with the closest recording of bats detected on Kāpiti Island (Department of Conservation, 2021).

3.2.2 Herpetofauna

There are very few records for lizards near the Kāpiti Coast watercourses. Northern grass skink (*Oligosoma polychrome*; Not Threatened) have been recorded at the upstream end of the Waimeha Stream - Residential Section, and copper skink (*Oligosoma aeneum*; At Risk-Declining) have been recorded nearby Mangaone Stream-Walkers Corner and Te Awahohonu Drain-Freemans Road watercourses. Other species nearby that may be present in vegetation near the watercourses include ornate skink (*Oligosoma ornatum*; At Risk-Declining), barking gecko (*Naultinus punctatus*; At Risk-Declining), and southern bell frog (*Litoria raniformis*; Introduced and Naturalised) (Department of Conservation, 2020).

3.2.3 Avifauna

Searches for bird sightings on iNaturalist found a number of inland and costal birds present on or nearby the Kāpiti Coast watercourses and associated wetlands (Table 3.1). Being situated on the coast, there is numerous coastal bird species present on river mouths and in coastal wetlands (Table

3.1). The river mouths of the Waikanae River, Waimeha Stream, Mangaone Stream, Ōtaki River and Waitohu Stream all provide significant, important costal bird and indigenous river bird habitat (Greater Wellington Regional Council, 2020e).

A total of 24 wetland and coastal bird species have been recorded on or near the Kāpiti Coast watercourses (Table 3.6: Bird species recorded within the vicinity of Kāpiti Coast watercourses that are likely to utilise wetland and watercourse habitats (iNaturalist, 2022)

). Of these, two are Introduced and Naturalised and ten are Not Threatened. The remaining 12 bird species have threat statuses of At Risk or Threatened. Terrestrial birds such as tūī (*Prosthemadera novaeseelandiae*; Not Threatened), kererū (*Hemiphaga novaeseelandiae*; Not Threatened), grey warbler (*Gerygone igata*; Not Threatened) and fantail (*Rhipidura fuliginosa placabilis*; not threatened) are also present in the landscape, however, are unlikely to be affected by watercourse maintenance as they are associated with forest habitats. As such, terrestrial birds have been excluded from the bird species list presented in Table 3.6:Bird species recorded within the vicinity of Kāpiti Coast watercourses that are likely to utilise wetland and watercourse habitats (iNaturalist, 2022)

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Table 3.6: Bird species recorded within the vicinity of Kāpiti Coast watercourses that are likely to utilise wetland and watercourse habitats (iNaturalist, 2022)

includes game birds such as mallard ducks (*Anas platyrhynchos*), which utilise highly modified lowland watercourses as nesting habitat and rearing habitats (McDougal, 2018).

Table 3.6: Bird species recorded within the vicinity of Kāpiti Coast watercourses that are likely to utilise wetland and watercourse habitats (iNaturalist, 2022)

Common name	Scientific name	Threat conservation status (Robertson *et al.*, 2017)
Australasian shoveler	*Anas rhynchotis*	Not Threatened
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk-Naturally Uncommon
Banded dotterel	*Charadrius bicinctus*	At Risk-Declining
Black swan	*Cygnus atratus*	Not Threatened
Black-fronted dotterel	*Elseyornis melanops*	At Risk-Naturally Uncommon
Canada goose	*Branta canadensis*	Introduced and Naturalised
Caspian tern	*Hydroprogne caspia*	Threatened-Nationally Vulnerable
Common white-faced heron	*Egretta novaehollandiae*	Not Threatened
Eastern-bar-tailed godwit	*Limosa lapponica baueri*	At Risk-Declining
Fairy prion	*Pachyptila turtur*	At Risk-Relict
Little black shag	*Phalacrocorax sulcirostris*	At Risk-Naturally Uncommon
Little shag	*Phalacrocorax melanoleucos brevirostris*	Not Threatened
Mallard	*Anas platyrhynchos*	Introduced and Naturalised
Paradise shellduck	*Tadorna variegata*	Not Threatened

Common name	Scientific name	Threat conservation status (Robertson *et al.*, 2017)
Pied stilt	*Himantopus himantopus*	Not Threatened
Pūkeko	*Porphyrio melanotus*	Not Threatened
Red-billed gull	*Chroicocephalus novaehollandiae scopulinus*	At Risk-Declining
Royal spoonbill	*Platalea regia*	At Risk-Naturally Uncommon
Southern black-backed gull	*Larus dominicanus*	Not Threatened
Spur-winged plover	*Vanellus miles*	Not Threatened
Variable oystercatcher	*Haematopus unicolor*	At Risk-Recovering

3.3 Wairarapa freshwater values

3.3.1 Watercourses

3.3.1.1 Habitat quality

There are approximately 1,000 km of highly modified watercourse networks in the Wairarapa, in the lower Ruamāhanga River Catchment. The watercourses were created to drain what was historically wetland (Perrie, 2014). The watercourses are channelised and are typically soft bottomed with moderate to high densities of aquatic macrophytes. Flow regimes, wetted width, water velocity and water clarity are variable between the drains (Perrie, 2014). Riparian vegetation is generally limited, with several of the watercourses being on roadside verges that undergo regular spraying and maintenance (Figure 3.1).

One of the Wairarapa watercourses, the Onoke Drainage Scheme, is a GWRC monitoring site (site RAN032). The Onoke Drainage Scheme was one of 48 stream and river sites surveyed as part of an ecological health assessment looking at habitat (using the RHA scoring sheet[3]), periphyton, and macroinvertebrate and fish communities (Perrie *et al*., 2020). The Onoke Drainage Scheme is the southernmost Wairarapa drainage scheme, which is located 8 km inland immediately above Lake Onoke. It is a 1st order stream and a GWRC class 6 stream (i.e. is a Low gradient, small stream), which flows through pasture (Greater Wellington Regional Council, 2020a).

Onoke scored 30.5 out of a possible 100 using the RHA[3] method (Perrie, A., Mitchell, A., Harrison, E., Morar., S, Heath, M., 2020). The site scored a 1 for sediment cover, with fine sediment covering 100% of the channel. Invertebrate habitat abundance and diversity were also low, scoring a 1 and 2, respectively. This means low habitat diversity for invertebrates limited to only two habitat features (e.g. macrophytes, woody debris), and that the habitat features are low in abundance. This is unsurprising given sediment covers most of the habitat making it unsuitable for colonisation by sensitive invertebrates. The stream has no hydraulic heterogeneity (i.e. is a slow or fast run), which is expected given its channelised nature. Riparian width, vegetation and shade all scored a 2 or a 2.5. This suggests that riparian vegetation was mostly grasses, it had a riparian width of 1 m either side and shade was only present for 10% of the stream channel. Fish habitat diversity was low (3) meaning two habitat types were present (e.g. woody debris, macrophytes), however fish habitat availability was higher (8) with 60% of the stream containing suitable fish habitat. The stream had very low erosion (8), with 5% of either bank actively eroding.

3.3.1.2 Water quality

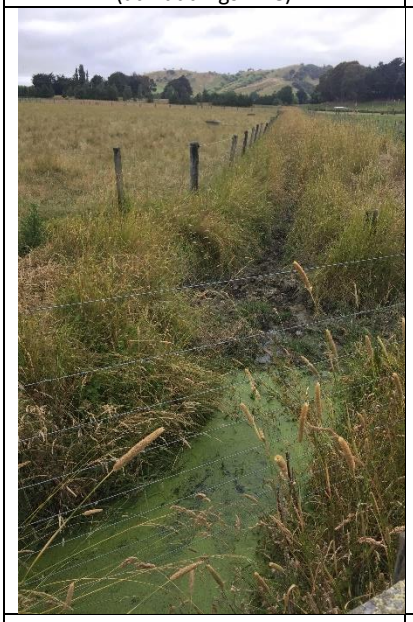
Water quality is typically poor in the drains, with low oxygen concentrations likely limiting fish colonisation (Perrie, 2014). This suggests that freshwater fauna communities in the drains are expected to be adapted to low oxygen concentrations with low taxa diversity.

Onoke Drainage Scheme received an MCI score of 66.4 and a QMCI score of 4.6 (Perrie, A., Mitchell, A., Harrison, E., Morar., S, Heath, M., 2020). With reference to Table 3.2, the MCI score indicates probable severe pollution and poor habitat quality, while the QMCI score indicates probable moderate pollution and fair water quality. The MCI score also falls within the D band, indicating severe organic pollution or nutrient enrichment largely insensitive taxa (New Zealand Government, 2020).

Battersea Drain Maintenance Scheme (at Duddings Line)

Manaia Drain Maintenance Scheme (at 10 Mania Road)

Ahikouka Drain Maintenance Scheme



Longbush Drain Maintenance Scheme

East Pukio Drain Maintenance Scheme

Otahoua Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Figure 3.1: Examples of highly modified watercourses managed by GWRC in the Wairarapa.

3.3.2 Wetlands and lakes

We identified six significant natural wetlands that are located within 500 m of Wairarapa watercourses are listed in Table 3.7 (Greater Wellington Regional Council, 2020d)[9]. Some of the watercourses are located adjacent to the wetlands and others are located very close by and may be affected by maintenance activities. Three of the wetlands, Pounui Lagoon, Lake Onoke Wetlands and Matthews Lagoon are Ramsar sites, forming part of the Wairarapa Moana (Ramsar Sites Information Service, 2020). The Wairarapa Moana is a large Ramsar site (10,547 ha) that encompasses Lake Wairarapa, and several wetlands and watercourses around it (Ramsar Sites Information Service, 2020). However, only three of the wetlands are located within 500 m of the Wairarapa watercourses. In addition to wetlands identified in Table 3.3, it is likely that many more lower value wetlands are also present and potentially affected by maintenance activities. While these lower value wetlands may not be considered significant they may still meet the definition of a Natural Inland Wetland under the NPS-FM, and will therefore require consideration in this AEcE.

Table 3.7: Size and significance of significant natural wetlands and their position in relation to Wairarapa watercourses (Greater Wellington Regional Council, 2020d)

Wetland	Wetland size (ha)	Significance criteria met	Watercourse name that requires maintenance	Watercourse position to wetland	Drain discharge location in relation to the wetlands
Pounui Lagoon (forms part of the Wairarapa Moana Ramsar site)	119.5	Representativeness, Rarity, Diversity, Ecological context	Onoke Drainage Scheme	adjacent	Into Lake Onoke, downstream of Pounui Lagoon and the stopbanks surrounding it.
Lake Onoke Wetlands (forms part of the Wairarapa Moana Ramsar site)	33.6	Representativeness, Rarity, Diversity, Ecological context	Onoke Drainage Scheme	nearby (*c*. 300 m to the west)	Into Lake Onoke, approximately 300m to the east of the Lake Onoke Wetlands
Boggy Pond / Matthews Lagoon (forms part of the Wairarapa Moana Ramsar site)	373.6	Representativeness, Rarity, Diversity, Ecological context	Te Hopai Drainage Scheme	adjacent – drains into wetland	Into Matthews Lagoon
Oporua Bush A	2.3	Representativeness, Rarity, Diversity, Ecological context	Te Hopai Drainage Scheme	nearby (*c*. 340 to the north)	Into Matthews Lagoon, downstream of Oporua Bush and stopbank.
Pukio Oxbow	5.4	Representativeness	Okawa Drain Maintenance Scheme	nearby (*c*. 240 m to the south)	Over 1.3km downstream of Pukio Oxbow.

Wetland	Wetland size (ha)	Significance criteria met	Watercourse name that requires maintenance	Watercourse position to wetland	Drain discharge location in relation to the wetlands
Taumata Oxbow	10.4	Representativeness, Rarity, Diversity, Ecological context	Taumata Drain Maintenance Scheme	nearby (*c*. 390 m to west)	Into Ruamahanga River, downstream of Taumata Oxbow

3.3.3 Fish communities

Searches of the New Zealand Freshwater Database (NZFFD) and fishing data collected from Wairarapa drains in 2013 (Perrie, 2014), found 13 fish species and one invertebrate species associated with Wairarapa watercourses. Four of the fish species have a conservation status of At Risk-Declining and four are introduced species. Fish and invertebrate species along with their threat classification are presented in Table 3.8. The fish community in highly modified watercourses of the Wairarapa is generally less diverse than those described for the Kāpiti Coast (see Section 3.1.3).

Table 3.8: List of freshwater fauna found within and close by the Wairarapa watercourses (NIWA, 2022; Perrie, 2014).

Common name	Scientific name	Threat conservation status (Dunn *et al.*, 2018; Grainger *et al.*, 2018)
Banded kōkopu	*Galaxias fasciatus*	Not Threatened
Brown mudfish	*Neochanna apoda*	At Risk-Declining
Brown trout	*Salmo trutta*	Introduced and Naturalised
Common bully	*Gobiomorphus cotidianus*	Not Threatened
Common smelt	*Retropinna retropinna*	Not Threatened
Giant kōkopu	*Galaxias argenteus*	At Risk-Declining
Goldfish	*Carassius auratus*	Introduced and Naturalised
Īnanga	*Galaxias maculatus*	At Risk-Declining
Kōura	*Paranephrops planifrons*	Not Threatened
Longfin eel	*Anguilla dieffenbachii*	At Risk-Declining
Perch	*Perca fluviatilis*	Introduced and Naturalised
Rudd	*Scardinius erythrophthalmus*	Introduced and Naturalised (Noxious fish*)
Shortfin eel	*Anguilla australis*	Not Threatened
Upland bully	*Gobiomorphus aff. breviceps*	Not Threatened

*under the Freshwater Fisheries Regulations 1983

An ecological survey of Wairarapa drains within the Ruamāhanga River Catchment in 2013 found them to support both indigenous and exotic freshwater fauna (Perrie, 2014). Fish diversity within the drains was overall low, with shortfin eels being the most common species found, with 80% of the 25 drains surveyed containing shortfin eels (Perrie, 2014). In addition to shortfin eels, native freshwater fauna captured included kōura (*Paranephrops planifrons*) (found at 36% of sites), longfin eel (32%), common bully (48%), upland bully (*Gobiomorphus* aff. *breviceps*) (4%), īnanga (2%), banded kōkopu (8%), brown mudfish (*Neochanna apoda*) (32%), and common smelt (*Retropinna retropinna*) (12%). Three sites on and near the Te Hopai Drainage Scheme including a site near the lagoon, the main channel and intermittent channel all contained brown mudfish *Neochanna apoda*; At Risk-Declining).

Two sites located nearby on Wairio Road also contained brown mudfish. Exotic fish species captured in the drains included brown trout (*Salmo trutta*) (4% of sites), perch (*Perca fluviatilis*) (8%), rudd (*Scardinius erythrophthalmus*) (16%), and goldfish (*Carassius auratus*) (12%). The Onoke Drainage Scheme, a soft bottomed site was also fished by GWRC staff using the standard netting and trapping protocols (Joy *et al*., 2013) in March 2017. Species captured included shortfin eels (n=15) and brown mudfish (n=12).

Four eDNA samples have been collected in May 2021 near the Battersea Drain Maintenance Scheme. Freshwater fauna detected include shortfin eel, galaxiid (*Galaxias sp.*), bullies (*Gobiomorphus sp.*) and longfin eel (Wilderlab, 2022). These results are consistent with those observed in samples collected using traditional fish sampling methods.

3.4 Wairarapa terrestrial values

3.4.1 Long-tailed bats

Very few long-tailed bat surveys have been undertaken on the Wairarapa Plains or low-lands, with most surveys occurring in indigenous forest on the hills. Long-tailed bats have been recorded in the nearby Aorangi Forest Park, situated approximately 5 km southeast of the Pouawha Drainage Scheme. Several long-tailed bats have also been recorded near the Golden Stairs Walking Track approximately 20 km east of Masterton (Department of Conservation, 2021). Due to the lack of tall riparian vegetation along potentially affected watercourses it is unlikely the bats will be adversely impacted by maintenance activities.

3.4.2 Herpetofauna

Ruakawa gecko (*Woodworthia maculata*) have been recorded at the Battersea Drain Maintenance Scheme. Other species found nearby that may also be present at the sites include common skink (*Oligosoma polychroma*), spotted skink (*Oligosoma kokowai*), barking gecko, ngahere gecko (*Mokopirirakau* "southern North Island"; At Risk-Taxonomically Unresolved), and copper skink (Department of Conservation, 2020). Introduced and Naturalised southern bell frogs have been identified at three locations around the eastern shoreline of Lake Wairarapa, predominantly on agricultural land. This includes records for on the Onoke Drainage Scheme, and nearby the Te Hopai Drainage Scheme and the Battersea Drain Maintenance Scheme.

3.4.3 Avifauna

Searches for bird sightings on iNaturalist found a number of bird species present on and nearby Wairarapa drainage schemes and associated wetlands (Table 3.9). Lake Onoke, Lake Wairarapa and Matthews Lagoon are all bird sighting hotspots, with Lake Onoke and Lake Wairarapa recognised as lakes providing habitat for indigenous birds (Greater Wellington Regional Council, 2020e). A total of 18 wetland and riverine bird species have been recorded on or near the Wairarapa drainage schemes. This includes eight bird species that are classified as Not Threatened, two Introduced and Naturalised, one Non-resident Native-Migrant, four At Risk and two Threatened species. Australasian bittern (*Botaurus poiciloptilus*; Threatened-Nationally Critical) were recorded in 2019 near the Ruamāhanga River, approximately 1 km from Okawa Drain Maintenance Scheme and 0.76 km from the East Pukio Drain Maintenance Scheme. Australasian bittern have also been recorded in Mathew's lagoon approximately 1.3 km from Te Hopi Drainage Scheme. The white heron (*Ardea alba modesta*; Threatened- Nationally Critical) was observed in 2020, 350 m from the Battersea Drain Maintenance Scheme.

Terrestrial birds as New Zealand kingfisher (*Todiramphus sanctus vagans*; Not Threatened), welcome swallow (*Hirundo neoxena neoxena*; Not Threatened), swamp hairier (*Circus approximans*; Not Threatened), fantail, and kererū are present in the landscape, however, are unlikely to be affected

by watercourse maintenance as they are associated with forest habitats. As such, terrestrial birds have been excluded from the bird species list presented in Table 3.9.

Table 3.9 includes game birds such as mallard ducks (*Anas platyrhynchos)*, which utilise highly modified lowland watercourses as nesting habitat and rearing habitats (McDougal, 2018).

Table 3.9: Bird species recorded on and nearby Wairarapa watercourses (iNaturalist, 2022). Note that mobile birds have been omitted from this table.

Common name	**Scientific name**	**Threat conservation status (Robertson *et al.*, 2017)**
Australasian bittern	*Botaurus poiciloptilus*	Threatened-Nationally Critical
Banded dotterel	*Charadrius bicinctus bicinctus*	At Risk-Declining
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk-Naturally Uncommon
Black swan	*Cygnus atratus*	Not Threatened
Canada goose	*Branta canadensis*	Introduced and Naturalised
Common white-faced heron	*Egretta novaehollandiae*	Not Threatened
Grey teal	*Anas gracilis*	Not Threatened
Little shag	*Phalacrocorax melanoleucos brevirostris*	Not Threatened
Mallard duck	*Anas platyrhynchos*	Introduced and Naturalised
New Zealand dabchick	*Poliocephalus rufopectus*	At Risk-Recovering
New Zealand Scaup	*Aythya novaeseelandiae*	Not Threatened
Pied stilt	*Himantopus himantopus*	Not Threatened
Pūkeko	*Porphyrio melanotus*	Not Threatened
Royal spoonbill	*Platalea regia*	At Risk-Naturally Uncommon
Spur-winged plover	*Vanellus miles*	Not Threatened
White heron	*Ardea alba modesta*	Threatened- Nationally Critical
White-winged black tern	*Chlidonias leucopterus*	Non-resident Native-Migrant

4 Assessment of ecological value

The ecological value of watercourses and freshwater fauna affected by the proposed maintenance activities was assessed using the EcIA guidelines, specifically the tables contained in Appendix C Table 1 and Appendix C Table 2.

The ecological value of the highly modified watercourses were assessed as **low** to **high**. Macroinvertebrate data is scarce but is indicative of poor water quality with the MCI score of 66 falling within the moderate band scoring (scores between 40-80). The stream habitat is modified (i.e. is channelised) and the stream banks are often managed (e.g. sprayed and mown). The modified watercourses generally had lower fish species diversity than the natural watercourses, with some records for introduced fish species in the Wairarapa watercourses. The high ecological value score for some watercourses is primarily driven by the presence of At-Risk fish species including brown mudfish, longfin eel and īnanga which have high ecological value.

The ecological value of the natural watercourses was assessed as ranging between **moderate** and **high**. Water quality and habitat of the natural watercourses is still degraded, but is slightly better than the artificial drains. MCI values of 81 and 78 fall within the moderate and high scoring bands (scores between 80-100 and higher). The main reason for classifying some of the natural watercourses as having high ecological value is their significance as īnanga spawning sites and the high diversity of indigenous fish species, including At Risk and Threatened fish species with high and very high ecological value. Additionally, no pest fish species were recorded in the natural watercourses.

Several receiving environments downstream of maintained watercourses were assessed as having **high** and **very high** ecological value. Those environments are associated with natural wetlands including internationally significant Wairarapa Moana. These environments have the potential to impacted if they receive poor water quality discharges from recently maintained watercourses.

The Wairarapa Moana, encompasses several hectares of wetland including three wetlands identified within 500 m of the Wairarapa Drainage Schemes (refer to Table 3.7), lakes Wairarapa and Onoeke and several kilometres of river all have **very high** ecological value. The Wairarapa Moana supports many threatened species of fish, birds and plant species (Wetland Trust, 2022). The remaining identified Significant Natural Wetlands in the Kāpiti Coast and Wairarapa have **high** ecological value, as they provide important habitat for indigenous fish and bird species.

Most of the watercourses have limited riparian vegetation due to either being grazed, sprayed or mowed. These riparian margins have very low ecological value as they are unlikely to provide habitat for indigenous birds and lizards. Vegetation that is not frequently disturbed, which may comprise rank grasses, shrubs and trees have higher ecological value, as they are able to provide habitat for fauna, as well as benefits to the stream (e.g. shading and riparian inputs). Riparian planting has occurred along some sections of channel in Kāpiti Coast watercourses and these areas of young native vegetation have been assessed as **moderate**. The ecological value of the riparian vegetation is considered **very low** to **moderate** depending on species composition and maintenance.

The ecological value of freshwater and terrestrial fauna species associated the watercourses and receiving environments will vary widely depending on the location. At some sites the freshwater species assemblage will have **negligible** value where only introduced species or native species that are common or abundant species. At the other extreme, some sites may support threatened native species resulting in **very high** assessment of ecological values.

5 Proposed activities

Descriptions of the proposed activities likely to occur during watercourse maintenance are listed below. These are activities intended to be covered by Rule 121B of the PNRP. These will have a range of actual and potential ecological effects, which are discussed in detail in Section 6.

- Removal of weeds and overgrown plants is proposed to occur in watercourses listed in Table 2.1 and Table 2.2. Removal will occur using a combination of machine removal, hand removal and removal by a purpose built weed-boat.
- Removal of unconsolidated fine sediment that has been deposited on the bed of the watercourse since it was last cleared.

The deepening and/or widening of the watercourse beyond the original cross-section is not part of these works. The watercourses will be maintained on an as required basis and no more than is required to maintain flows and the flood conveyance capacity of the network. All works are managed by a suitably qualified person.

6 Assessment of ecological effects

This section provides an overall assessment of ecological value, an assessment of magnitude and overall level of effects, for watercourses in the Kāpiti Coast and Wairarapa regions.

Assessing the effects of maintenance works is more complex than for other types of activities (e.g. land development) for a number of reasons. Firstly, the activities covered by the consent have been occurring for many decades. This means that the habitat and biotic communities present have been shaped by that disturbance and, to a degree, are tolerant of it. This makes it difficult to clearly define an ecological baseline from which to identify effects.

The ecological baseline we have used for assessing effects is the typical condition of affected watercourses immediately prior to maintenance works being undertaken. This baseline has been defined as a way to deal with the fact that the ecological condition of affected watercourses will fluctuate depending on its position in the maintenance cycle. It is assumed that ecological condition will be poorest immediately after watercourses have been disturbed and ecological condition greatest immediately prior to disturbance. This will not always hold true because it does not account for watercourse where some removal of macrophytes will actually benefit ecological condition (e.g. by improving dissolved oxygen conditions and habitat diversity in weed choked streams).

The baseline also assumes that the watercourses should continue to support “stream-like” characteristics and that will not always be the case. If left unmaintained, many watercourses are likely to transition into wetland habitats which will support a completely different set of ecological values and functions.

The activities to be covered by proposed resource consent encompass the clearing of vegetation, accumulated silt, and blockages from watercourses. These activities are known to have a range of effects on these watercourses and adjacent habitats. These effects are described in more detail in Sections 6.1 to 6.6 below.

A summary of actual and potential effects on ecological values arising from the works is provided below.

Actual adverse effects (expected to occur)

- Temporary decreases in water quality at site.
- Loss and simplification of aquatic habitat when macrophytes and other structures are removed.
- Removal and direct mortality of macroinvertebrates and fish.
- Disturbance of existing riparian vegetation.

Potential adverse effects (may occur under some circumstances)

- Potential removal of food for instream fauna and wetland birds.
- Spread of pest plants via fragments remaining on machinery.
- Discharge of sediment to receiving environments.
- Disturbance of native wetland birds game birds and nesting habitat.
- Potential changes in hydrology of adjacent wetland habitats.
- Potential adverse effects to indigenous terrestrial fauna.

Potential positive effects

- Improved dissolved oxygen conditions.
- Increased open water habitat.

The following sections will describe each of these effects in turn. An evaluation of magnitude of effects will not be included in Section 6 but will be considered in Section 8 once all effects management (Section 7) has been taken into account.

6.1 Effects on water quality

6.1.1 Suspended sediment

The physical disturbance to the watercourses due to the sediment and aquatic macrophyte removal results in the resuspension of fine sediment. This can occur directly through the disturbance of the bed and banks of watercourses, and also indirectly by increasing bed and bank erosion by increasing flow velocities and removing protective vegetation.

Effects of increased suspended sediment in freshwater ecosystems have been well studied (see reviews by Wood & Armitage (1997), Cavanagh (2014), Davies-Colley (2014) and Ryan (1991)) and include:

- Decreasing light penetration in the water leading to reduction in growth of macrophytes;
- Damage to macrophytes and moss by physical abrasion;
- Smothering of aquatic plants, reducing quality of food for macroinvertebrates;
- Reducing feeding ability of fish and macroinvertebrates;
- Clogging of fish and invertebrate gills;
- Reduced water clarity for visual feeders;
- Disruption to fish passage;
- Smothering of aquatic plants;
- Increased invertebrate drift; and
- Clogging interstitial spaces and filling in pools and riffles, reducing habitat quality.

Several New Zealand studies have found that the mechanical excavation of macrophytes and bed material resulted in large increase the suspended solid (SS) concentrations (Young *et al*., 2004; Greer *et al*., 2017). Short-term spikes in SS resulting from direct disturbance of bed and banks can be extreme with concentrations of over 15,000 mg/L recorded by Greer *et al.* (2017). These spikes tend to dissipate as soon as excavation ceases and will also attenuate with distance downstream and sediment settles on the bed. Wilcock *et al.* (1998) found that turbidity remained elevated for a number of hours following excavation in an 80 m section of a Waikato waterway. Young *et al.* (2004) also reported rapid recovery following excavation in a Marlborough drain.

Long-term increases have also been observed and attributed to the increased flow velocities and the removal of aquatic and marginal vegetation that had previous protected the channel bed and banks. Suspended sediment concentrations are unlikely to return to pre-excavation levels in watercourses until either all the erodible sediment is transported out of the system, or until the macrophytes grew back, increasing the capture and binding of sediments (Greer *et al.,* 2017). The magnitude of effect of long-term SS increases is therefore likely to depend on the length of watercourses disturbed within a catchment. It is important to note that the long-term effects on water quality reported by Greer *et al.* (2017) were recorded at a site where over 80 km of watercourse had been excavated.

Long term increases in SS probably have a greater ecological effect than short term increases even though the increase in concentrations are much lower over the long term. This is because long term increases in SS have the potential to transport a greater overall load of sediment to receiving environments. Aquatic biota are likely to be relatively tolerant of short term increases in SS, as would be experienced during natural flood events, but would be more affected by the effects of long term changes in water clarity.

Common smelt, redfin bully and banded kōkopu have been found to be the most sensitive fish to suspended sediment during lethal studies exposing fish to sediment (Rowe *et al*., 2009). Banded kōkopu and common smelt are found in Wairarapa and Kāpiti watercourses and redfin bullies have been recorded in the Kāpiti Coast. High suspended sediment has also been found to deter migratory juvenile fish species from accessing waterways, as well as sensitive species of fish (Greer *et al.,* 2017). Suspended sediment concentrations in Waituna Lagoon, Southland study found concentrations often exceeded levels required to cause an avoidance response in banded kokopu, inanga and kōaro (*Galaxias brevipinnis*) in the 77 days following excavation (Greer *et al.,* 2017).

6.1.2 Dissolved oxygen

When sediment is disturbed, large amounts of anoxically decomposing organic matter within the sediment can lead to a reduction in dissolved oxygen (DO) concentrations. Low oxygen may kill fish long before suspended sediment reaches lethal concentrations.

Dissolved oxygen requirements of fish were reviewed by Davies-Colley *et al.* (2013) and Franklin (2013). Oxygen is essential to fish during respiration and a reduction in dissolved oxygen can negatively impact fish in the following ways:

- A shortage of oxygen elicits physiological and behavioural responses to compensate for the stress caused by low DO. The most common behavioural change is increased ventilation of the gills and surface respiration;
- Stress as a result of low dissolved oxygen levels causes a reduction in activity to reduce energy expenditure, and vertical or horizontal habitat changes (Dean & Richardson 1999, Kramer 1987);
- Habitat shifts to avoid hypoxic environments;
- Feeding is often affected because search, digestion and food assimilation use significant amounts of energy; and
- Predator avoidance may also be altered by different behavioural changes as a result of low DO avoidance.

There have been two major studies of the effect of low DO on New Zealand fish species. Dean & Richardson (1999) found that exposure to 1 mg/L DO was lethal to most species tested, with 100% of juvenile rainbow trout, banded kokopu whitebait, juvenile torrentfish, adult and juvenile common smelt, and juvenile common bully deceased after 48 hours of exposure. Adult and juvenile inanga, adult common bully, and *Paratya* shrimp had lower mortality rates, while longfin and shortfin elvers all survived. In contrast, Landman *et al.* (2005) found that inanga whitebait were the most sensitive species tested, followed by common smelt, rainbow trout. Common bullies, shortfin eel elvers, *Paratya* shrimp and kōura were more tolerant.

Greer (2014) monitored DO before and after mechanical excavation of macrophytes in Waikato drains. Following excavation, the amount of time in moderate (DO below 30% saturation) and severe hypoxia (DO below 10%) were 43 and 37% greater than before the works. At one site large numbers of stressed giant kokopu were observed surface breathing and with a loss of equilibrium during works (likely a direct result of reduced DO concentrations).

The DO minima observed by Greer (2014) was short-lived at the treatment sites (less than 48 hours), however, it is may have caused some fish mortality. Dead giant kokopu have been observed during mechanical weed and silt removal in Waikato (M. Lake, Tonkin & Taylor Ltd pers. comm.) although the exact cause could not be determined. Several New Zealand fish species are intolerant of low dissolved oxygen concentrations and significant mortality may result at extended exposure to very low dissolved oxygen. Juveniles are more likely to be affected than adults. Sharp declines in DO, like those observed by Greer (2014), are likely to impact resident organisms as they are unable to move

out of the reach, this impact is likely to be greater for sensitive species such as giant kokopu, common smelt and inanga.

Effects of low DO will be magnified by factors such as elevated temperature, reduced flows and high SS concentrations.

The removal of macrophytes from severely weed-choked watercourses has the potential to improve DO conditions. Macrophyte dominated streams tend to experience DO sags at night when photosynthesis ceases but respiration by the plants and other organism continues. This effect can be exacerbated by dense weed beds reducing flow velocities and covering the water surface which reduces re-aeration rates at the water-air interface. The results of studies on the response of DO to macrophyte removal have been somewhat equivocal however small increases in nocturnal DO concentrations of approximately 1 mg/L have been observed in one study (Kaenel et. al. 2000, James 2013).

6.1.3 Potential effects on receiving environments

The water quality effects described in Section 6.1 have the potential to impact beyond the watercourses where activities are occurring to downstream receiving environments through the discharge of contaminants.

The potential impacts of sediment have been discussed in Section 6.1.1. Aquatic values within the watercourses being maintained are, in many instances, likely to be relatively tolerant of high sediment loads. However, some receiving environments in Kāpiti Coast and Wairarapa catchments will be much more sensitive. Lakes, wetlands and coastal environments are all environments that can be adversely affected by high sediment loads (Donohue & Molinos, 2009; Robertson *et al*., 2006).

Sediment re-suspension though disturbance by excavators has been shown to release nutrients, particularly those bound to sediment bound like phosphorus (Young 2014, Ballentine & Hughes 2012). Ballentine & Hughes (2012) noted an increase in phosphorous as a result of watercourse maintenance works in Southland, however, little difference was observed in nitrate and nitrogen concentrations in the long-term record. The release of nutrients within the watercourses themselves may have relatively little effect because they are typically nutrient-enriched already. However, the effects will be greater where nutrients are discharged into less enriched receiving environments. Lakes and wetlands are examples of two habitat types that can be sensitive to nutrient enrichment because the nutrients can alter species assemblages and ecosystem function. Lakes and wetlands also tend to accumulate and store nutrients which can have long term effects. It is important to note that sediment discharges caused by watercourse maintenance alone may be comparatively small compared to other factors such as landuse.

The removal of nutrient laden sediment may be a positive effect of watercourse maintenance works through the removal of nutrients which may cause eutrophication and increased macrophyte growth in receiving environments (Hudson & Harding 2004; Ballentine & Hughes 2012). This positive effect would only occur where sediment and nutrients will eventually be resuspended by future flow events or geomorphic processes (e.g. channel avulsion). In cases where sediment has become locked up within the channel it is unlikely to cause adverse effects downstream.

6.2 Effects on aquatic habitat

Sediment and aquatic vegetation (macrophytes) removal will remove any existing instream fish and invertebrate habitat within the watercourses, creating a homogenous environment. While existing habitat is likely to be limited given the frequent disturbance of the sites and their highly modified nature, they still provide habitat for indigenous fish (Perrie, 2014). Macrophytes provide important habitat structure in soft-bottom streams and so its removal during watercourse maintenance will

have a large effect on aquatic biota (James, 2013). Macrophytes provide cover from predators as well as colonisation substrates for periphyton and macroinvertebrate communities to live on.

If channel maintenance results in the removal of marginal vegetation it may increase light levels, thereby increasing water temperatures and primary productivity.

In addition to macrophytes, other structural cover such as instream wood and undercut banks that species such as longfin eels rely on as habitat may also be lost during watercourse maintenance. Holmes *et al.* (2019) found that longfin eel biomass decreased by half one year after the streambanks were reshaped with excavators. It wasn't until three years after reshaping, following the growth of bank-edge vegetation that longfin eel biomass returned to pre-disturbance levels. Bank vegetation is also important for species such as giant kōkopu are known to spawn amongst vegetation on low lying benches. Inanga also spawn on bankside vegetation in the freshwater intertidal zone. Removal of bankside vegetation can remove fish nests directly and even if carried out several months before spawning occurs there may be insufficient time for vegetation to recover to the extent that it can provide suitable spawning habitat.

Flow rates and depths may be reduced during macrophyte removal. Kaenel *et al.* (2000) found that removal of roughly 90% of macrophytes in two streams increased the flow rates by roughly a third and decreased water depth by 50%. These effects are different for spring fed streams where groundwater levels dictated flow and water levels more than macrophyte cover (Young *et al.*, 2004).

Evidence gathered in New Zealand indicates that habitat recovery is relatively rapid following mechanical removal and reductions in vegetation cover, macroinvertebrates and fish are not noticeable soon after, with most returning to a pre clearance state within one to three years post disturbance (Kaenel 1998, Holmes *et al.*, 2019; Ballantine & Hughes, 2012; Young *et al.*, 2004). However, effects should be considered cumulatively over the extent of watercourses covered by the proposed consent. Many kilometres of watercourses will be maintained each year under the proposed consent, which equates to an ongoing suppression of ecological value at any given point in time. This cumulative aspect to watercourse maintenance was taken into account during the assessment of ecological effects.

6.3 Direct effects on freshwater fauna

Maintenance activities can have a wide range of effects on freshwater fauna communities. Many of those effects have already been discussed in Sections 6.1 and 6.2 with regard to reductions in water quality and habitat. This section looks at direct effects on fish caused by machinery physically striking fish as well as removing fish and invertebrates from the channel while undertaking maintenance work.

Direct mortality on macroinvertebrates is considered high as a large proportion of them will be attached to the aquatic vegetation that is mechanically removed (Young *et al.,* 2004; James, 2013). Macroinvertebrate communities quickly recover after disturbance, with Young *et al.* (2004) finding macroinvertebrate densities recovering in Marlborough watercourses within one month following mechanical excavation. Freshwater mussels (*Echyridella* spp.), freshwater crayfish (*Paranephrops* spp.) and freshwater fish are also known to be removed from the channel (Greer *et al.*, 2012; Young *et al.*, 2004; Lake, 2015). Direct mortality of fish caused by mechanical desilting was estimated by Lake (2015) in three watercourses in the Waikato Region. Almost all of the fish recovered from spoil that had been deposited on the bank were shortfin eels. He found that the number of fish deposited on the bank was variable but could be high, between 0.27 and 0.78 eels per m of channel length. Spoil piles were also searched by Lake (2015), who estimated that around 2/3^{rds} of eels were caught within spoil matrix where their ability to return to the watercourse unaided was uncertain.

One of the most comprehensive and targeted study to date involved population surveys of fish before and after macrophyte removal from 350 m reaches of Southland drains (Greer, 2014; Greer

et al., 2012). Native fish abundance declined by 52% following excavation, however species diversity remained constant meaning that no species were lost. It is not clear whether this response was caused by direct mortality of fish or through the loss of habitat structure and diversity. Removal of macrophytes from alternating 50 m reaches of the drain (rather than the entire drain) still resulted in a similar impacts at the fish community level, although it did benefit larger giant kokopu.

Holmes et. al (2019) studied the impact of mechanically reshaping stream banks in the Waituna Creek, Southland. They observed a reduction in the abundance of eels and contrasting increases in bullies immediately following bank reshaping. Three years following reshaping the fish communities were observed to have almost fully recovered. Holmes et al. (2019) concluded that instream works could reduce instream habitat quality and displace eels for at least one year.

The capacity for native freshwater fauna to recover from disturbance caused by maintenance works is likely to be the result of a degree of tolerance to poor habitat conditions and an ability for migratory species to recolonise disturbed habitat. Non migratory species, particularly brown mudfish may be at greater risk of long term or permanent loss because they appear to have a more restricted distribution, specific habitat requirements. Minimising the total extent of drainage sub-catchments where brown mudfish occur may be particularly important for reducing effects on At Risk brown mudfish (see Section 7.2).

6.4 Effects on riparian vegetation

Riparian vegetation along the watercourse margins may be impacted as a result of watercourse maintenance. Given the high proportion of agricultural land in Kāpiti Coast and Wairarapa surrounding waterways, riparian margins are likely to be dominated by exotic rank grasses. RHA's undertaken on natural and highly modified watercourses in both regions found riparian margins to be consistently narrow, being typically less than 2 m wide each side, with exotic grazed and rank grasses being the common vegetation types. These in turn, provided low channel shading and low ecological value. Natural watercourses in Kāpiti Coast visually appear to be more vegetated and these watercourses will have higher riparian ecological value than grassed riparian margins.

Riparian vegetation of the natural watercourses is more likely to be damaged with use of an excavator to remove sediment build-up and macrophytes needs close access. Macrophyte removal via boat and by hand is less likely to impact the watercourse margins.

6.5 Potential hydrological effects on wetlands & lakes

Removing sediment from the bed of watercourses that are adjacent or close to natural wetlands and lakes has the potential to alter the hydrology of those wetlands and lakes[9]. For example, extreme water table lowering caused by artificial drainage can alter the composition of wetland animals and plants, and may allow for the colonisation of dry-tolerant species, effectively reducing the size of the wetland (Campbell, 2010). Given that the watercourses included within the proposed Kāpiti Coast and Wairarapa watercourses (i.e. watercourses listed in Table 3.3 and Table 3.7) have been in existence for many decades and have experienced an ongoing regime of maintenance, it is unlikely that the continued removal of deposited sediment[10] will result in further any changes to the water levels of nearby wetlands. However, if the bed of the watercourse is inadvertently lowered over time through the ongoing maintenance programme, the hydrology of nearby wetlands could potentially be impacted on. This is a risk not only to significant wetlands but also low value wetlands that may still meet the definition of a Natural Inland Wetland under the NPS-FM, many of which may not have been identified yet.

[10] Deposited sediment refers to sediment that has fallen out of suspension and been deposited on the bed of the watercourse since it was last maintained.

6.6 Potential effects on terrestrial fauna

The removal of riparian vegetation and disturbance from the proposed earthworks may result in potential adverse effects on terrestrial fauna. Potential effects on birds, lizards and long-tailed bats are discussed below.

6.6.1 Birds

Birds are particularly vulnerable to noise and dust disturbance during breeding seasons, typically in the months from October to January inclusive. The disturbance of riparian vegetation can result in the destruction of nests, loss of eggs, and fledglings during construction. Trees are not currently a common feature within the riparian margins of highly modified watercourses, however, the occurrence of indigenous trees may increase as more and more riparian planting programmes are implemented. However, maintenance or highly modified watercourses it not expected to result in much disturbance of riparian vegetation, except where trees fall or slip into the channels and need to be removed as blockages.

Indigenous birds including those with a Threatened and At-Risk conservation status, are more likely to be utilising the various lakes, wetlands, rivers and estuaries present in the receiving environment rather, than the maintained watercourses and riparian habitats themselves. Potential effects on the receiving environments is covered in more detail in Section 6.1.3. It is suspected that watercourse upgrades are more likely to directly affect gamebirds, particularly mallard ducks (*Anas platyrhynchos*). Watercourses may provide nesting habitat for mallard ducks which are known to nest along stream and drain margins close to water (McDougal, 2018). While not a native, mallards support a valued gamebird resource in the Greater Wellington region.

6.6.2 Lizards

Skinks and gecko species found near the watercourses have either have **low** (i.e. non-threatened species) or **high** (i.e. At-Risk species) ecological value.

Native lizards utilise indigenous and introduced vegetation that provides cover in form of flaky bark, epiphytes, hollows, and / or ground cover, rocks, logs and crevices. Very little suitable skink and gecko habitat is likely to be present along the riparian margins of highly modified watercourses. Native skinks may be present in long rank grass and weed along the margins of watercourses and have been observed falling into watercourses during maintenance works in the Waikato (M. Lake, Tonkin & Taylor Ltd, pers. obs.). Other lizards may utilise woody vegetation where it has been established through planting programmes but this will not be disturbed through maintenance activities which are focussed within the wetted channel. Weedy and overgrown habitats that cannot be access by machines are cleared by hand so the potential impact on lizards in these environments is considered limited.

6.6.3 Long-tailed bats

While were no records for long-tailed bats near the watercourses, it does not fully exclude the possibility of long-tailed bats using the watercourses and riparian vegetation as roosting and foraging habitat.

Long-tailed bats have **very high** ecological value (Appendix C Table 1).

7 Effects Management

The purpose of this section is to outline the range of options for managing ecological impacts that may be considered. The measures are framed within the effects management hierarchy as defined within the National Policy Statement for Freshwater Management 2020 and GWRC guidance on managing adverse effects on indigenous biodiversity[11].

7.1 Avoidance of effects

Where possible adverse effects should be avoided where practicable. Where sections of watercourses do not need to be maintained to provide the required drainage they should not be maintained. It is likely that this is largely self-regulating by GWRC staff because of the associated cost of undertaking maintenance activities.

Timing maintenance works so that they don't overlap with during sensitive lifecycle periods, such as spawning or migration, can also be used to avoid effects. However, when the sensitive periods for all ecological values present are considered the window within which works can be undertaken may become too small to allow maintenance works to be fully implemented. It is recommended that location specific avoidance calendars be developed that identify priority ecological values and sensitivity periods.

7.2 Minimisation of effects

Where avoidance of effects on rivers and streams cannot be achieved, adverse effects should be minimised where practicable. There are a range of options that can be implemented to effectively minimise the effect of maintenance works including;

- Salvage of freshwater fish and other fauna to minimise the direct effects on these species.
- Minimise the frequency of maintenance works in any particular section of watercourse.
- Minimise the extent of maintenance works carried out within any sub-catchments within any one year to facilitate the rapid recovery of watercourses.
- Use a weed boat or weed-cutting bucket to remove excessive aquatic vegetation where possible to reduce bed disturbance.
- Use a slotted weed bucket rather than standard excavator bucket and have the machine pause above the wetted channel to maximise the potential for freshwater fauna to fall back into the watercourse rather than be deposited on the bank.
- Retain patches of aquatic vegetation where there is sufficient channel capacity to do so.
- High-mowing/grazing rank grass tracks prior to machine maintenance to disperse At-Risk lizards that may be present.

Many of these actions are already incorporated into standard operating practices by GWRC staff.

This list should not be considered exhaustive, and we recommend that further work be completed to developed best practice methodologies that specifically for activities covered under the consent. Further utility could be achieved by customising best practice methodologies for specific schemes or groups of schemes that that have similar characteristics.

Increasing recurrence intervals and decreasing the lengths of stream disturbed at any point in time will increase the overall condition of ecological values. It is important to note that, if considered at the reach scale, this will potentially also result in a greater levels of effect in future due to an

[11]GWRC (2022) Managing adverse effects on indigenous biodiversity in the Wellington Region - A guide to implementing the effects management hierarchy in the Natural Resources Plan. Greater Wellington Regional Council.

increase in the ecological values of watercourses. It is therefore important to consider effects at a drainage scheme scale where an overall improvement in ecological condition should be considered preferable to increases in ecological effects at the smaller reach scale.

7.3 Remediation of effects

Where adverse effects cannot be minimised, they must be remedied where practicable. Remediation refers to the rehabilitation, restoration, or reinstatement of ecological values to rectify adverse effects that have occurred. The opportunities to remediate sites where maintenance has occurred is relatively limited. In most instances where a mechanical excavator is used it is necessary to maintain access to the channel and room to manoeuvre the machine. This requirement is usually incompatible with establishing tall woody riparian vegetation on both banks of the channel (although it may be possible to enhance one bank).

As discussed in Section 6.2, natural recovery of aquatic and marginal habitat to a baseline-like condition is relatively rapid and unlikely to be substantially sped up through intervention. However, best practice methodologies should include stabilisation of bare earth where excavator tracks cause substantial tracking damage along channel margins.

7.4 Biodiversity offsetting

Biodiversity offsets refer to the provision of a measurable positive outcome for the impacted ecological values so that there is a no net loss or preferable net gain is achieved. There are a number of principles that need to be met to ensure that biodiversity offsets are achieved. Biodiversity offsets require the impact on biodiversity to be quantifiable and are technically complex. They are well suited where loss can be measured, for example under development or roading footprints, and ecological values are well understood. We don't think that biodiversity offsets are currently achievable for watercourse maintenance because the effects cannot be quantified. This is mainly due to impacts being caused a regime of pulse disturbance rather than complete loss of values. There is also insufficient detail regarding the ecological values present to allow effects to be quantified.

7.5 Biodiversity compensation

Where residual effects cannot be managed through a biodiversity offset they can be managed through biodiversity compensation. Biodiversity compensation produces a measurable benefit but one that cannot be quantified to the same level as a biodiversity offset. They are regarded as the last step in the effects management hierarchy because they provide the least certain outcome for affected ecological values even if they can create a net benefit to other biodiversity values.

Biodiversity offsets are less technically challenging because they are not held to the biodiversity offsetting principles including the one that requires that losses and gains are quantified to achieve no-net-loss or net-gain outcomes, arguably the hardest principle to achieve from a technical perspective.

We recommend that residual effects of watercourse maintenance be managed through a biodiversity compensation package that includes a suite of enhancement programmes that have the potential to further avoid, minimise or remediate potential effects. Examples of projects could include wetland restoration work in receiving environments the manage sediment discharges, riparian planting programmes aimed at reducing the future frequency and extent of maintenance works or restoring inanga spawning habitats.

7.6 Monitoring and adaptive management

Best practice methodologies can effectively avoid and minimise many of adverse effects associated with watercourse maintenance. We recommend that best practice methodologies be captured within Section 5[12] of the VSRMP, which sets out a Code of Practice specific to the proposed consent. Where possible the methodologies can be tailored to fit the ecological and operational opportunities and constraints presented by each scheme through Site Specific Effects Management Plans (SSEMPs). Given the lack of ecological information currently available across all of the schemes it will be necessary to undertake more ecological surveys. The information gained from the surveys will inform the VSRMP, Site Specific Effects Management Plans as well as the development of an appropriate compensation package.

We recommend that continuous improvement to best practice methods (Code of Practice) be achieved through an adaptive management process run over the life of the proposed consent. In our view changes to best practice are best informed by well-designed trials rather than a programme of monitoring ecological condition before and after works have occurred. This is because of the type of short-term disturbance caused by maintenance works, the range of other pressures that also influence ecological condition (e.g. landuse, climate), and high variability in the scale of works undertaken. Gaining meaningful conclusions from monitoring works will require a large number of sites to be surveyed at a high intensity. The far more efficient approach is to use targeted trials to focus on a single effect, ecological value and management approach by controlling other factors that may influence ecological responses. Improvements to the best practice may also be guided by observations made by operational stuff who are well placed to identify opportunities to minimise impacts at a practical level.

[12] The section designed to meet Clause (j) of the Schedule X requirements of the PNRP

8 Magnitude and overall level of effects

This section assesses the magnitude of effects and overall level of effects described in Section 6 in accordance with the EcIAG. The magnitude and overall level of effects all take into account the effects management outlined in Section 7.

8.1 Aquatic habitat in watercourses

The magnitude of effects of watercourse maintenance on aquatic habitat can be minimised through implementation of best practice methodologies as outlined in Section 7.2. Reducing the frequency of maintenance and/or the extent of channel maintained within a sub-catchment in any one year will be the most substantive measures to reduce effects (Bączyk et. al 2018). These actions will reduce the magnitude of effects to ranging from **low** in artificial drains to **moderate** in natural watercourses. The magnitude of effect on natural watercourses is considered higher because the baseline condition is higher.

If the recommendations in Section 7 are followed, we consider the overall effect on water quality will range from **very low** to **high** for watercourses, depending on their classification.

8.2 Direct effects on freshwater fauna

Direct impacts on native fish are likely to be significant, especially when considered cumulatively when long lengths of channel are disturbed annually. The magnitude of effects on freshwater fish can be reduced by implementing best practice methodologies, particularly the use of weed buckets and fish salvage techniques. This will reduce the magnitude of effects to **low,** with only a minor and short duration shift away from baseline conditions. If these recommendations are followed, we consider the overall effect to range between **very low** (e.g. watercourses where native freshwater fauna are absent) and **moderate** (e.g. some mortality of threatened lamprey).

8.3 Effects on riparian vegetation

The magnitude of effects on riparian vegetation can be reduced by undertaking removal of macrophytes via boat or hand where possible, minimising the use of an excavator, and when used, keeping the footprint of the excavator to a minimum aiming to keep to short grasses and avoiding crushing of rank grasses (may provide lizard habitat) and vegetation where possible. Preferential use of boat or hand clearance, minimising the use of an excavator and keeping disturbance of vegetation to a minimum will reduce the magnitude of effects to **low**. If these recommendations are followed, we consider the overall effect on riparian vegetation to be **very low** to **low**, depending on the condition of the riparian vegetation.

8.4 Potential hydrological effects on wetlands & lakes

We understand that the depth of sediment removal during maintenance is typically established by 'feel' by the excavator operator using a bucket. While this may be adequately accurate in a majority of watercourses we recommend that additional steps be undertaken where there is a risk of hydrological change to any Natural Inland Wetlands[9] (see Section 6.5). Those steps would include establishing design invert levels for the watercourse levels and periodic monitoring of bed levels over the life of the consent to ensure that watercourses are not being deepened. If deepening that poses a risk to nearby wetlands and lakes is detected, steps can be taken to re-establish design levels. If those effect management actions are put in place we have assessed the magnitude of effect on the hydrology of wetlands and lakes as **negligible**. The overall level of effects is therefore assessed as **low**.

8.5 Potential effects on terrestrial fauna

The magnitude of effects on birds can be reduced through undertaking works outside of the peak bird breeding season (i.e. October to January inclusive), and keeping the disturbance of vegetated riparian zones to a minimum by avoiding crushing via machinery or removal where possible. Undertaking watercourse maintenance outside of the peak bird breeding season and avoiding unnecessary crushing and/or removal of riparian vegetation will reduce the magnitude of effects to **low**. If these recommendations are followed, we consider the overall effect on birds will be **very low** to **low**. Additional effects may be associated with impacts on wetland and lakes (i.e. hydrological and downstream water quality effects) but these are hard to quantify with existing information.

The magnitude of effects on lizards can be minimised by high-mowing or grazing access tracks a few days prior to undertaking mechanical clearance. In the long term, the proposed riparian planting is likely to provide more suitable lizard habitat than what is currently available. Implementing best practice methodologies such as minimising the extent and frequency of channel maintenance will reduce the magnitude of effects to **low**. If these recommendations are followed, we consider the overall effect on native lizards will be **low** to **very low** depending on the conservation status of lizards that may be present.

The magnitude of effects can be reduced through the avoidance of removing any trees that could potentially provide habitat for bats, reducing the magnitude of effects to **negligible** and the overall level of effect to **low**. If mature trees need to be removed, then a separate assessment for bat habitat and presence or absence will need to be undertaken, to determine the magnitude and level of effect.

9 Conclusion

An effects assessment has been completed for the proposed maintenance of Kāpiti Coast and Wairarapa watercourses. The effects assessment has considered the ecological value of artificial drains, highly modified watercourses, natural watercourses and receiving environments, which have ecological values ranging from **low, moderate** to **very high** (Table 9.1).

Based on the effects listed in Section 6, the magnitude of effects with effects management ranges from **very low** to **very high** (Table 9.1). This variation is caused by the spatial scale of the consent which includes a large number of environments, which vary widely in ecological condition. Where a range in magnitude of effect existed (e.g. across water quality, habitat and direct effects) we have taken a precautionary approach and considered the highest magnitude of effect.

Measures to manage these effects were identified in accordance with the mitigation hierarchy. The development of and adherence to best management practices were identified as an effective mechanism to minimise and, in some instances avoid, effects. It is recommended that the best management practices be captured within operational plans for each of the drainage sub-catchments so that ecological values and operational constraints and opportunities for each sub-catchment can be captured.

When measures to avoid, remedy or mitigate effects are taken into account, we have assessed that the maintenance of Kāpiti Coast and Wairarapa watercourses will generally have low to moderate effects provided the effect management actions outlined in Section 7 are implemented. However, greater effects are expected where more sensitive environments such as natural watercourses, wetland and lakes are at risk (Table 9.1).

Further effects management is generally required for residual effects when any overall level of effects is **moderate** or above[13] and therefore, further measures may be required to address ecological effects. We recommend that a compensation package be developed to manage residual effects of the proposed works. The compensation package should focus on managing those effects that have the greatest potential to cause permanent declines in the ecological condition of receiving environments including high value wetlands and lakes. Before an appropriate compensation package can be developed it will be necessary to have more complete understanding of ecological values within each sub-catchment and receiving environments. There is currently little ecological information for individual drainage schemes, particularly within the Wairarapa. We recommend an ecological survey programme be established to fill this knowledge gap.

Table 9.1: Ecological value, magnitude and overall level of effect with effects management applied of the proposed watercourse maintenance

Ecological Component	Ecological Value	Magnitude of effect with effects management applied*	Overall level of effect with effects management applied
Artificial drains	Low-High	Low	Very Low - Low
Highly modified watercourses	Low-High	Low	Moderate
Natural watercourses	Moderate - High	Moderate	Moderate - High
Wetlands and lakes	High – Very High	Very High	Very Low - Very high
Riparian vegetation	Low to Moderate	Low	Very low to Low
Freshwater fauna	Negligible to Very high	Low	Very low to Moderate
Terrestrial fauna	Negligible to Very high	Low	Very low to Moderate

[13] As recommend by Roper-Lindsay et. al. (2018).

10 Applicability

This report has been prepared for the exclusive use of our client Greater Wellington Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that Greater Wellington Regional Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:

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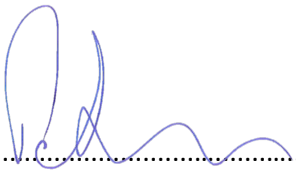
Mike Lake
Senior Freshwater Ecologist

Authorised for Tonkin & Taylor Ltd by:



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Peter Roan
Project Director

Report technically reviewed by Dean Miller.

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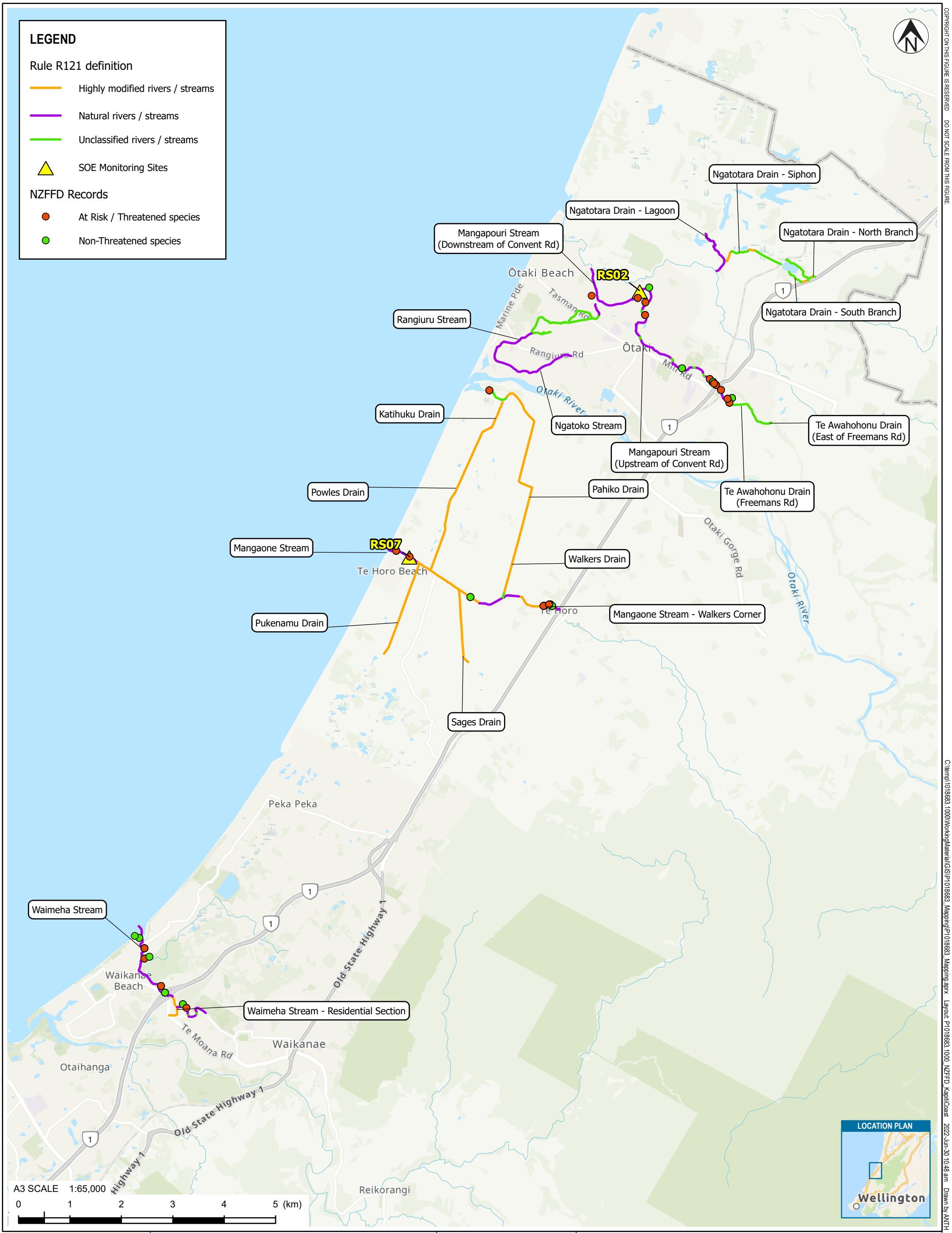
Appendix A Location of watercourses covered by the proposed maintenance consent

- **Figure 1: Watercourses covered by the proposed maintenance consent in Kāpiti Coast**
- **Figure 2: Watercourses covered by the proposed maintenance consent in Wairarapa**



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NOTES:
Basemap NZ Topographic - Basemap Only: Eagle, LINZ, StatsNZ, OSM. NZ Navigation Map: Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.. NZ Topographic - Reference Labels: Eagle, OSM

REV	DESCRIPTION	GIS	CHK	DATE	APPROVED	DATE
0	First version	ANTH	JORB	30/06/22		

PROJECT No.	P1018683.1000	
DESIGNED	ANTH	JUN.22
DRAWN	ANTH	JUN.22
CHECKED	JORB	JUN.22

CLIENT **GREATER WELLINGTON REGIONAL COUNCIL**
PROJECT ECOLOGICAL EFFECTS ASSESSMENT FOR MAINTENANCE OF HIGHLY MODIFIED WATERCOURSES
TITLE WATERCOURSES COVERED BY THE PROPOSED MAINTENANCE CONSENT IN KĀPITI COAST
SCALE (A3) 1:65,000 FIG No. FIGURE 1. REV 0

LEGEND

Rule R121 definition

- Highly modified rivers / streams
- Investigative Site

NZFFD Records

- At Risk/Threatened species
- Non-Threatened species

Otahoua Drain Maintenance Scheme
Manaia Drain Maintenance Scheme
Masterton
Carterton
Te Whiti Drain Maintenance Scheme
Ahikouka Drain Maintenance Scheme
Greytown
Taumata Drain Maintenance Scheme
Featherston
Battersea Drain Maintenance Scheme
Longbush Drain Maintenance Scheme
Whakawiriwiri Drain Maintenance Scheme
Lake Wairarapa
Martinborough
Okawa Drain Maintenance Scheme
Te Hopai Drainage Scheme
East Pukio Drain Maintenance Scheme
Pouawha Drainage Scheme
Moonmoot Drainage Scheme
RAN032
Onoke Drainage Scheme

A3 SCALE 1:220,000

0 2 4 6 8 10 (km)

LOCATION PLAN

Wellington

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NOTES:
Basemap NZ Topographic - Basemap Only: Eagle, LINZ, StatsNZ, OSM. NZ Navigation Map: Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.. NZ Topographic - Reference Labels: Eagle, OSM

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	ANTH	JORB	30/06/22

PROJECT No.	P1018683.1000	
DESIGNED	ANTH	JUN.22
DRAWN	ANTH	JUN.22
CHECKED	JORB	JUN.22
APPROVED		DATE

CLIENT **GREATER WELLINGTON REGIONAL COUNCIL**
PROJECT ECOLOGICAL EFFECTS ASSESSMENT FOR MAINTENANCE OF HIGHLY MODIFIED WATERCOURSES
TITLE WATERCOURSES COVERED BY THE PROPOSED MAINTENANCE CONSENT IN WAIRARAPA

SCALE (A3) 1:220,000 FIG No. FIGURE 1. REV 0

Appendix B Stream classification

Appendix B Table 1: GWRC watercourse descriptions taken from the guidance note[14]

Watercourse type	Definition
River	River means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).
Highly modified river or stream	Highly modified river or stream for the purposes of Rules R121, R121A and R121B only, means a river or stream that has been modified and channelled for the purpose of land drainage of surface or sub-surface water and has the following characteristics: (a) it has been channelled into a single flow, and (b) the channel has been straightened, and (c) the channel is mechanically formed with straight or steeply angled banks, and (d) it exhibits these characteristics for at least its entire length through the property in which the activity is being carried out.
Drain	Drain means any artificial watercourse, designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes.
Ephemeral watercourse	Ephemeral watercourse means a watercourse that: (a) Has a bed that is predominantly vegetated, and (b) Only conveys or temporarily retains water during or immediately following rainfall events, and (c) Does not convey or retain water at other times, and (d) Is not a wetland.

[14] https://archive.gw.govt.nz/assets/Plans--Publications/Regional-Plan-Review/Watercoursecategorisationguidancedocument27-May-21.pdf

Appendix C Environmental Institute of Australia and New Zealand Ecological Impact Assessment Guidelines (EcIAG)

Step one: Assigning ecological value

Ecological values are assigned on a scale of 'Low' to 'Very High' based on species and freshwater ecology using criteria in the EcIAG.

Appendix C Table 1: Ecological values assigned to species (adapted from Roper-Lindsay *et al.* (2018))

Value	Species values
Very high	Nationally threatened – endangered, critical or vulnerable.
High	Nationally At Risk– declining.
Moderate-high	Nationally At Risk– recovering, relict or naturally uncommon.
Moderate	Not nationally threatened or At Risk, but locally uncommon or rare
Low	Not threatened nationally, common locally
Negligible	Introduced and naturalised species, including species with recreational value

Appendix C Table 2: Ecological values assigned to freshwater ecology to supplement the EcIAG process (Quinn, 2020)

Value	Explanation	Characteristics
Very High	A reference quality watercourse in condition close to its pre-human condition with the expected assemblages of flora and fauna and no contributions of contaminants from human induced activities including agriculture. Negligible degradation e.g., stream within a native forest catchment.	Benthic invertebrate community typically has high diversity, species richness and abundance. Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and settled sediments. Benthic community typically with no single dominant species or group of species. MCI scores typically 120 or greater. EPT richness and proportion of overall benthic invertebrate community typically high. SEV scores high, typically >0.8. Fish communities typically diverse and abundant. Riparian vegetation typically with a well-established closed canopy. Stream channel and morphology natural. Stream banks natural typically with limited erosion. Habitat natural and unmodified.
High	A watercourse with high ecological or conservation value but which has been modified through loss of riparian vegetation, fish	Benthic invertebrate community typically has high diversity, species richness and abundance. Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and settled sediments.

Value	Explanation	Characteristics
	barriers, and stock access or similar, to the extent it is no longer reference quality. Slight to moderate degradation e.g., exotic forest or mixed forest/agriculture catchment.	Benthic community typically with no single dominant species or group of species. MCI scores typically 80-100 or greater. EPT richness and proportion of overall benthic invertebrate community typically moderate to high. SEV scores moderate to high, typically 0.6-0.8. Fish communities typically diverse and abundant. Riparian vegetation typically with a well-established closed canopy. No pest or invasive fish (excluding trout and salmon) species present. Stream channel and morphology natural. Stream banks natural typically with limited erosion. Habitat largely unmodified.
Moderate	A watercourse which contains fragments of its former values but has a high proportion of tolerant fauna, obvious water quality issues and/or sedimentation issues. Moderate to high degradation e.g., high-intensity agriculture catchment.	Benthic invertebrate community typically has low diversity, species richness and abundance. Benthic invertebrate community dominated by taxa that are not sensitive to organic enrichment and settled sediments. Benthic community typically with dominant species or group of species. MCI scores typically 40-80. EPT richness and proportion of overall benthic invertebrate community typically low. SEV scores moderate, typically 0.4-0.6. Fish communities typically moderate diversity of only 3-4 species. Pest or invasive fish species (excluding trout and salmon) may be present. Stream channel and morphology typically modified (e.g., channelised) Stream banks may be modified or managed and may be highly engineered and/or evidence of significant erosion. Riparian vegetation may have a well-established closed canopy. Habitat modified.
Low	A highly modified watercourse with poor diversity and abundance of aquatic fauna and significant water quality issues. Very high degradation e.g., modified urban stream	Benthic invertebrate community typically has low diversity, species richness and abundance. Benthic invertebrate community dominated by taxa that are not sensitive to organic enrichment and settled sediments. Benthic community typically with dominant species or group of species. MCI scores typically 60 or lower. EPT richness and proportion of overall benthic invertebrate community typically low or zero. SEV scores moderate to high, typically less than 0.4. Fish communities typically low diversity of only 1-2 species. Pest or invasive fish (excluding trout and salmon) species present.

Value	Explanation	Characteristics
		Stream channel and morphology typically modified (e.g., channelised). Stream banks often highly modified or managed and maybe highly engineered and/or evidence of significant erosion. Riparian vegetation typically without a well-established closed canopy. Habitat highly modified.

Step two: Assess magnitude of effects

Magnitude of effect is a measure of the extent or scale of the effect of an activity and the degree of change that it will cause. The magnitude of an effect is scored on a scale of 'Negligible' to 'Very High' and is assessed in terms of:

- Level of confidence in understanding the expected effect;
- Spatial scale of the effect;
- Duration and timescale of the effect (Table A.4);
- The relative permanence of the effect; and
- Timing of the effect in respect of key ecological factors.
- The spatial scale for effects is considered in the context of the local and landscape scale effects as appropriate.

Appendix C Table 3: Criteria for describing magnitude of effect (Roper-Lindsay, Fuller, Hooson, Sanders, & Ussher, 2018)

Magnitude	Description
Very high	Total loss of, or very major alteration to, key elements/features/ of the existing baseline[1] conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature
High	Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR Having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating the 'no change' situation; AND/OR Having negligible effect on the known population or range of the element/feature

[1]Baseline conditions are defined as 'the conditions that would pertain in the absence of a proposed action' (EIANZ, 2018).

Appendix C Table 4: Timescale for duration of effects (Roper-Lindsay, Fuller, Hooson, Sanders, & Ussher, 2018)

Timescale	Description
Permanent	Effects continuing for an undefined time beyond the span of one human generation (taken as approximately 25 years)
Long-term	Where there is likely to be substantial improvement after a 25 year period (e.g. the replacement of mature trees by young trees that need > 25 years to reach maturity, or restoration of ground after removal of a development) the effect can be termed 'long term'
Temporary[1]	Long term (15-25 years or longer – see above) Medium term (5-15 years) Short term (up to 5 years) Construction phase (days or months)

[1]Note that in the context of some planning documents, 'temporary' can have a defined timeframe.

Step three: Assessment of the level of effects

An overall level of effects is identified for each activity or habitat/fauna type using a matrix approach that combines the ecological values (described in Section 3) with the magnitude of effects resulting from the activity (Appendix C Table 5).

The matrix describes an overall level of effect on a scale of 'Negligible' to 'Very High'. Positive effects are also accounted for within the matrix.

The level of effect is then used to guide the extent and nature of the ecological management response required, which may include avoidance, remediation, mitigation, offsetting or compensation.

The overall level of effects on each value (habitat or species) is assessed before and after recommendations to avoid, remedy or mitigate effects. As such, the need for and extent to which recommendations to reduce effects, if implemented, is clearly understood.

Appendix C Table 5: Criteria for describing overall levels of ecological effects (Roper-Lindsay, Fuller, Hooson, Sanders, & Ussher, 2018)

Ecological value / Magnitude	Very high	High	Moderate	Low	Negligible
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

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Appendix D Vegetation and Sediment Removal Management Plan

DRAFT Vegetation and Sediment Removal Management Plan

Kāpiti Coast and Wairarapa

Author: GW Flood Protection

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Contents

Schedule X Requirements

Schedule X of the Proposed Natural Resources Plan (PNRP) sets out the information required in a 'Vegetation and Sediment Removal Management Plan'. The following table provides a summary of the information required by Schedule X and a quick reference to its location in this report, or its location within the Code of Practice.

Schedule X Requirement	Location in Plan
Management Outcomes	
(a) describe the outcomes sought in relation to managing the hazard risk of flooding to people, property, infrastructure and communities by carrying out the vegetation and sediment removal works, and	**Section 1.2**
Catchment characteristics & risk assessment	
(b) include maps and descriptions of the relevant rivers, including identifying any sites listed in Schedule A (outstanding water bodies), Schedule B (Ngā Taonga Nui a Kiwa), Schedule C (mana whenua), and Schedule F (indigenous biodiversity), and their significant values; and	**Section 3.1**
(c) identify the values associated with the relevant rivers (including any identified by the relevant Whaitua Implementation Programmes), including the species present, or potentially present, and	**Section 3.2**
(d) identify the key risks to these values (potential adverse effects) as a result of the proposed vegetation and sediment removal activities, and	**Section 3.3**
(e) prioritise those rivers, or reaches of rivers, covered by the consent for implementation actions or mitigation measures to maintain or improve the aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use values, and	**Section 3.4**
(f) identify the benefits of managing the hazard risk of flooding to people, property, infrastructure and communities (potential positive effects) as a result of the proposed vegetation and sediment removal activities, and	**Section 3.2**
(g) identify the hazard risks of those rivers, or reaches of rivers, covered by the consent and the priorities for clearance activities, and	**Section 3.2 and Section 3.3**
Management outcomes/approach	
(h) describe the approach that will be taken over time to minimise the extent and frequency of the vegetation and sediment removal activities, so that they are carried out only when necessary, and	**Section 4.1**
(i) identify the triggers to be used to decide when to undertake the vegetation and sediment removal activities, and	**Section 4.1.1**

A Code of Practice	
(j) describe how vegetation and sediment removal activities will be managed to minimise adverse effects, including: i. measures to implement the Good Practices for the Mechanical Management of Highly Modified Waterways guidance document during maintenance work, and ii. measures to minimise sediment disturbance and control sediment movement, and iii. measures to retain the cross-section of the channel and vegetation on the banks during works, and iv. measures to minimise the discharge of any contaminants to water or the bed of the river, and v. measures to identify the aquatic species present, or potentially present, at the times that works are scheduled, and vi. measures to maintain or provide habitat diversity, quality and availability during the maintenance activities, and vii. timing the activity to minimise the risks during critical breeding and migration times for the indigenous birds, whitebait and trout present in the catchment, and viii. measures to minimise the effects on fish, kākahi, kōura and birds, and ix. a fish, kākahi and kōura management and recovery plan that describes the methods to be used to avoid/minimise the entrapment and stranding of fish, kākahi and kōura and to recover and return any relocated from the works area to the waterway, and x. measures to manage spoil to ensure that it does not re-enter the waterway, and xi. measures to manage adverse effects on the significant values of any sites identified in Schedule A (outstanding water bodies), Schedule B (Ngā Taonga Nui a Kiwa), Schedule C (mana whenua), and Schedule F (indigenous biodiversity), and details of consultation undertaken with mana whenua for any sites within Schedule C, and xii. measures to manage other adverse effects, including cumulative effects, on aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use, and	**Section 4.1.1**

Monitoring, Review and Reporting	
(k) describe the methods and monitoring that will be carried out to identify the effects of the vegetation and sediment removal activities on aquatic ecosystem health and mahinga kai, contact recreation and Māori customary use, and the significant values of any sites identified in Schedule A, Schedule B (Ngā Taonga Nui a Kiwa), Schedule C (Mana whenua) or Schedule F (indigenous biodiversity). The extent of monitoring required will correspond with the nature of the works undertaken, with the values of the sites and risk of adverse effects on those values, and	**Section 6**
(l) will be sufficient to inform review on the 10th yearly anniversary, and	**Section 6.2**
(m) set out the process to be used to report on the monitoring results, and	**Section 6.2**
(n) describe adaptive management approaches to be used to address any adverse effects of the vegetation and sediment removal activities, including cumulative adverse effects, that are more than minor, and consider any update to the Good Practices for the Mechanical Management of Highly Modified Waterways guidance document in preparing or updating the vegetation and sediment removal management plan, in order to contribute to a catchment-wide improvement in these values.	**Section 7**

1 Introduction

1.1 Overview

Greater Wellington Regional Council (GW) Flood Protection currently maintains a network of highly modified rivers and streams throughout the Wellington region, across the Kāpiti Coast and Wairarapa areas. These are called drain maintenance schemes, or drainage schemes, which involves undertaking vegetation and sediment removal activities to reduce the hazard risk of flooding to people, property, infrastructure, communities and the production of farmland. These activities are generally undertaken when there has been a reduction in hydraulic capacity caused by aquatic plant growth and/or the build-up of sediment on the bed of a watercourse.

The schemes were established by the Wairarapa and Manawatu catchment boards under the Land Drainage Act 1908, and the Soil Conservation and Rivers Control Act 1941. While the schemes were originally funded by the landowners, responsibility for the schemes was inherited by GW after the Local Government Act 1974 disestablished the catchment boards.

In Kāpiti, responsibility for watercourses was agreed between Kāpiti Coast District Council (KCDC) and GW in 1990 under the Kapiti Coast Watercourses Administration Agreement.

In the Wairarapa many 14 drainage schemes are located within the larger Lower Wairarapa Valley Development Scheme. Whereas GW is responsible for the Waikanae River Scheme, Ōtaki River Scheme and Mangaone Drainage Scheme which are centred around the main rivers including other minor watercourses and drainage networks.

1.2 Purpose and scope

This 'Vegetation and Sediment Removal Management Plan' (VSRMP) has been prepared in accordance with Schedule X of the Proposed Natural Resources Plan (PNRP) to support the resource consent application lodged by GW associated with the maintenance of the highly modified rivers and streams (commonly known as drains) within the Kāpiti Coast and Wairarapa areas.

Highly modified rivers and streams make up drainage networks, often referred to as infrastructure, hold important aquatic habitats for native fish and invertebrates (insects, worms, crustaceans, etc). Similarly, these activities are undertaken to maintain the carrying capacity of the drains, to prevent flooding of the adjacent land, and improve the aquatic ecosystem health, mahinga kai, contact recreation and Māori customary use.

The purpose of the drainage schemes is to lower groundwater levels and reduce the duration, frequency, and extent of flooding of farmland and residential properties. These highly modified watercourses can silt up over time, and the adjacent bank edges and channels themselves can become overgrown with weeds and other plants, limiting the carrying capacity and overall operation of the network. As such, requiring ongoing maintenance of the watercourses by removing weed and sediment to maintain the flood carrying capacity of the channel.

This management plan includes the following, in accordance with the effects management clauses of Schedule X:

- A description of the proposed impact footprint;
- A description of the values associated with the relevant watercourses;
- An assessment of key risks and ecological adverse effects of the proposed vegetation and sediment removal on ecological values;

- A description of implementation actions and mitigation methods associated with the works;
- Any recommendations to avoid, remedy, or mitigate potential adverse effects associated with the works; and
- Any additional measures such monitoring, review and reporting to address residual ecological effects.

1.3 Site location and description (Clause (b))

This VSRMP covers modified waterbodies within both the Kāpiti Coast District and the Wairarapa area, vary greatly across the region ranging from urban areas to rural farmland. There is no standard width, or depth; some may be only a metre wide while others can be over five metres wide. They can also vary by native and invasive species present, rate of weed growth, sediment levels, visual amenity. Adjacent land use can be residential or farmland.

The 14 drainage schemes in the Wairarapa are listed below. Those marked with an asterisk are pumped drainage schemes which include pump station assets, while the remainder are gravity drainage schemes.

SCHEME NAME	SCHEME TYPE	LENGTH (km)
Moonmoot Drainage Scheme*	Pump Drainage Scheme	3.4
Onoke Drainage Scheme*	Pump Drainage Scheme	7.1
Pouawha Drainage Scheme*	Pump Drainage Scheme	11.8
Te Hopai Drainage Scheme*	Pump Drainage Scheme	20.4
Ahikouka Drain Maintenance Scheme	Gravity Drainage Scheme	4.5
Battersea Drain Maintenance Scheme	Gravity Drainage Scheme	41.0
East Pukio Drain Maintenance Scheme	Gravity Drainage Scheme	7.2
Longbush Drain Maintenance Scheme	Gravity Drainage Scheme	9.3
Manaia Drain Maintenance Scheme	Gravity Drainage Scheme	12.2
Okawa Drain Maintenance Scheme	Gravity Drainage Scheme	2.5
Otahoua Drain Maintenance Scheme	Gravity Drainage Scheme	5.6
Taumata Drain Maintenance Scheme	Gravity Drainage Scheme	4.5
Te Whiti Drain Maintenance Scheme	Gravity Drainage Scheme	2.6
Whakawiriwiri Drain Maintenance Scheme	Gravity Drainage Scheme	13.6
	Total (km)	145.7

The highly modified or unclassified watercourses under the three schemes, on which vegetation and sediment removal takes place, are listed below:

- Waikanae River Scheme
    - Waimeha Stream
- Ōtaki River Scheme
    - Katihuku Drain
    - Mangapouri Stream
    - Ngatoku Stream
    - Ngatotara Drain
    - Pahiko Drain
    - Rangiuru Stream
    - Te Awahohonu Drain
    - Waitohu Stream
- Mangaone Drainage Scheme
    - Mangaone Stream
    - Powles Drain
    - Pukenamu Drain
    - Sages Drain
    - Walkers Drain

Plans showing the general extent and location of the network of highly modified rivers and streams maintained by GW are provided in **Appendix A** to this report. Often, these highly modified rivers and streams are located on land that is privately owned. Figures 1 and 2 are examples of highly modified rivers and streams in the Wairarapa. It is prudent to note that some of the targeted waterbodies are listed in either of Schedules A, B, C and F of the PNRP.

Figure 1: modified stream – Battersea, Wairarapa.

Figure 2: modified stream on Manaia Road

GW Flood Protection do not intend to deepen or widen drain, only to maintain the existing capacity.

2 Background

2.1 Regulatory Context

2.1.1 Statutory obligations

GW has a statutory responsibility to minimise and prevent flood and erosion damage under the Soil Conservation and Rivers Control Act 1941, and the avoidance or mitigation of natural hazards, including flooding, under section 30 of the Resource Management Act 1991.

2.2 Summary of proposed activities

GW seeks to continue to maintain the highly modified watercourses it has responsibility for throughout the Kāpiti Coast District and in the Wairarapa. This activity includes the removal of unconsolidated fine sediment that has been deposited on the bed of the watercourse since it was last cleared, and the removal of weeds and overgrown plants. The drains will be maintained on an as required basis and no more than is required to maintain flows and the flood conveyance capacity of the network.

The trigger for works being required is either an inspection undertaken by GW, or a report by the landowner to confirm vegetation growth or sediment levels are at or approaching a level that is affecting the performance of the watercourse.

The requirements for a resource consent are determined by Rule R121B which provides for the removal of aquatic vegetation and/or accumulated sediment and associated activities by a local authority from the bed of highly modified rivers or streams to manage the hazard risk of flooding as a restricted discretionary activity provided that a 'Vegetation and Sediment Removal Management Plan' prepared in accordance with Schedule X is provided with the application.

3 Catchment characteristics and risk assessment

3.1 Overview (Clause (b))

Tables 3.1 and 3.2 detail the location of watercourses where sediment removal and vegetation removal will be undertaken. The location of these watercourses is shown in **Appendix A.**

Table 3.1: Names, lengths and clearance methods of watercourses that require maintenance in Kāpiti Coast drainage schemes.

Watercourse	Scheme	Rule R121	Length (km)	Clearance method
Katihuku Drain	Ōtaki River Scheme	Highly Modified	0.783	Hand
			1.454	Machine
Mangaone Stream	Mangaone Drainage Scheme	Highly Modified	0.493	Machine
			0.994	Weed Boat
		Natural	0.495	Machine
			0.657	Weed Boat
Mangaone Stream - Walkers Corner	Mangaone Drainage Scheme	Highly Modified	0.668	Machine
	Mangaone Drainage Scheme	Natural	0.591	Machine

Watercourse	Scheme	Rule R121	Length (km)	Clearance method
Mangapouri Stream - Downstream of Convent Road	Ōtaki River Scheme	Natural	0.685	Hand
			0.478	Machine
			1.136	Weed Boat
		Unclassified	0.021	Hand
Mangapouri Stream - Upstream of Convent Road	Ōtaki River Scheme	Natural	0.972	Hand Machine
		Unclassified	0.103	
Ngatoko Stream	Ōtaki River Scheme	Natural	1.702	Machine
Ngatotara Drain - Lagoon	Ōtaki River Scheme	Natural	1.029	Machine
Ngatotara Drain - North Branch	Ōtaki River Scheme	Highly Modified	0.064	Machine
		Unclassified	0.701	
Ngatotara Drain - Siphon	Ōtaki River Scheme	Highly Modified	0.435	Machine
		Unclassified	0.894	
Ngatotara Drain - South Branch	Ōtaki River Scheme	Highly Modified	0.142	Machine
		Unclassified	0.371	
Pahiko Drain	Ōtaki River Scheme	Highly Modified	3.186	Machine
		Unclassified	0.347	
Powles Drain	Mangaone Drainage Scheme	Highly Modified	1.413	Machine
Pukenamu Drain	Mangaone Drainage Scheme	Highly Modified	1.890	Machine
Rangiuru Stream	Ōtaki River Scheme	Natural	1.226	Weed Boat Machine
		Unclassified	2.714	
Sages Drain	Mangaone Drainage Scheme	Highly Modified	1.465	Machine
Te Awahohonu Drain - East of Freemans Road	Ōtaki River Scheme	Unclassified	0.277	Hand
Te Awahohonu Drain - Freemans Road	Ōtaki River Scheme	Natural	1.864	Hand
		Unclassified	1.033	
Waimeha Stream	Waikanae River Scheme	Highly Modified	0.237	Hand
		Natural	1.867	Weed Boat
Waimeha Stream - Residential Section	Waikanae River Scheme	Highly Modified	0.302	Hand
		Natural	0.898	
		Unclassified	0.054	
Walkers Drain	Mangaone Drainage Scheme	Highly Modified	1.308	Machine
		Unclassified	0.083	

Table 3.2: Names of and lengths of watercourses that require maintenance in the Wairarapa drainage schemes.

Drainage scheme name	Drainage scheme type	Pump stations if present	Rule R121 definition	Length (km)	Plan No.
Otahoua Drain Maintenance Scheme	Gravity		Highly Modified	5.557	D 536
Manaia Drain Maintenance Scheme	Gravity		Highly Modified	12.161	D 87 / 1
Te Whiti Drain Maintenance Scheme	Gravity		Highly Modified	2.929	No data
Ahikouka Drain Maintenance Scheme	Gravity		Highly Modified	4.383	D 526
Taumata Drain Maintenance Scheme	Gravity		Highly Modified	4.620	D / 466
Longbush Drain Maintenance Scheme	Gravity		Highly Modified	9.200	D 16B
Battersea Drain Maintenance Scheme	Gravity		Highly Modified	40.592	D 239
Whakawiriwiri Drain Maintenance Scheme	Gravity		Highly Modified	13.612	No data
Okawa Drain Maintenance Scheme	Gravity		Highly Modified	2.457	D 504
East Pukio Drain Maintenance Scheme	Gravity		Highly Modified	7.168	D 546
Te Hopai Drainage Scheme	Pump	Te Hopai Pump Station	Highly Modified	20.435	D 471
Pouawha Drainage Scheme	Pump	Pouawha Pump Station No 1, Pouawha Pump Station No 2	Highly Modified	11.811	2A / 150 / 208
Moonmoot Drainage Scheme	Pump	Moonmoot Pump Station	Highly Modified	5.217	D 472A
Onoke Drainage Scheme	Pump	Onoke Pumping Station	Highly Modified	7.102	D 527

3.2 Watercourses and values (Clause (c))

There are a range of values associated with the various watercourses in the Wellington region. The Good Practices for the Mechanical Management of Highly Modified Waterways[1] indicates that these are considered of low ecological value due to the "unappealing" appearance, the intensively developed state of the landscapes they flow through, and the fact that they're often considered to be infrastructure, rather than natural water courses.

However, these waterways are critical aquatic habitats for native fish and invertebrates (insects, worms, crustaceans, etc), and maintenance activities will enhance the aquatic habitat of the stream, allowing more biodiversity. Maintaining the watercourses reduces the potential for blockages and clears existing blockages caused by sediment or vegetation. Blockages can cause damage to culverts and water draw off weirs, and redirect water causing damage and accessways, fences, and other infrastructure and property.

The drainage schemes maintain groundwater levels to minimise pasture damage. This allows higher yields in livestock, and cropping farms, and enables high value land use such as dairy. If the schemes were not maintained it can be expected that the land would return to its pre-development state, reducing production. Drainage also improves the value of residential land.

While the exact value benefit of each scheme is not understood. However, for the drain maintenance schemes in the lower Wairarapa valley, the public benefit is estimated at $600,000 per annum, which includes $200,000 private benefit to the landowners.

Table 3.2 identifies the values of the relevant watercourses described in Table 3.1.

[1] Summary-Statement-45-GRWC-Drain-Maintenance-Guide.pdf (gw.govt.nz)

Table 3.2: Watercourses and values

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
Katihuku Drain	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mangaone Stream	N/A	N/A	N/A	F1 - Migratory Fish Habitat, Threatened or At-Risk Fish Habitat F1b: Inanga Spawning Habitat	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Mangaone Stream - Walkers Corner	N/A	N/A	Ng ā Hapū o Ōtaki	F1 - Migratory Fish Habitat & Threatened or At-Risk Fish Habitat	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
Mangapouri Stream - Downstream of Convent Road	N/A	N/A	sites of significance	F1 - Migratory Fish Habitat & Threatened or At-Risk Fish Habitat	N/A	N/A	TBC
Mangapouri Stream - Upstream of Convent Road	N/A	N/A	Ngā Hapū o Ōtaki	F1 - Migratory Fish Habitat & Threatened or At-Risk Fish Habitat	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Ngatoko Stream	N/A	N/A	Ngā Hapū o Ōtaki	F1 - Migratory Fish Habitat; Threatened or At-Risk Fish Habitat; Lakes; High Macroinvertebrate community health	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	High Macroinvertebrate community health	TBC
Ngatotara Drain - Lagoon	N/A	N/A	Ngā Hapū o Ōtaki	F1: Migratory Fish Habitat; Threatened or At-	Migratory Fish Habitat and	N/A	TBC

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
				Risk Fish Habitat; Lakes & Lakes.	threatened or At-Risk Fish Habitat		
Ngatotara Drain - North Branch	N/A	N/A	Ngā Hapū o Ōtaki	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat; Lakes & Lakes.	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Ngatotara Drain - Siphon	N/A	N/A	Ngā Hapū o Ōtaki	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat; Lakes & Lakes.	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Ngatotara Drain - South Branch	N/A	N/A	Ngā Hapū o Ōtaki	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat; Lakes & Lakes.	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Pahiko Drain	N/A	N/A	N/A	N/A	N/A	N/A	TBC

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
Pukemanu Drain	N/A	N/A	N/A	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat; Lakes	N/A	N/A	TBC
Rangiuru Stream	N/A	N/A	Ngā Hapū o Ōtaki	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat; Lake; High Macroinvertebrate community health F2: Indigenous Bird Habitat	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	High Macroinvertebrate community health	TBC
Sages Drain	N/A	N/A	N/A	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat;	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
Te Awahohonu Drain - East of Freemans Road	N/A	N/A	N/A	N/A		N/A	TBC
Te Awahohonu Drain - Freemans Road	N/A	N/A	Ngā Hapū o Ōtaki	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat;	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Waimeha Stream (Natural Stream)	N/A	Ngā Taonga Nui a Kiwa	Te Ātiawa ki Whakarongotai	F1 - Migratory Fish Habitat; Threatened or At-Risk Fish Habitat;	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Waimeha Stream - Residential Section	N/A	Ngā Taonga Nui a Kiwa	Te Ātiawa ki Whakarongotai	N/A	N/A	N/A	TBC
Onoke Drainage Scheme	N/A	Ngā Taonga Nui a Kiwa	N/A	F1: Threatened or At-Risk Fish Habitat; & Lakes. F2: Indigenous Bird Habitat	N/A	N/A	TBC

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
Pouawha Drainage Scheme	N/A	N/A	N/A	F1: Threatened or At-Risk Fish Habitat;	N/A	N/A	TBC
Moonmoot Drainage Scheme	N/A	Ngā Taonga Nu i a Kiwa	N/A	F1: Lake	N/A	N/A	TBC
Te Hopai Drainage Scheme	N/A	N/A	N/A	F1: Lake	N/A	N/A	TBC
Okawa Drain Maintenance Scheme	N/A	N/A	N/A	N/A	N/A	N/A	TBC
East Pukio Drain Maintenance Scheme	N/A	Ngā Taonga Nu i a Kiwa	N/A	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat;	Migratory Fish Habitat and threatened or At-Risk Fish Habitat	N/A	TBC
Whakawiriwiri Drain Maintenance Scheme	N/A	N/A	N/A	N/A	N/A	N/A	TBC
Battersea Drain Maintenance Scheme	N/A	N/A	N/A	N/A	N/A	N/A	TBC

Watercourse	Schedule A: Outstanding Waterbodies	Schedule B	Schedule C: Mana Whenua Sites of Significance	Schedule F: Ecosystems & habitats with significant indigenous biodiversity values	Fish present and threat status	Invertebrate values	Key risks
Ahikouka Drain Maintenance Scheme	N/A	N/A	N/A	F1: Migratory Fish Habitat; Threatened or At-Risk Fish Habitat;	N/A	N/A	TBC
Taumata Drain Maintenance Scheme	N/A	N/A	Wairarapa Iwi	N/A	N/A	N/A	TBC
Longbush Drain Maintenance Scheme	N/A	N/A	N/A	N/A	N/A	N/A	TBC
Manaia Drain Maintenance Scheme	N/A	N/A	N/A	N/A	N/A	N/A	TBC
Otahoua Drain Maintenance Scheme	N/A	Ngā Taonga Nui a Kiwa	N/A	N/A	N/A	N/A	TBC

3.3 Risks to values from the activities (Clause (d))

The activity to remove vegetation and sedimentation has negative effects of various magnitudes on the values of a stream ecosystem, dependant on the physical characteristics of the waterbody and the sensitivity of the ecosystem it supports.

The likely adverse effects as a result of the maintenance works proposed on the values of the targeted watercourses include:

- Reductions in bank stability due to contact with the excavator bucket;
- Fish stranding and mortality;
- Sediment release and the resulting potential for de-oxygenation and downstream sediment deposition;
- The removal of specific habitats such as riffles and the loss of stream bed variability; and
- Interruption of fish migrations and spawning and disturbance of inanga spawning habitat

Table 3.3 below provides a condition rating guide overall assessment of the potential risk for each of the abovementioned key risks.

		Sensitivity to effects		
		High Ecological – Healthy macroinvertebrate and fish community dominated by species sensitive to the effects of suspended sediment and deoxygenation Cultural/recreational – Stream has high visual clarity and is regularly used for contact recreation/Mahinga Kai/ Māori customary use	**Moderate** Ecological – Macroinvertebrate and fish communities are in fair condition with some sensitive species present Cultural/recreational – Stream has moderate visual clarity occasionally used for contact recreation/Mahinga Kai/ Māori customary use	**Low** Ecological – Macroinvertebrate and fish communities are in poor condition with low abundance and diversity and no sensitive species present Cultural/recreational – Stream has poor visual clarity and is rarely used for contact recreation/Mahinga Kai/ Māori customary use
Susceptibility to effects	**High** Deep deposits (>100 mm) and high cover (>50%) of fine sediment present across the of the bed	Very high	High	Moderate
	Moderate Deep deposits (> 100 mm) and high cover (>50%) of fine sediment present across the of the bed	High	Moderate	Low

	Low Low coverage (<50%) of shallow deposited sediment (< 100 mm)	Moderate	Low	Very low

Step 3: Identify the key risks to values in different parts of the network based on the results of Step 2

[Freshwater scientist with an in-depth knowledge of the effects of vegetation and sediment removal, the sensitivity of different values to those effects, and the factors that influence the magnitude of different effects.]

Key risks	**Value 1**	**Value 2**	**Value 3**	**Value 4**	**Value 5**	**Value 6**
Risk 1						
Risk 2						
Risk 3						

3.4 Prioritisation of river reaches (Clause (e))

Maintenance will be prioritised where most benefit would be accrued. This includes drains on or adjacent to residential properties where the risk to people is greatest. GW Flood Protection Operations staff may also be aware of 'problem areas' where vegetation is likely to have increased impacts on the flood risk, or where flooding is more frequent.

Priority areas for maintenance will be determined each year based on inspection. Inspections and prioritisation will ensure that the extent and frequency of the vegetation removal is appropriate and are only carried out when necessary. Inspections will be conducted annually during summer when weeds growth is fastest. Inspections may also be done at other times on receipt of a notification from the landowner. This is important as blockages can form at any time during the year. It is expected that in some priority areas annual clearance will be required as weeds grow more quickly and can have greater consequences.

Inspections will be conducted by a GW Flood Protection Operations team member or contractor. It will not be possible to inspect the entire length of all drainage networks. Inspections will be done on an easily accessible, representative length of drain to determine the condition and schedule maintenance.

The inspection procedure and triggers will be further developed over the first year of this activity.

Table 3: Example of a risk assessment approach for prioritisation

The below table could be used to prioritise rivers/reaches for implementation actions and mitigation methods based on the values present, the sensitivity of those values to the effects of vegetation and sediment removal and the scale/frequency of works.

Red cells represent the grades that would result in a river/reach being prioritised if the threshold for prioritisation was set at a Priority score of 2.

		Sensitivity of values to effects		
		High • Aquatic ecosystem health value 1 • Mahinga kai Value 1 • Contact recreation Value 1 • Māori customary use values Value 1	**Moderate** • Aquatic ecosystem health value 2 • Mahinga kai Value 2 • Contact recreation Value 2 • Māori customary use Value 2	**Low** • No aquatic ecosystem health, Mahinga kai, Contact recreation or Māori customary use values
Scale/frequency of works	**Large/Frequent**	Priority 1	Priority 2	Priority 3
	Moderate/Intermediate	Priority 2	Priority 3	Priority 4
	Small/Rare	Priority 3	Priority 4	Priority 5

4 Management practices

4.1 Timing, frequency, and extent of activities (Clause (h))

4.1.1 Triggers for maintenance (Clause (i))

Vegetation and sediment removal activities are undertaken on an as required basis when the hydraulic capacity has been reduced.

In the Wairarapa, only up to 20% of the drainage network will be cleared of vegetation each year, depending on available resources. In Kāpiti, highly modified watercourses, including the entire length of the Mangaone Drainage Scheme, are generally cleared of vegetation by weed boat annually. As mentioned earlier, the inspection procedure and triggers will be further developed over the first year of this activity. More observation of the functioning of the drainage networks and testing of the inspection/ prioritisation procedure is needed before the details can be finalised.

Determining when these activities are required depends on:

- A five-scale drain condition assessment for vegetation based on a visual inspection of the drain to determine approximate vegetation coverage;
- Sediment is not usually targeted for removal. Sediment is usually maintained at appropriate levels as some comes out naturally during vegetation clearance. Inspections for deposited sediment levels will only need to be conducted about every five years. This will be based on measurement of the water level in the channel.

The extent of works for each watercourse will be variable. During the duration of this consent, GW will look to reduce the frequency of both mechanical and manual clearance activities through other means, such as riparian management.

Timing maintenance works so that they don't overlap with during sensitive lifecycle periods, such as spawning or migration. However, when the sensitive periods for all ecological values present are considered the window within which works can be undertaken may become too small to allow maintenance works to be fully implemented. It is recommended that a location specific avoidance calendar be developed that identify priority ecological values and sensitivity periods.

Appendix B provides an example a vegetation and sediment condition rating guide.

4.1.1.1 Management options assessment

Going forward, GW will begin to investigate the feasibility of implementing other methods to reduce the frequency and extent of vegetation and sediment removal activities being undertaken. Methods may include:

- Riparian planting to shade out aquatic plants and filter sediment from run-off before it enters the stream;
- Creation of low-flow channels to increase water velocity (reduce sediment deposition and plant growth);
- Bank-reshaping and riparian planting to increase bank stability and reduce sediment input from bank erosion;
- Improving stormwater networks to reduce sediment input from hardstand surfaces;
- Working collaboratively at the sub-catchment scale with GW/landowners to reduce upstream sediment sources;
- The use of less destructive plant removal methods to keep plant density low at key times (weed cutter boats/spraying); and

- The use of sediment traps.

4.1.1.2 Suitability of different options

The suitability of the above methods varies relative to the existing physical conditions of the watercourse, physical constraints and operational constraints. Table X summaries some of the potential constraints for each option mentioned above.

Table 4.1: Overview of constraints for different management methods

	Existing physical conditions	Physical constraints	Operational restraints
Riparian planting			

A list of the specific management practices to be adopted within (i.e., not throughout) the target waterbodies based on assessments described above.

4.1.1.3 Decisions framework for determining the preferred option

To determine what management option is suitable for a watercourse, GW will use the decision framework shown in Figure 1:4.1.1.3.

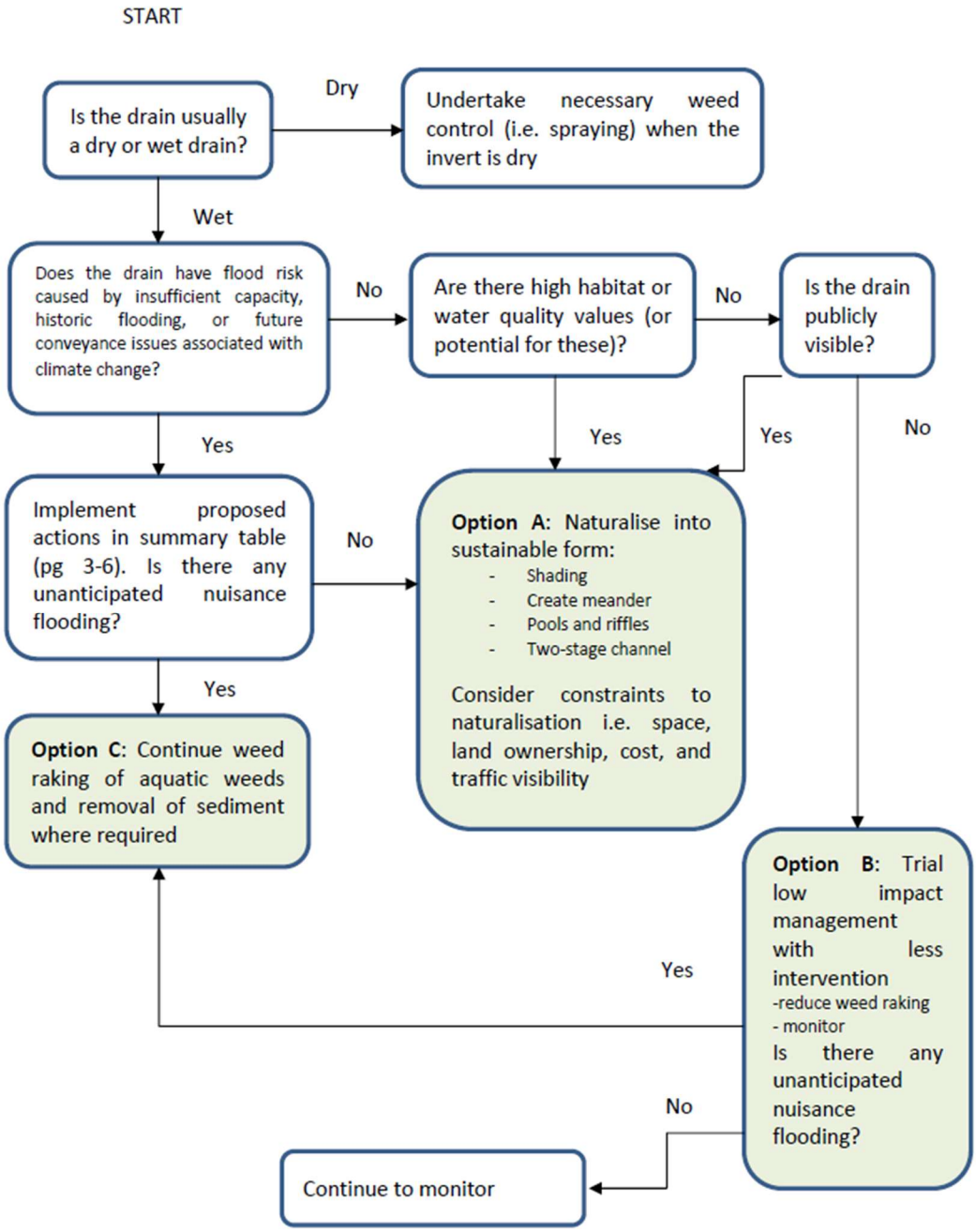


Figure 2:4.1.1.3 Decision framework for determining the preferred option

4.1.1.4 Monitoring and reporting

To measure the performance of the decision-making framework, GW will keep records regarding:

- The number and locations of clearing operations undertaken each year;
- Trends in the occurrence and damage caused by floods of different return intervals;
- Customer satisfaction (i.e. complaints records); and
- Over time, the financial costs/benefits of alternative management regime.

4.1.1.5 Timeframe of implementation

Implementation will occur following granting of the resource consent and will occur over time, as the works occur across the areas covered by this application.

5 Code of practice (Clause (j))

Clause (j) requires a description of how vegetation and sediment removal activities will be managed to minimise adverse effects. This is described below (source: AEE June 2022). All works are supervised by a suitably qualified person approved by GW.

5.1.1 Site Specific Effects Management Plans

If a proposed activity or set of activities have the potential to generate significant adverse effects on the river environment at a specific site or within a specific reach, the activities may need to be conducted in accordance with a more detailed Site-Specific Effects Management Plans (SSEMP), in addition to the good management practice methods. The purpose of an SSEMP is to gather information on high potential impact activities and activities in identified sensitive locations and seasons in order to limit, remedy or mitigate potential adverse effects.

Appendix C outlines the process for determining when site specific effects management is necessary, and if required, what it should include. This process should be read in line with any relevant consent conditions.

There are two tests for a SSEMP, the first test involves a five-step process and combines:

- The potential risk for adverse effects
- The sensitivity of the site
- Scale of the proposed works.

The second test relates to values and is determined by reviewing the activity constraints tables in the Appendix 7 of the 'Code of Practice for River Management Activities' (**Appendix D**). This test covers timing and location of the activity to ensure that values are protected.

5.1.2 Methodology

The works are undertaken using a mechanical excavator or other mechanical means, a weed boat, or by using hand tools. The works are generally undertaken as follows:

- Machinery is operated from the banks of the watercourse rather than within it wherever possible.
- Disturbance to the banks is limited to one side of the waterway (although this may vary from side to side).
- Works will commence at the upstream end of the works site, and progress downstream, unless this is not practical, i.e.
    - The works are to clear isolated blockages
    - Manual clearing is being undertaken, where the upstream vegetation is entangled with the downstream
    - Any restrictions in times of access to parts of the drain, i.e. Traffic Management requirements.
- A self-draining 'weed bucket' is used in gravel bedded watercourse. This provides for easy drainage of water as well as the release of any trapped fish.
- A conventional bucket is used in areas with large volumes of sediment.
- Various types of sediment traps are utilised as required and as suited to the specific watercourse, including the following options:
    - silt fences,
    - haybales, or

- retaining a section of undisturbed vegetation downstream.

- Excavated bed material is placed on the bank in a suitable location so that it does not re-enter the watercourse, while also being located to allow stranded fish/eels to make their way back to the watercourse.
- Alternatively, the excavated material may be removed from the site and disposed of appropriately.
- Where works occur in areas of limited space such as roadsides, the material is removed and placed nearby, i.e. a paddock, where the material is then searched for any fish, any found are returned to the watercourse.
- Material placed on roadside areas such that it is prevented from washing back into the watercourse may be removed as required, usually every few years.

5.1.2.1 Fish management and salvage

The following measures and practices will be utilised to manage works undertaken in the watercourses that have the potential to affect fish:

- When fish are observed in the extraction area, the digger operator keeps the bucket submerged at the end of each cut to give any fish an opportunity to escape.
- Material removed from the watercourse will be visually checked for fish following its removal from the waterway. Any stranded fish will be returned to the watercourse at a site unaffected by the clearance activities (i.e. upstream) as soon as practicable.
- At least one observer (in addition to the machinery operator) will be present for the works, to assist with finding, capturing and relocating trapped fish.
- Any fish exhibiting obvious signs of distress (e.g. surface breathing, loss of equilibrium from the channel) will be recovered and relocated by the operator to clear water upstream of the works.
- Any pest species found are excluded from the actions above, and will be disposed of appropriately and humanely.

5.1.2.2 Aquatic plant management

Approximately 10% of aquatic vegetation will be retained to assist with the re-colonisation of aquatic organisms and plants to provide refuge for aquatic fauna. This 10% is spread along the work site or grouped into discrete lengths. In addition:

- Any significant patches of native or valued (e.g. watercress) macrophytes are identified and included within the 10% of aquatic vegetation retained. If the valued macrophytes covers more than 10%, then the percentage of area retained may be more than 10%. Where greater areas are retained, vegetation on the edges will be retained in preference to vegetation in the watercourse, which can cause blockages.
- Selected ecological refuge areas are left in the channel at intervals to assist in re-colonisation of the invertebrate and fish populations present in the watercourse.
- Instream woody debris are not removed, except where they pose a flood or erosion risk, or a hazard to recreational users.
- Where works are proposed within areas of known mahinga kai value, and where possible, local iwi are advised of the upcoming works, so that any mahinga kai can be gathered before the works occur.

5.1.2.3 Other actions and mitigation measures

In addition to the above, other actions will be used during works, including but not be limited to:

- Requirements regarding the refuelling of machinery and any storage of hazardous substances (such as fuel).
- The use of sediment and erosion control measures during earthworks.
- The protocol to be followed in the event of an accidental discovery of archaeological material.

5.1.2.4 Duration and timing

The watercourses will be maintained on an as required basis and no more than is required to maintain flows and the flood conveyance capacity of the network. Works are timed in consideration of spawning season and other limitations, although some work is reactive to particular circumstances (i.e. to clear localised blockages). The trigger for works being required is either an inspection undertaken by GW, or a report by the landowner to confirm vegetation growth or sediment levels are at or approaching a level that is affecting the performance of the watercourse.

5.1.3 Vegetation removal

In the Wairarapa area, vegetation in the watercourses is removed using manual methods, and this generally covers less than 5% of the network by length, due to funding restrictions. The aspiration is to undertake these works using a machine every 5-6 years, i.e. 20% length per year average.

In the Kapiti district, weed boats are used and in the wider and deeper channels, the aspiration is to operate the weed boat twice a year. Approximately 80% of watercourses, mainly in rural areas, are machine cleaned each year, mainly with a weed bucket.

5.1.4 Sediment removal

In the Wairarapa, sediment removal is generally only undertaken on an as required basis. This activity does not occur often and is undertaken on less than 5% of the average length of drain annually.

Sediment removal is not undertaken often in the Kapiti district, generally once every 10 years.

6 Monitoring, review and reporting (Clauses (k-m))

6.1 Environmental monitoring

The tables below describe the required actions and environmental monitoring that will be undertaken before, during and following works. Monitoring plan development should account for the core objectives of the Vegetation and Sediment Removal Management Plan, which are:

- To reduce the magnitude of the immediate effects of vegetation and sediment removal such as:
  - Fish stranding;
  - Sediment release;
  - De-oxygenation; and
  - Habitat loss etc.
- Gradually reduce the need for vegetation and sediment removal over time thereby reducing the frequency at which the immediate effects occur and improving the overall state of target waterbodies.

[Tables to be developed]

6.2 Reporting

GW Flood Protection will prepare an annual report to be provided to GW on an annual basis. This report will include:

- A description of the works completed during the previous 12 months including the location and timing of works.
- The proposed works for the next 12 months.
- The results and recommendations of monitoring undertaken in accordance with the Environmental Monitoring Plan.
- Any non-compliances and/or complaints received in the previous 12 months.
- Trends in the occurrence and damage caused by floods of different return intervals (method yet to be determined).

7 Adaptive management approach (Clause (n))

This Vegetation and Sediment Removal Management Plan does not prescribe the adaptive management approach in full as that would be counterproductive (i.e., not be adaptive).

However, as an example the management plan may document the following:

1. The effects-based thresholds that will trigger an adaptive management response. These effects thresholds should be linked to the factors measured in a monitoring plan and correspond with the effects envelope mentioned in the clause (i.e., more than minor).

   Note – the wording of the clause requires an adaptive management response when the Good Practices for the Mechanical Management of Highly Modified Waterways guidance document is updated and this should also be acknowledged in the Vegetation Sediment Removal Management Plan.

2. The general actions to be undertaken when triggers are exceeded. Such actions could include:

   a) Investigating whether the effects threshold has been exceeded as a result of a natural process (e.g., if a sediment trigger was exceeded due heavy rainfall causing a slip or bank erosion at the same time as vegetation and sediment removal was undertaken);

   b) Investigating whether any other activities could have caused the effects threshold to be exceeded (e.g., if a dissolved oxygen trigger is exceeded was it exceeded due to an accidental discharge at the same time);

   c) Ensuring vegetation and sediment removal was conducted in accordance with the COP at the time the trigger was exceeded;

   d) Determining whether the effects threshold being exceeded was an isolated case or is likely to be repeated

   e) Investigating and implementing modifications to the COP, which may include:

   (i) Adoption of as yet unimplemented good management practices; and

   (ii) Reduction in the scale of the activity undertaken at any one time.

8 Conclusion

This Draft VSRMP has prepared on behalf of Greater Wellington Regional Council to accompany a resource consent application to Greater Wellington Regional Council for the maintenance of highly modified rivers and streams.

Appendix A: Map of rivers and streams within the Kāpiti Coast and Wairarapa

Ngatotara Drain (Lagoon)

Ngatotara Drain (Siphon)

Ngatotara Drain (North Branch)

Mangapouri Stream (Downstream of Convent Rd)

Ngatoko Stream

06b

04b

Rangiuru Stream

Ngatotara Drain (South Branch)

05b

Katihuku Drain

Te Awahohonu Drain (East of Freemans Road)

Mangapouri Stream (Upstream of Convent Rd)

03b

Powles Drain

Pahiko Drain

Te Awahohonu Drain (Freemans Road)

Mangaone Stream

02b

Walkers Drain

Mangaone Stream (Walkers Corner)

Pukemanu Drain

Sages Drain

Waimeha Stream (Natural Stream)

01b

Waimeha Stream (Residential Section)

SHEET REFERENCE

GWRC Maintained (HIGHLY MODIFIED, NATURAL & UNCLASSIFIED) Rivers and Streams

STREAM CLEARING METHOD

- HAND
- MACHINE
- WEED BOAT
- Other Watercourse (Maintained by GW)

REFER ALSO O-214/01 to 04 FOR GWRC MAINTAINED WATERCOURSES

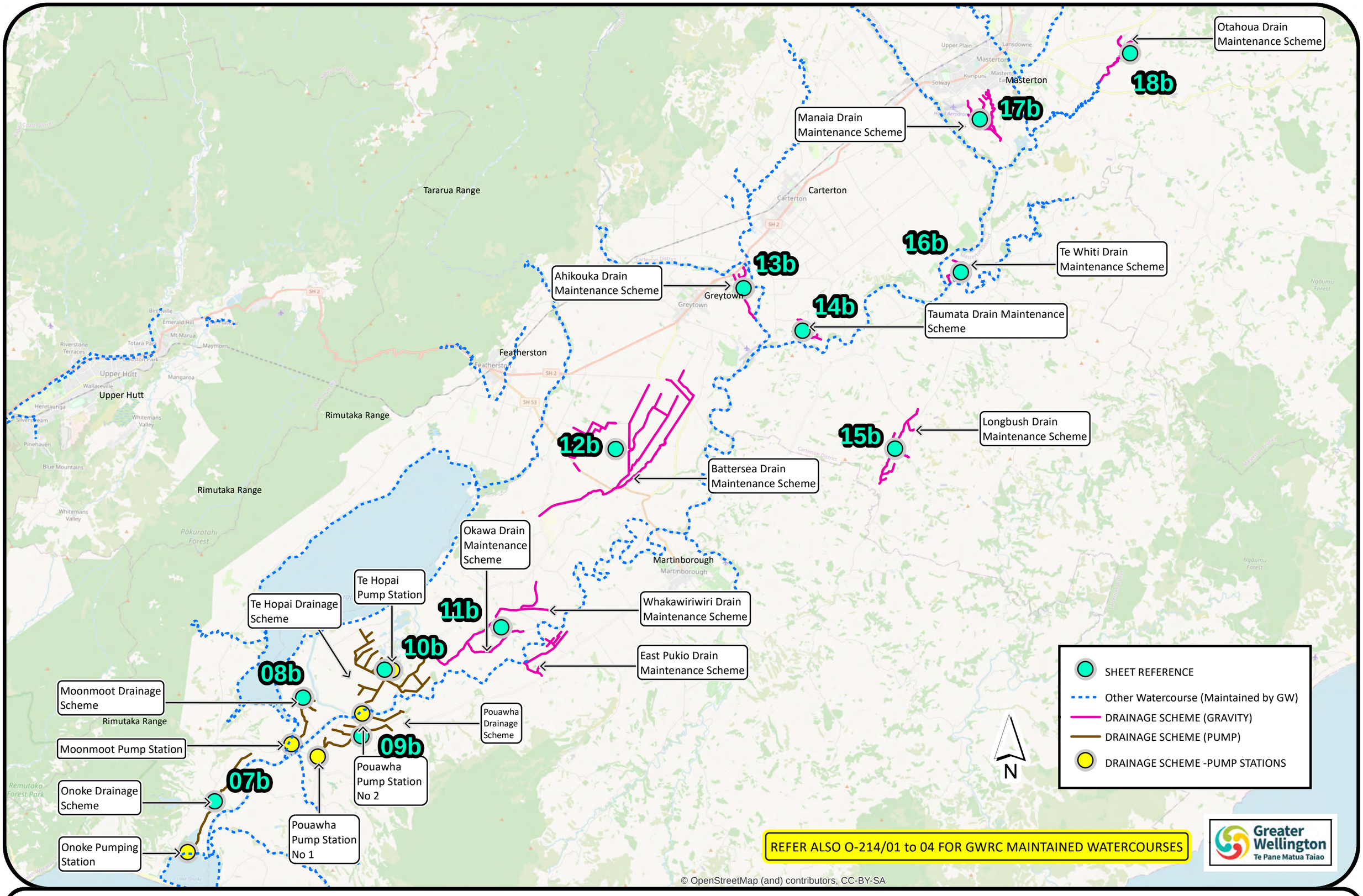
WEED CLEARING OF STREAMS/DRAINS MAINTAINED BY GWRC (PNRP Schedule a, b, c & f)

SHEET LAYOUT (Kapiti)

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent - Layout (Kapiti) - PNRP.mxd
Plotted 1:38:03 PM, 31/05/2022

0 0.5 1 2 Kilometers

A3 Scale : n.t.s.



WEED CLEARING OF STREAMS/DRAINS MAINTAINED BY GWRC (PNRP Schedule a, b, c & f)

SHEET LAYOUT (Wairarapa)

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - Layout (Wai) - PNRP.mxd
Plotted 1:36:22 PM, 31/05/2022

0 1.25 2.5 5 Kilometers

A3 Scale : n.t.s.

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

Tutere Street
Heperi Street
Field Way
Konini Crescent
Titoki Road
Atua Street
Ngapaki Street
Hona Street
Huiawa Street
Hemara Street
Rauparaha Street
Rangihiroa Street
Ono Street
Waimea Road
Lavinia Grove
Fairway Oaks Drive
Isabel Street
Mirek Street
Te Ara Kawaka
Ara Hereke
Te Moana Road
Alexander Street
Park Avenue
Rosebank Grove
Walton Avenue
Bush Road
Pigeon Grove
Pukeko Street
North Bay
N

OTAKI SCHEME (Waimeha Stream) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 01b of 18b**

Drawn : P.Cook, 26 May 2022
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0 60 120 240 Metres
A3 Scale : n.t.s.

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3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Sims Road
Sea Road
Rodney Avenue
Dixie Street
Gawler Street
Pukenamu Road
Harakeke Road
Te Waka Road
Te Horo Beach Road
Mahurenga Lane
Puruaha Road
State Highway 1
Gear Road

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values
- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

- Watercourse (Maintained by GW)
- Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values
- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies
- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance
- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

N

Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Mangaone Drains) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 02b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 12:57:45 PM, 31/05/2022

0 100 200 400 Metres
A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

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Haraleke Road

Swamp Road

Te Waka Road

Addington Road

Sandown Road

Mangaone Stream

N

OTAKI SCHEME (Mangaone Drains) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 03b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
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0 100 200 400 Metres

A3 Scale : n.t.s.

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

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N

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OTAKI SCHEME (Ngatoko & Rangiuru Sream) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 04b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 12:59:36 PM, 31/05/2022

0 100 200 400 Metres
A3 Scale : n.t.s.

Te Rauparaha Street
Te Wiremu Lane
Lupin Road
Tasman Road
Main Street
Raukawa Street
Te Awahohonu Drain - Freemans Road
Rangiuru Road
Rangatira Street
Iti Street
Carkeek Drive
Anzac Road
Domain Road
Mill Road
Temuera
Hinau Street
Riverbank Road Extension
Knights Grove
Aotaki Street
Dunstan Street
State Highway 1
Dittmer Street
Greenwood Boulevard
Cobb Place
Te Manuao Road
Waitohu Valley Road
County Road
Renata Road
Ludlam Way
Speranza Avenue
Brandon Street
Freemans Road
Rahui Road
Te Waka Road
Riverbank Road

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

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N

Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Mangapouri Stm / Te Awahohonu Drain) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 05b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:00:34 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Taylors Road

Ngatotara Drain - Lower

Ngatotara Drain - Middle

Ngatotara Drain - North Branch

Ngatotara Drain - South Branch

Old Coach Road North

Convent Road

Bennetts Road

Lawlors Road

State Highway 1

N

Greater Wellington
Te Pane Matua Taiao

OTAKI SCHEME (Ngatotara Drain) PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 06b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:01:36 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

East West Access Road

Raho Ruru Road

Western Lake Road

Onoke Drainage Scheme

Lake Ferry Road

McDougalls Road

Beach Road

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - ONOKE DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 07b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:03:16 PM, 31/05/2022

0 275 550 1,100 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Parera Road

Te Hopai Drainage Scheme

Wairio Road

Te Hopai Road

Moonmoot Drainage Scheme

Kumenga Road

East West Access Road

Pouawha Drainage Scheme

Pouawha Road

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - MOONMOOT DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 08b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:04:49 PM, 31/05/2022

0 250 500 1,000 Metres

A3 Scale : n.t.s.

Moonmoot Drainage Scheme

Te Hopai Road

Te Hopai Drainage Scheme

Kāhutara Road

East West Access Road

Kumenga Road

Moonmoot Drainage Scheme

Pouawha Drainage Scheme

Clarkes Road

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Drainage Scheme

Pouawha Road

NOTES / DISCLAIMER:
1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

- F1b : Inanga Spawning Habitat
- F1 : Migratory Fish Habitat
- F1 : Threatened or At Risk Fish Habitat
- F1 : High Macroinvertebrate community health
- F1 : Lakes
- F1c : Lakes with Significant Aquatic Plants
- F3 : Significant Natural Wetlands
- F4 : Indigenous Biodiversity Coastal
- F2 : Indigenous Bird Habitat

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

- Historic Heritage Coastal Features
- Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

- Lake
- Wetland
- **SCHEDULE B** : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

- Ngā Hapū o Ōtaki
- Ngāti Toa Rangātira
- Taranaki Whānui ki te Upoko o te Ika a Maui
- Te Ātiawa ki Whakarongotai
- Wairarapa Iwi

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - POUAWHA DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 09b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:05:59 PM, 31/05/2022

0 200 400 800 Metres
A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Parera Road

Judds Road

Kahutara

Te Hopai Drainage Scheme

Whakawiriwiri Drain Maintenance Scheme

Elgars Road

Wairio Road

Moonmoot Drainage Scheme

Te Hopai Road

East West Access Road

Pouawha Drainage Scheme

Moonmoot Drainage Scheme

Kumenga Road

Pouawha Road

Clarkes Road

Lake Ferry Road

N

Greater Wellington
Te Pane Matua Taiao

PUMP DRAINAGE SCHEME - TE HOPAI DRAIN PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 10b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:07:05 PM, 31/05/2022

0 250 500 1,000 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C
2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS
3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

Whakawiriwiri Drain Maintenance Scheme

Pukio West Road

Pahautea Road

Kahutara Road

Okawa Drain Maintenance Scheme

Bulcks Road

East Pukio Drain Maintenance Scheme

Pukio East Road

Chisholms Road

Parera Road

Whakawiriwiri Drain Maintenance Scheme

Elgars Road

Te Hopai Drainage Scheme

East Pukio Drain Maintenance Scheme

Lake Ferry Road

Te Hopai Drainage Scheme

N

Greater Wellington
Te Pane Matua Taiao

GRAVITY DRAINAGE SCHEME - OKAWA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 11b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:07:53 PM, 31/05/2022

0 255 510 1,020 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

Moroa Road

Settlement Road

Battersea Road

Cross Line

Fabians Road

Bidwills Cutting Road

Glenmorven Road

Kanuka Way

Riverside Road

Moiki Road

No 1 Line

Pharazyns Road

Phillips Line

Duddings Line

State Highway 53

Fenwicks Line

Wards Line

Kahutara Road

Bicknells Road

Bidwills Road

Te Maire Road

Battersea Drain Maintenance Scheme

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

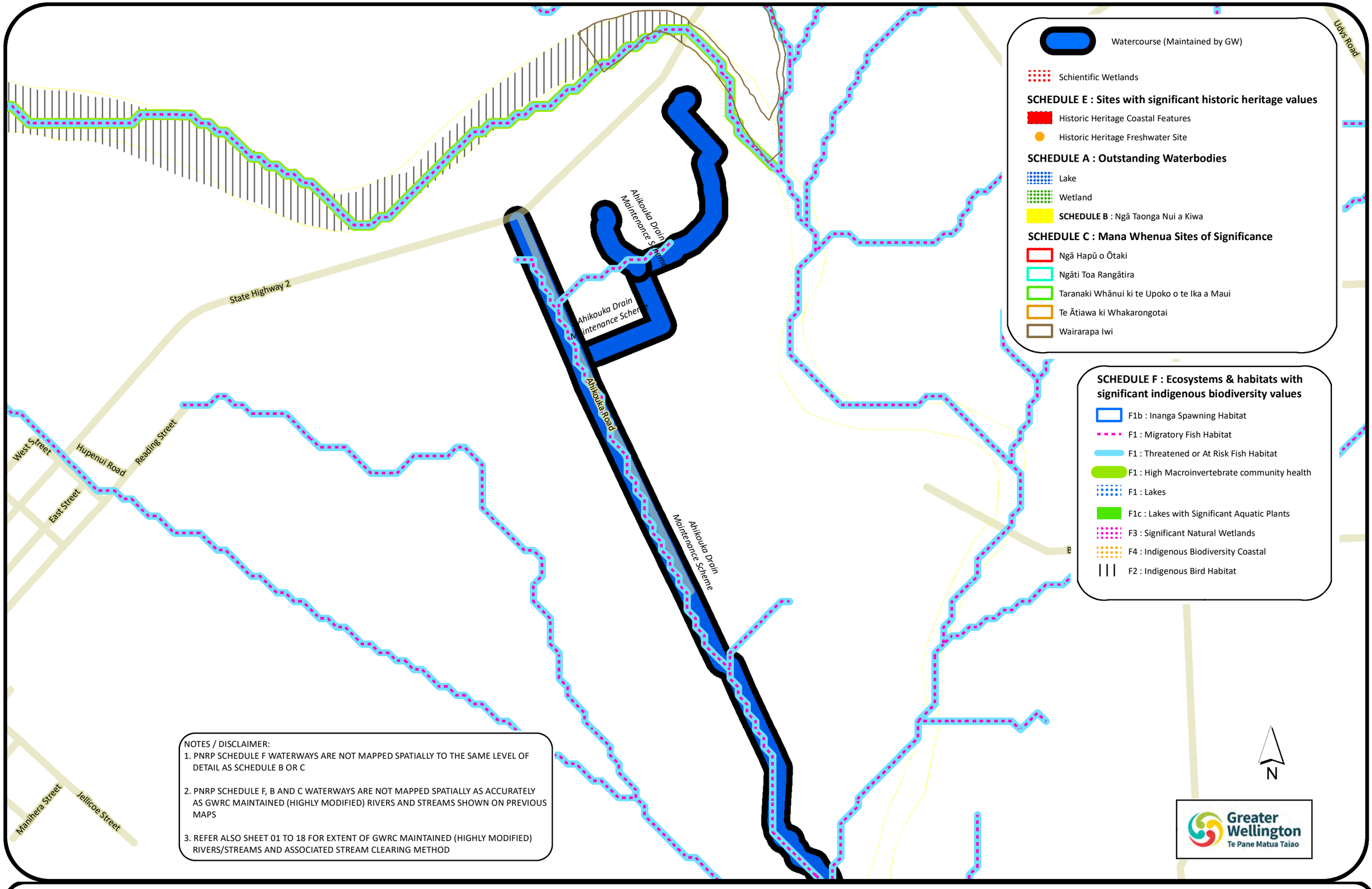
GRAVITY DRAINAGE SCHEME - BATTERSEA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 12b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:08:59 PM, 31/05/2022

0 350 700 1,400 Metres

A3 Scale : n.t.s.



GRAVITY DRAINAGE SCHEME - AHIKOUKA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 13b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:10:14 PM, 31/05/2022

0 120 240 480 Metres
A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Drain Maintenance Scheme

Taumata Island Road

Waihakeke Road

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

GRAVITY DRAINAGE SCHEME - TAUMATA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 14b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:11:04 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

GRAVITY DRAINAGE SCHEME - LONGBUSH PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 15b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:23:38 PM, 31/05/2022

0 220 440 880 Metres

A3 Scale : n.t.s.

Dakins Road

Te Whiti Drain Maintenance Scheme

Te Whiti Drain Maintenance Scheme

Gladstone Road

Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

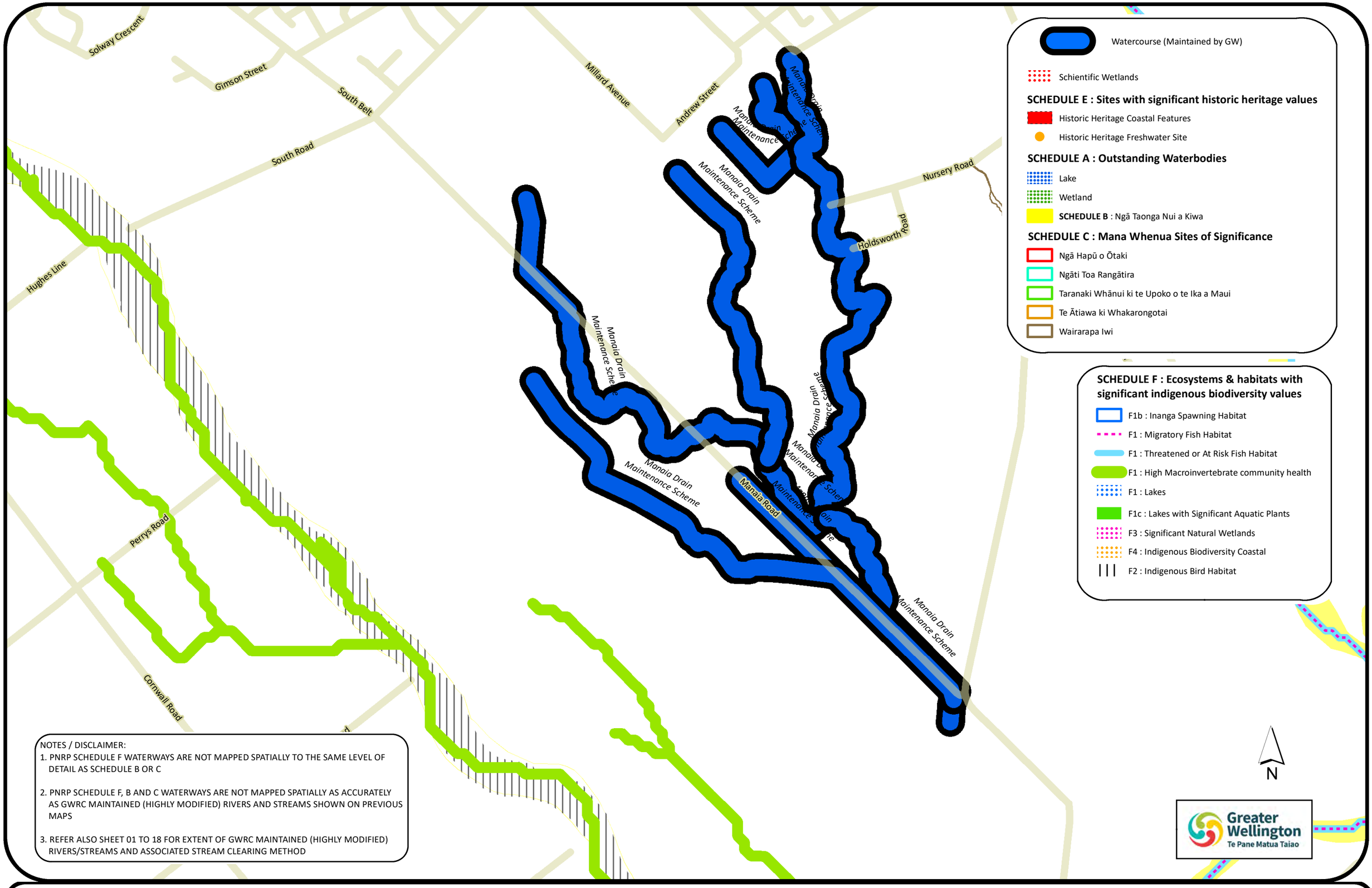
GRAVITY DRAINAGE SCHEME - TE WHITI PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 16b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:24:28 PM, 31/05/2022

0 100 200 400 Metres

A3 Scale : n.t.s.



NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

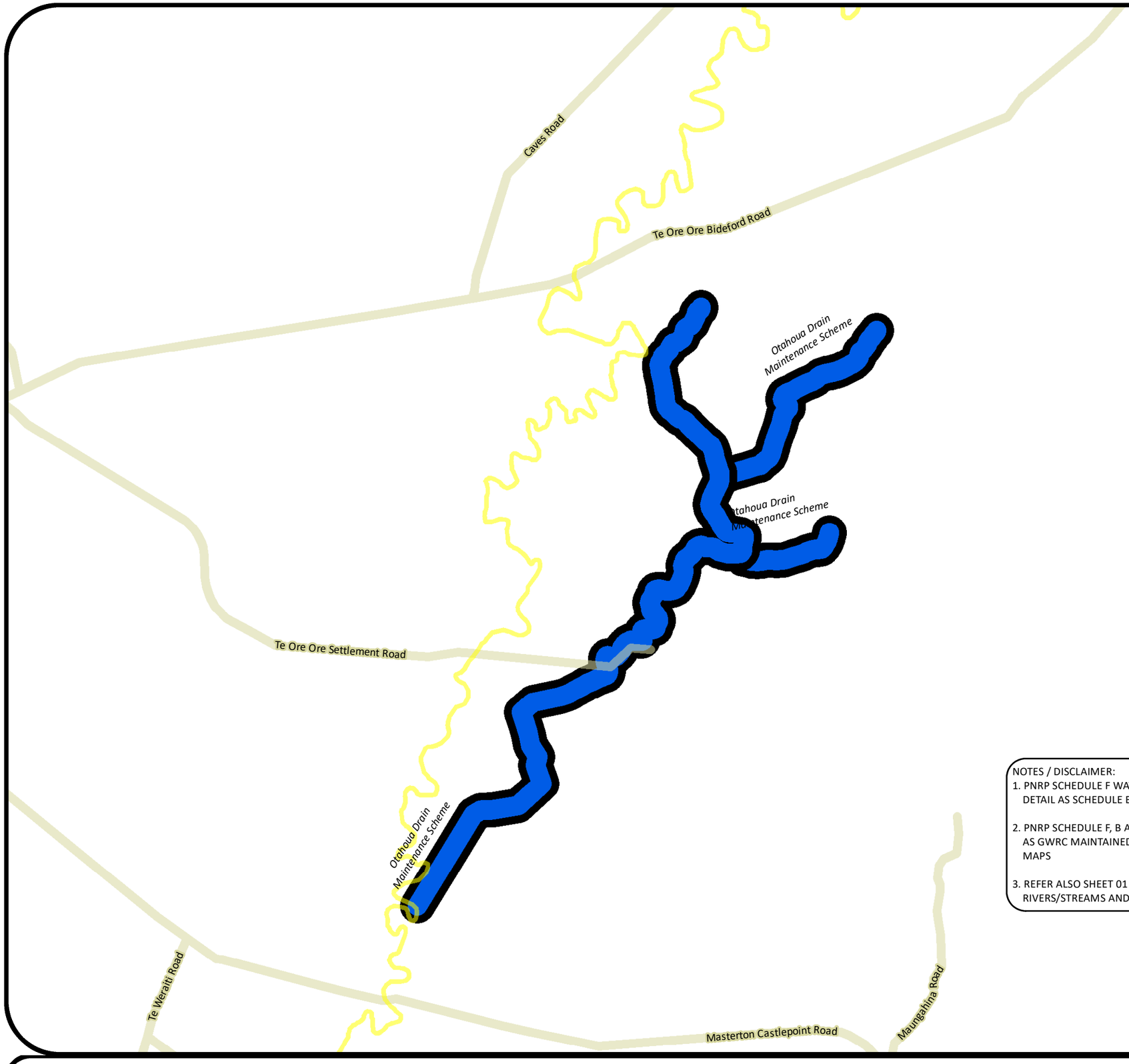
GRAVITY DRAINAGE SCHEME - MANAIA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 17b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:27:33 PM, 31/05/2022

0 150 300 600 Metres

A3 Scale : n.t.s.



Watercourse (Maintained by GW)

Schientific Wetlands

SCHEDULE E : Sites with significant historic heritage values

Historic Heritage Coastal Features

Historic Heritage Freshwater Site

SCHEDULE A : Outstanding Waterbodies

Lake

Wetland

SCHEDULE B : Ngā Taonga Nui a Kiwa

SCHEDULE C : Mana Whenua Sites of Significance

Ngā Hapū o Ōtaki

Ngāti Toa Rangātira

Taranaki Whānui ki te Upoko o te Ika a Maui

Te Ātiawa ki Whakarongotai

Wairarapa Iwi

SCHEDULE F : Ecosystems & habitats with significant indigenous biodiversity values

F1b : Inanga Spawning Habitat

F1 : Migratory Fish Habitat

F1 : Threatened or At Risk Fish Habitat

F1 : High Macroinvertebrate community health

F1 : Lakes

F1c : Lakes with Significant Aquatic Plants

F3 : Significant Natural Wetlands

F4 : Indigenous Biodiversity Coastal

F2 : Indigenous Bird Habitat

NOTES / DISCLAIMER:

1. PNRP SCHEDULE F WATERWAYS ARE NOT MAPPED SPATIALLY TO THE SAME LEVEL OF DETAIL AS SCHEDULE B OR C

2. PNRP SCHEDULE F, B AND C WATERWAYS ARE NOT MAPPED SPATIALLY AS ACCURATELY AS GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS AND STREAMS SHOWN ON PREVIOUS MAPS

3. REFER ALSO SHEET 01 TO 18 FOR EXTENT OF GWRC MAINTAINED (HIGHLY MODIFIED) RIVERS/STREAMS AND ASSOCIATED STREAM CLEARING METHOD

N

Greater Wellington
Te Pane Matua Taiao

OGRAVITY DRAINAGE SCHEME - TAHOUA PNRP SCHEDULES A,B, C & F

WATERWAY MAINTENANCE : **Sheet 18b of 18b**

Drawn : P.Cook, 26 May 2022
File Ref : Drainage Consent Ownership - PNRP_RevB.mxd
Plotted 1:28:58 PM, 31/05/2022

0 180 360 720 Metres

A3 Scale : n.t.s.

Appendix B: Vegetation and sediment condition rating guide of watercourses

Vegetation condition rating guide			
Condition rating	Description	Photo	Action
1	Vegetation cleared from the drain bed The drain's functioning is not restricted		Vegetation control not required Continue to monitor condition
2	Vegetation growing on less than 25% of the drain bed The drain's functioning is not restricted		Vegetation control not required Continue to monitor condition
3	Vegetation growing on between 25% and 50% of the drain bed The drain's functioning may be restricted. Vegetation may grow to become significantly restrictive in a few months.		Vegetation control required Monitor weather forecasts and plan for vegetation control before next significant rainfall or within the next 2 months

4	Vegetation growing on over 50% of the drain bed The drain's functioning is significantly restricted		Vegetation control required Monitor weather forecasts and plan for vegetation control before next significant rainfall or within the next month
5	Drain is completely choked by vegetation The drain's functioning is significantly restricted.		Vegetation control urgently required Monitor weather forecasts. Plan for vegetation control as soon as possible

Sediment level condition rating guide		
Condition rating	Description	Action
1	Sediment levels are less than x% of the depth of the drain Water levels (before rainfall) are more than x mm from the top of the bank Minor impact on the drain's capacity	Sediment removal not required. Continue to monitor condition
2	Sediment levels are more than x% of the depth of the drain Water levels (before rainfall) are less than x mm from the top of the bank	Sediment removal required. Continue to monitor condition

	Moderate impact on the drain's capacity	
3	Sediment levels are more than x% of the depth of the drain Water levels (before rainfall) are less than x mm from the top of the bank Moderate impact on the drain's capacity	Sediment removal not required. Continue to monitor condition

Date of inspection:	
Inspection undertaken by:	
Watercourse:	
Location:	
Priority (low/med/high):	
Condition rating (1-5):	
Further action required:	
Comments:	

Appendix C: Site Specific Effects Management

Site Specific Effects Management

Many river management activities have the potential for some short-term adverse impacts, but the significance of this needs to be considered in the context of the naturally dynamic river environment (where form and habitat are constantly changing and re-forming). The significance of effects also depends on factors such as the scale of disturbance, the values of a particular site, their sensitivity, and the time for recovery to pre-disturbance levels.

If a proposed activity or set of activities have the potential to generate significant adverse effects on the river environment at a specific site or within a specific reach, the activities may need to be conducted in accordance with a more detailed, Site Specific Effects Management Plan (SSEMP), in addition to the good management practices in section 10 of the Code.

The following activities, or activities within the following locations, will require an SSEMP to be prepared prior to any works, as set out in the conditions of the consent.

- **Construction of grade control structures**: the construction of grade control structures will require an SSEMP, regardless of the time of year, or projected level of disturbance.
- **Wet gravel extraction**: all wet gravel extraction will require an SSEMP, regardless of the time of year, or projected level of disturbance.
- **Mechanical clearance of bottom rooted plant community in low gradient streams**: will require an SSEMP. This includes activities that disturb the bottom of the steam but excludes the use of weed boats.
- **Waikanae Estuary Scientific Reserve:** all river management activities proposed to be undertaken within the Reserve will require an SSEMP.
- **Clearance of riparian vegetation with high ecological values:** the clearance of 100m^2 or more of high value riparian vegetation identified in the Operative Natural Resources Plan, GWRC's Key Native Ecosystems and Wetland Programmes, or by flood protection surveys as having significant indigenous biodiversity values will require an SSEMP.
- **Additional activities identified in an OMP**

For other activities, the method set out below outlines the process for determining when an SSEMP and site specific effects management is necessary, and if required, what it should include. This process should be read in conjunction with the relevant consent conditions.

Process for determining when site specific effects management is required

The five step process below combines:

- the potential risk for adverse effect;
- the scale of the proposed work; and
- the sensitivity of the site,

to determine whether site specific effects management is required to undertake an activity.

Step 1 – Identify activities with high potential for adverse impact

Activities classified as having a high potential for adverse impact are those where it is recognised that recovery of river habitat that is altered by those activities may take months

or possibly years (or possibly not at all). These include activities that cause extensive mechanical disturbance of the wetted riverbed, as listed in **Table 1**.

Table 1: High potential impact activities

High potential impact activities (wet channel)
• bed recontouring • channel diversion cuts • ripping in the wet channel • construction and repair of impermeable structures

Step 2 – Assign a magnitude to the proposed disturbance

For activities identified in Step 1, **Table 2** assigns a magnitude to the proposed disturbance, based on the length of riverbed affected and/or the amount of time involved.

Table 2: Scale of activity disturbance

Amount of proposed disturbance	Magnitude
• > 800m wetted riverbed length; and/or • > 80 hours in river works or >150 hours per 10 km reach.	**Large**
• 175m - 800m wetted riverbed length; and/or • 30 - 80 hours in river works or no more than 150 hours per 10 km reach.	**Moderate**
• < 175m wetted riverbed length; and/or • no more than 30 hours in river works or 150 hours per 10 km reach.	**Small**

Step 3 – Define sensitivity of habitat

Important habitats in terms of river ecology are defined as:

- inanga spawning habitat on the banks only from 1 January to 28 February (i.e. in the months prior to inanga spawning season) and on the banks and beds from 1 March to 31 May (i.e. during inanga spawning season);
- trout spawning habitat from 1 May to 31 October (i.e. during trout spawning season);
- native fish migration routes, particularly between 1 August and 31 December; and
- instream ecology in the actively flowing channel at times when river flows recedes below the minimum flows identified in the Operative Natural Resources Plan.

Table 3 assigns a relative sensitivity to disturbance ranking to these habitats.

The locations of these habitats in each river system are found in the 'affected area' columns in **Appendix 7**.

Table 3: Habitat sensitivity

Habitat type	Sensitivity
• inanga spawning habitat on the banks only from 1 January to 28 February • inanga spawning habitat on the banks and bed from 1 March to 31 May • trout spawning habitat from 1 May to 31 October • actively flowing channels during minimum flows	**Most**
• inanga spawning habitat from 1 June to 31 December • wetted channel utilised by migrating fish from 1 August to 31 December	**Intermediate**
• other instream habitats	**Least**

Step 4 – Determine risk of adverse impact

Table 4 can be used to determine the level of risk of adverse impact (high, medium or low) arising from river management activities at a specific site, based on a combination of the magnitude of disturbance proposed (determined from **Table 2**) and from the relative sensitivity of the work site (determined from **Table 3**).

Table 4: Risk of adverse impact of high potential impact activities

		Habitat sensitivity (from Table 3)		
Magnitude of disturbance (from Table 2)		**Most** • inanga spawning habitat on the banks only from 1 January to 28 February • inanga spawning habitat on the banks and bed from 1 March to 31 May • trout spawning habitat from 1 May to 31 October • actively flowing channels during minimum flows	**Intermediate** • inanga spawning habitat from 1 June to 31 December • the wetted channel utilised by migrating fish from 1 August to 31 December	**Least** • other instream habitats
	Large • > 800m wetted riverbed length; and/or • > 80 hours in river works or >150 hours per 10 km reach.	***High***	***High***	***High***
	Moderate • 175m - 800m wetted riverbed length; and/or • 30 - 80 hours of in-river works or no more than 150 hours per 10 km reach.	***High***	***Medium***	***Low***
	Small • < 175m wetted riverbed length; and/or • no more than 30 hours in-river works or 150 hours per 10 km reach.	***High***	***Low***	***Low***

Step 5 – Determine response based on risk of adverse impact

Table 5 below summarises the appropriate management responses applying according to the determined risk of adverse impact in **Table 4**.

Table 5: Required management responses based on risk of adverse impact

	Risk of adverse impact (from Table 4)		
	High	**Medium**	**Low**

Management Response	• A site specific before/after habitat assessment must be undertaken at each work site by the operations supervisor using the template at **Appendix 5**; • Preparation of a SSEMP; and • Works to follow all good management practices at section 10 of the Code (unless otherwise prescribed in the SSEMP).	• Works to follow all the good management practices at section 10 of the Code; and • A site specific before/after habitat assessment must be undertaken at each work site by the operations supervisor using the template at **Appendix 5**.	• No specific site management over and above the need for works to follow all the good management practices at section 10 of the Code.

Scope of SSEMPs

Each SSEMP must cover the following matters:

- describe the works proposed, including methodology and timing, noting that any changes must be discussed with all parties involved in the SSEMP preparation
- describe the necessity of the work (noting that necessity will usually be addressed at the Annual Work Plan stage – the Annual Work Plan must be consistent with the decision making framework at section 6 of the Code)
- include an assessment of the various options considered and reasons why undertaking the proposed activities is preferred
- include an assessment as to why the proposed activities are to be undertaken during the period specified and within that habitat, as applicable, and specific measures to remedy or mitigate effects of the proposed activities
- describe the site specific (event) monitoring that will be undertaken
- set out communication requirements with mana whenua, the Department of Conservation, Wellington Fish and Game Council and stakeholder groups specified in the consent conditions
- describe how the design channel and bed levels will be maintained
- describe how the mana whenua values of any kaitiaki sites have been taken into account
- include reporting requirements and site management responsibilities. It is expected that the various expert reports will inform the SSEMP
- include a suitably qualified expert's opinion of how appropriate steps will be taken to avoid, remedy or mitigate adverse effects.

SSEMPs will be prepared by Flood Protection staff and must include communication with relevant parties (who will be dependent on the particular values identified for the site) and certified by the Manager, Environment Regulation before work can commence. Advice will also be sought from a suitably qualified expert. The scope of site specific (event) monitoring is described at section 3 of the Environmental Monitoring Plan at **Appendix 3**.

Appendix D: General activity constraints calendars

General Activity Constraints Calendar – Te Awa Kairangi/Hutt River (including parts of the Akatarawa River, Stokes Valley, Speedy's and Te Mome Streams)

Value to be protected	Affected areas	Summer			Autumn			Winter			Spring		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Inanga spawning (refer section 10.3.10)	Tidally inundated riparian vegetation on: • Te Awa Kairangi/Hutt River between XS100 and XS210.	*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*	**Key sensitivity period – banks only** **1 January to 28 February** Preferably **avoid** disturbance of vegetation on bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.		**Key sensitivity period - bed and banks** **1 March to 31 May** Preferably **avoid** disturbance of vegetation on bed or bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.* Whitebait fishing season – 15 August to 30 November		
Trout spawning (refer section 10.3.10)	Actively flowing channel of: • Akatarawa River	*Follow general good practice*					**Key sensitivity period** **1 May to 31 October** Preferably **avoid** disturbance of the bed at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.						*Follow general good practice*
Peak native fish migration (refer section 10.3.10)	Actively flowing channel	→	*Follow general good practice*							**Key sensitivity period** **1 August to 31 December** → **Avoid** the mechanical clearance of silt and weed from low gradient waterways. **Limit** activities that disturb the wetted channel at these times to no more than 30 hours of in river works or 150 hours per 10 km reach. If these activities are unavoidable, follow requirements for site specific effects management as per **Appendix 2.**		
Instream ecology at times of low flow (refer section 10.3.10)	Actively flowing channel	As far as is practicable **avoid** work in the actively flowing channel during periods when the river flow recedes below the minimum flow specified in GWRC's Natural Resources Plan, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2.**											
River bird nesting (refer section 10.3.10)	Dry beaches of Te Awa Kairangi/Hutt River between: • XS310 and XS2270; and • XS2731 and XS2900.	→			*Follow general good practice*					**Key sensitivity period (nesting)** **1 August to 28 February** → Preferably **avoid** work on dry gravel beaches at these times, but if urgent works are required, works should be preceded by a survey carried out by a suitably qualified ecologist to identify the presence of banded dotterel, pied stilt and black-fronted dotterel nests or chicks. If nests or chicks are found during pre-works surveys, exclusion zones should be maintained at 100m from nests and 50m from chicks during activities causing continuous disturbance to habitat (e.g. beach contouring or gravel extraction). Vehicles must not be operated within 25m of any nests and chicks and the birds and nests should not be disturbed.		
Lizards and geckos (refer section 10.3.10)	River terrace manuka or kanuka scrub Native grassland Scree or boulder fields	If more than 100 m² of habitat type noted is to be disturbed, or if lizards and/or geckos are known or likely to be present at the site, a suitably qualified herpetologist **MUST** undertake a prior works survey to check for the presence of lizards and geckos within the affected site. IF any lizard or gecko species is identified in the survey, works must not proceed until Wildlife Act 1953 permits have been issued to distrub wildlife and a detailed plan is in place to avoid or mitigate any adverse effects of the works. (NB: it is a legal requirement to obtain a wildlife permit from the Department of Conservation before lizards and/or geckos are disturbed.)											
Safe machine operation (refer sections 10.3.4, 10.3.6 and 10.3.9)	Actively flowing channel and berms	→ For safety, activities in the actively flowing channel should avoid periods of high flow whenever possible. For control of turbidity in runoff, operation of machinery on berms should avoid times when ground conditions are extremely wet, whenever practicable.						Activities in actively flowing channel and on berms should be programmed outside this period whenever possible, for both safety reasons and control of sediment in runoff.		→			
Peak instream recreational use (refer section 10.3.12)	Active bed and berms	**Key sensitivity period** **1 December to 28 February** **Avoid** activities in the flowing channel and on berms on Saturdays, Sundays or public holidays at these times.			*Follow general good practice*								
Significant mana whenua values (Refer section 10.3.13)	River corridor	Operational Management Plans must identify significant mana whenua values and sites to be taken into account in work planning and method selection for each management reach.											

General Activity Constraints Calendar – Wainuiomata River and other watercourses not specifically identified Appendix 7

Value to be protected	Affected areas	Summer			Autumn			Winter			Spring		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Inanga spawning (refer section 10.3.10)	Tidally inundated riparian vegetation	*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*	**Key sensitivity period – banks only 1 January to 28 February** Preferably **avoid** disturbance of vegetation on bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.		**Key sensitivity period - bed and banks 1 March to 31 May** Preferably **avoid** disturbance of vegetation on bed or bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.* Whitebait fishing season – 15 August to 30 November		
Trout spawning (refer section 10.3.10)	Spawning habitat in the actively flowing channel	*Follow general good practice*						**Key sensitivity period 1 May to 31 October** Preferably **avoid** disturbance of the bed at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2.**					*Follow general good practice*
Peak native fish migration (refer section 10.3.10)	Actively flowing channel	→	*Follow general good practice*							**Key sensitivity period 1 August to 31 December** → **Avoid** the mechanical clearance of silt and weed from low gradient waterways. **Limit** activities that disturb the wetted channel at these times to no more than 30 hours of in river works or 150 hours per 10 km reach. If these activities are unavoidable, follow requirements for site specific effects management as per **Appendix 2.**		
Instream ecology at times of low flow (refer section 10.3.10)	Actively flowing channel	As far as is practicable **avoid** work in the actively flowing channel during periods when the river flow recedes below the minimum flow specified in GWRC's Natural Resources Plan, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2.**											
River bird nesting (refer section 10.3.10)	Dry beaches	→			*Follow general good practice*					**Key sensitivity period (nesting) 1 August to 28 February** → Preferably **avoid** work on dry gravel beaches at these times, but if urgent works are required, works should be preceded by a survey carried out by a suitably qualified ecologist to identify the presence of banded dotterel, pied stilt and black-fronted dotterel nests or chicks. If nests or chicks are found during pre-works surveys, exclusion zones should be maintained at 100m from nests and 50m from chicks during activities causing continuous disturbance to habitat (e.g. beach contouring or gravel extraction). Vehicles must not be operated within 25m of any nests and chicks and the birds and nests should not be disturbed.		
Lizards and geckos (refer section 10.3.10)	River terrace manuka or kanuka scrub Native grassland Scree or boulder fields	If more than 100 m^2 of habitat type noted is to be disturbed, or if lizards and/or geckos are known or likely to be present at the site, a suitably qualified herpetologist **MUST** undertake a prior works survey to check for the presence of lizards and geckos within the affected site. IF any lizard or gecko species is identified in the survey, works must not proceed until Wildlife Act 1953 permits have been issued to distrub wildlife and a detailed plan is in place to avoid or mitigate any adverse effects of the works. (NB: it is a legal requirement to obtain a wildlife permit from the Department of Conservation before lizards and/or geckos are disturbed.)											
Safe machine operation (refer sections 10.3.4, 10.3.6 and 10.3.9)	Actively flowing channel and berms	→ For safety, activities in the actively flowing channel should avoid periods of high flow whenever possible. For control of turbidity in runoff, operation of machinery on berms should avoid times when ground conditions are extremely wet, whenever practicable.						Activities in actively flowing channel and on berms should be programmed outside this period whenever possible, for both safety reasons and control of sediment in runoff.		→			
Peak instream recreational use (refer section 10.3.12)	Active bed and berms	**Key sensitivity period 1 December to 28 February** **Avoid** activities in the flowing channel and on berms on Saturdays, Sundays or public holidays at these times.			*Follow general good practice*								
Significant mana whenua values (Refer section 10.3.13)	River corridor	Operational Management Plans must identify significant mana whenua values and sites to be taken into account in work planning and method selection for each management reach.											

General Activity Constraints Calendar – Waikanae River (including parts of Waimeha and Ngarara Streams)

Value to be protected	Affected areas	Summer			Autumn			Winter			Spring		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Inanga spawning (refer section 10.3.10)	Tidally inundated riparian vegetation: • Waikanae River XS20 to XS110 and Waimeha Stream downstream of Ngarara Stream	*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*	**Key sensitivity period – banks only 1 January to 28 February** Preferably **avoid** disturbance of vegetation on bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.		**Key sensitivity period - bed and banks 1 March to 31 May** Preferably **avoid** disturbance of vegetation on bed or bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.* Whitebait fishing season – 15 August to 30 November		
Trout spawning (refer section 10.3.10)	Areas of trout spawning habitat in actively flowing channels	*Follow general good practice*					**Key sensitivity period 1 May to 31 October** Preferably **avoid** disturbance of the bed at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2.**						*Follow general good practice*
Peak native fish migration (refer section 10.3.10)	Actively flowing channel	→	*Follow general good practice*							**Key sensitivity period 1 August to 31 December** → **Avoid** the mechanical clearance of silt and weed from low gradient waterways. **Limit** activities that disturb the wetted channel at these times to no more than 30 hours of in river works or 150 hours per 10 km reach. If these activities are unavoidable, follow requirements for site specific effects management as per **Appendix 2.**		
Instream ecology at times of low flow (refer section 10.3.10)	Actively flowing channel	As far as is practicable **avoid** work in the actively flowing channel during periods when the river flow recedes below the minimum flow specified in GWRC's Natural Resources Plan, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2.**											
River bird nesting (refer section 10.3.10)	Dry beaches	→			*Follow general good practice*					**Key sensitivity period (nesting) 1 August to 28 February** → Preferably **avoid** work on dry gravel beaches at these times, but if urgent works are required, works should be preceded by a survey carried out by a suitably qualified ecologist to identify the presence of banded dotterel, pied stilt and black-fronted dotterel nests or chicks. If nests or chicks are found during pre-works surveys, exclusion zones should be maintained at 100m from nests and 50m from chicks during activities causing continuous disturbance to habitat (e.g. beach contouring or gravel extraction). Vehicles must not be operated within 25m of any nests and chicks and the birds and nests should not be disturbed.		
Lizards and geckos (refer section 10.3.10)	River terrace manuka or kanuka scrub Native grassland Scree or boulder fields	If more than 100 m² of habitat type noted is to be disturbed, or if lizards and/or geckos are known or likely to be present at the site, a suitably qualified herpetologist **MUST** undertake a prior works survey to check for the presence of lizards and geckos within the affected site. IF any lizard or gecko species is identified in the survey, works must not proceed until Wildlife Act 1953 permits have been issued to distrub wildlife and a detailed plan is in place to avoid or mitigate any adverse effects of the works. (NB: it is a legal requirement to obtain a wildlife permit from the Department of Conservation before lizards and/or geckos are disturbed.)											
Safe machine operation (refer sections 10.3.4, 10.3.6 and 10.3.9)	Actively flowing channel and berms	→ For safety, activities in the actively flowing channel should avoid periods of high flow whenever possible. For control of turbidity in runoff, operation of machinery on berms should avoid times when ground conditions are extremely wet, whenever practicable.						Activities in actively flowing channel and on berms should be programmed outside this period whenever possible, for both safety reasons and control of sediment in runoff.			→		
Peak instream recreational use (refer section 10.3.12)	Active bed and berms	**Key sensitivity period 1 December to 28 February** **Avoid** activities in the flowing channel and on berms on Saturdays, Sundays or public holidays at these times.			*Follow general good practice*								
Significant mana whenua values (Refer section 10.3.13)	River corridor	Operational Management Plans must identify significant mana whenua values and sites to be taken into account in work planning and method selection for each management reach.											

General Activity Constraints Calendar – Ōtaki River (including Rangiuru/Ngatoko Streams and Katihiku/Pahiko Drains)

Value to be protected	Affected areas	Summer			Autumn			Winter			Spring		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Inanga spawning (refer section 10.3.10)	Tidally inundated riparian vegetation on: • Ōtaki River XS20 to XS120, • Rangiuru/Ngatoko Streams, and • Katihiku/Pahiko Drains)	*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*	**Key sensitivity period – banks only** **1 January to 28 February** Preferably **avoid** disturbance of vegetation on bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.		**Key sensitivity period - bed and banks** **1 March to 31 May** Preferably **avoid** disturbance of vegetation on bed or bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.* Whitebait fishing season – 15 August to 30 November		
Peak native fish migration (refer section 10.3.10)	Actively flowing channel	→	*Follow general good practice*							**Key sensitivity period** **1 August to 31 December** → **Avoid** the mechanical clearance of silt and weed from low gradient waterways. **Limit** activities that disturb the wetted channel at these times to no more than 30 hours of in river works or 150 hours per 10 km reach. If these activities are unavoidable, follow requirements for site specific effects management as per **Appendix 2.**		
Instream ecology at times of low flow (refer section 10.3.10)	Actively flowing channel	As far as is practicable **avoid** work in the actively flowing channel during periods when the river flow recedes below the minimum flow specified in GWRC's Natural Resources Plan, or if unavoidable, follow requirements for site-specific effects management as per **Appendix 2.**											
River bird nesting (refer section 10.3.10)	Dry beaches	→			*Follow general good practice*					**Key sensitivity period (nesting)** **1 August to 28 February** → Preferably **avoid** work on dry gravel beaches at these times, but if urgent works are required, works should be preceded by a survey carried out by a suitably qualified ecologist to identify the presence of banded dotterel, pied stilt and black-fronted dotterel nests or chicks. If nests or chicks are found during pre-works surveys, exclusion zones should be maintained at 100m from nests and 50m from chicks during activities causing continuous disturbance to habitat (e.g. beach contouring or gravel extraction). Vehicles must not be operated within 25m of any nests and chicks and the birds and nests should not be disturbed.		
Lizards and geckos (refer section 10.3.10)	River terrace manuka or kanuka scrub Native grassland Scree or boulder fields	If more than 100 m² of habitat type noted is to be disturbed, or if lizards and/or geckos are known or likely to be present at the site, a suitably qualified herpetologist **MUST** undertake a prior works survey to check for the presence of lizards and geckos within the affected site. IF any lizard or gecko species is identified in the survey, works must not proceed until Wildlife Act 1953 permits have been issued to distrub wildlife and a detailed plan is in place to avoid or mitigate any adverse effects of the works. (NB: it is a legal requirement to obtain a wildlife permit from the Department of Conservation before lizards and/or geckos are disturbed.)											
Safe machine operation (refer sections 10.3.4, 10.3.6 and 10.3.9)	Actively flowing channel and berms	→ For safety, activities in the actively flowing channel should avoid periods of high flow whenever possible. For control of turbidity in runoff, operation of machinery on berms should avoid times when ground conditions are extremely wet, whenever practicable.						Activities in actively flowing channel and on berms should be programmed outside this period whenever possible, for both safety reasons and control of sediment in runoff.		→			
Peak instream recreational use (refer section 10.3.12)	Active bed and berms	**Key sensitivity period** **1 December to 28 February** **Avoid** activities in the flowing channel and on berms on Saturdays, Sundays or public holidays at these times.			*Follow general good practice*								
Significant mana whenua values (Refer section 10.3.13)	River corridor	Operational Management Plans must identify significant mana whenua values and sites to be taken into account in work planning and method selection for each management reach.											

General Activity Constraints Calendar – Rivers in the Wairarapa Valley

Value to be protected	Affected areas	Summer			Autumn			Winter			Spring		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Inanga spawning (refer section 10.3.10)	Tidally inundated riparian vegetation	*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*	**Key sensitivity period – banks only 1 January to 28 February** Preferably **avoid** disturbance of vegetation on bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.		**Key sensitivity period - bed and banks 1 March to 31 May** Preferably **avoid** disturbance of vegetation on bed or bank edges at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2**.			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.*			*Follow general good practice and requirements for site specific effects management as per **Appendix 2**.* Whitebait fishing season – 15 August to 30 November		
Trout spawning (refer section 10.3.10)	Actively flowing channels of the: • Mangatarere, • Kaipatangata, • Enaki, • Waipoua, • Kopuaranga, • Huangarua • Tauherenikau rivers	*Follow general good practice*			**Key sensitivity period 1 May to 31 October** Preferably **avoid** disturbance of the bed at these times, or if unavoidable, follow requirements for site specific effects management as per **Appendix 2.**								*Follow general good practice*
Peak native fish migration (refer section 10.3.10)	Actively flowing channel	→	*Follow general good practice*								**Key sensitivity period 1 August to 31 December** → **Avoid** the mechanical clearance of silt and weed from low gradient waterways. **Limit** activities that disturb the wetted channel at these times to no more than 30 hours of in river works or 150 hours per 10 km reach. If these activities are unavoidable, follow requirements for site specific effects management as per **Appendix 2.**		
Instream ecology at times of low flow (refer section 10.3.10)	Actively flowing channel	As far as is practicable **avoid** work in the actively flowing channel during periods when the river flow recedes below the minimum flow specified in GWRC's Natural Resources Plan, or if unavoidable, follow requirements for site-specific effects management as per **Appendix 2.**											
River bird nesting (refer section 10.3.10)	Dry beaches	→			*Follow general good practice*						**Key sensitivity period (nesting) 1 August to 28 February** → Preferably **avoid** work on dry gravel beaches at these times, but if urgent works are required, works should be preceded by a survey carried out by a suitably qualified ecologist to identify the presence of banded dotterel, pied stilt and black-fronted dotterel nests or chicks. If nests or chicks are found during pre-works surveys, exclusion zones should be maintained at 100m from nests and 50m from chicks during activities causing continuous disturbance to habitat (e.g. beach contouring or gravel extraction). Vehicles must not be operated within 25m of any nests and chicks and the birds and nests should not be disturbed.		
Lizards and geckos (refer section 10.3.10)	River terrace manuka or kanuka scrub Native grassland Scree or boulder fields	If more than 100 m² of habitat type noted is to be disturbed, or if lizards and/or geckos are known or likely to be present at the site, a suitably qualified herpetologist **MUST** undertake a prior works survey to check for the presence of lizards and geckos within the affected site. IF any lizard or gecko species is identified in the survey, works must not proceed until Wildlife Act 1953 permits have been issued to distrub wildlife and a detailed plan is in place to avoid or mitigate any adverse effects of the works. (NB: it is a legal requirement to obtain a wildlife permit from the Department of Conservation before lizards and/or geckos are disturbed.)											
Safe machine operation (refer sections 10.3.4, 10.3.6 and 10.3.9)	Actively flowing channel and berms	→ For safety, activities in the actively flowing channel should avoid periods of high flow whenever possible. For control of turbidity in runoff, operation of machinery on berms should avoid times when ground conditions are extremely wet, whenever practicable.						Activities in actively flowing channel and on berms should be programmed outside this period whenever possible, for both safety reasons and control of sediment in runoff.			→		
Peak instream recreational use (refer section 10.3.12)	Active bed and berms	**Key sensitivity period 1 December to 28 February** **Avoid** activities in the flowing channel and on berms on Saturdays, Sundays or public holidays at these times.			*Follow general good practice*								
Significant mana whenua values (Refer section 10.3.13)	River corridor	Operational Management Plans must identify significant mana whenua values and sites to be taken into account in work planning and method selection for each management reach.											

Appendix E Records of consultation

Wairarapa Gravity Drainage Schemes

Ahikouka Drain

Parcel ID	Legal Description	Location
4032009	Lot 1 DP 90642	90 Ahikouka Road Greytown
6526508	Lot 3 DP 302963	106A Ahikouka Road Greytown
7031827	Part Lot 5 DP 6122	State Highway 2 Greytown
7460560	Part Section 275 Taratahi DIST	Jellicoe Street Greytown
3841279	Lot 15 DP 1100	146 Ahikouka Road Greytown
3921720	Part Lot 16 DP 1100	146 Ahikouka Road Greytown
4002119	Lot 17 DP 1100	146 Ahikouka Road Greytown
4009773	Lot 14 DP 1100	146 Ahikouka Road Greytown
7949982	Lot 2 DP 531248	
4018718	Lot 1 DP 81553	72 Ahikouka Road Greytown
3936248	Lot 3 DP 76094	Ahikouka Road Greytown
3828837	Lot 2 DP 84446	14 Ahikouka Road Greytown
6526509	Lot 5 DP 302963	106B Ahikouka Road Greytown
6526510	Lot 6 DP 302963	106 Ahikouka Road Greytown
3795787	Lot 3 DP 83783	Ahikouka Road Greytown
3933361	Part Lot 2 DP 3052	2576 State Highway 2 Greytown
3925494	Lot 1 DP 62862	Ahikouka Road Greytown
3933428	Part Ahikouka South B Block	
3865020	Lot 1 DP 84099	65 Ahikouka Road Greytown
6535225	Lot 1 DP 304294	2600 State Highway 2 Greytown
3920469	Lot 2 DP 62200	112 Ahikouka Road Greytown
3923276	Lot 1 DP 62200	112 Ahikouka Road Greytown

Battersea Drain

Parcel ID	Legal Description	Location
4045624	Lot 2 DP 41260	84 Phillips Line Greytown
3785845	Part Section 1 Block VIII Wairarapa SD	412 Kahutara Road Featherston
3804399	Section 23 Moroa SETT	229 Battersea Road Martinborough
6698946	Lot 1 DP 337526	2521A Wards Line Martinborough
6571399	Lot 1 DP 310472	283 Battersea Road Greytown
3901513	Lot 1 DP 64855	Wards Line Martinborough
7770821	Lot 1 DP 509322	108 Phillips Line Featherston
4018761	Lot 4 DP 32240	88 Duddings Line Featherston
3871077	Part Section 2 Pahautea SETT	392 Te Maire Road Featherston
3768790	Section 5 SO 19235	618 Wards Line Featherston
3786197	Part Lot 1 DP 51369	618 Wards Line Featherston
3797877	Lot 13 DEEDS 224	618 Wards Line Featherston
3814847	Part Section 19 Moroa DIST	618 Wards Line Featherston
3838235	Part Section 87 Moroa DIST	618 Wards Line Featherston
3928029	Part Section 20 Moroa DIST	618 Wards Line Featherston
3968209	Lot 1 DP 32466	618 Wards Line Featherston
4007850	Part Lot 1 DP 6992	618 Wards Line Featherston

Battersea Drain

Parcel ID	Legal Description	Location
4008420	Section 3 SO 19235	618 Wards Line Featherston
7745374	Lot 5 DP 501191	434 Wards Line Greytown
3976904	Lot 1 DP 85988	2246 Kahutara Road Featherston
3750614	Lot 1 DP 89807	123 Battersea Road Martinborough
3899146	Lot 1 DP 79407	Wards Line Martinborough
4020586	Lot 3 DP 41260	76 Phillips Line Greytown
7432047	Lot 1 DP 451235	255 Battersea Road Martinborough
3747089	Part Section 65 Moroa DIST	127 Wards Line Martinborough
3824373	Lot 1 DP 21460	127 Wards Line Martinborough
6569719	Lot 1 DP 309117	Wards Line Martinborough
6569721	Lot 3 DP 309117	479 Bidwills Cutting Road Greytown
3991527	Section 3 Block VIII Wairarapa SD	250 Te Maire Road Featherston
3811723	Lot 1 DP 61229	86 Bicknells Road Featherston
3770708	Lot 1 DEEDS 181	162 Wards Line Greytown
3979635	Lot 2 DEEDS 181	162 Wards Line Greytown
3986902	Lot 3 DEEDS 181	162 Wards Line Greytown
4002268	Part Lot 4 DEEDS 181	162 Wards Line Greytown
4000495	Lot 3 DP 32240	Duddings Line Featherston
3901511	Part Section 16 Moroa DIST	4 Wards Line Martinborough
4000346	Section 55 Pahautea SETT	Kahutara Road Featherston
3749013	Part Section 46 Greytown SM FM SETT	224 Bidwills Cutting Road Greytown
3786586	Part Section 44 Greytown SM FM SETT	224 Bidwills Cutting Road Greytown
3836838	Section 54 Greytown SM FM SETT	224 Bidwills Cutting Road Greytown
3962017	Section 53 Greytown SM FM SETT	224 Bidwills Cutting Road Greytown
4009366	Part Section 47 Greytown SM FM SETT	224 Bidwills Cutting Road Greytown
4029935	Part Section 45 Greytown SM FM SETT	224 Bidwills Cutting Road Greytown
4050741	Part Section 48 Greytown SM FM SETT	312 Bidwills Cutting Road Greytown
7500371	Lot 3 DP 468232	312 Bidwills Cutting Road Greytown
4043921	Lot 1 DP 51748	430 Bidwills Cutting Road Martinborough
3773544	Lot 1 DEEDS 224	265 Phillips Line Featherston
3827149	Part Section 26 Moroa DIST	359 Phillips Line Featherston
3888169	Part Lot 1 DEEDS 450	359 Phillips Line Featherston
3961233	Lot 2 DEEDS 224	265 Phillips Line Featherston
4048173	Lot 4 DEEDS 224	359 Phillips Line Featherston
7469582	Lot 1 DP 465088	1179-1179A State Highway 53 Martinborough
3921573	Lot 1 DP 66196	412 Fabians Road Greytown
3992792	Part Section 15 Moroa SETT	Moroa Road Martinborough
3786664	Lot 5 DEEDS 224	122 Fenwicks Line Greytown
3816975	Lot 9 DEEDS 224	122 Fenwicks Line Greytown
3920860	Lot 8 DEEDS 224	122 Fenwicks Line Greytown
3968061	Lot 10 DEEDS 224	122 Fenwicks Line Greytown
4026806	Lot 6 DEEDS 224	122 Fenwicks Line Greytown
4033972	Lot 7 DEEDS 224	122 Fenwicks Line Greytown
7469583	Lot 2 DP 465088	1174 State Highway 53 Martinborough

Battersea Drain

Parcel ID	Legal Description	Location
3920557	Part Section 66 Moroa DIST	301 Wards Line Martinborough
6561553	Lot 2 DP 308852	459 BIDWILLS CUTTING RD greytown
6561554	Lot 2 DP 308852	459 BIDWILLS CUTTING RD greytown
3758589	Part Section 26 Moroa DIST	793 State Highway 53 Featherston
6854421	Lot 2 DP 366150	182 Wards Line Martinborough
7745371	Lot 2 DP 501191	460 Wards Line Martinborough
3977774	Lot 2 DP 89644	Bidwills Cutting Road Martinborough
8080162	Lot 2 DP 536255	
6534755	Lot 4 DP 303986	886A Bidwills Cutting Road Martinborough
3759524	Lot 2 DEEDS 450	839 State Highway 53 Featherston
4031568	Part Section 77 Moroa DIST	745 State Highway 53 Featherston
6854420	Lot 1 DP 366150	210 Wards Line Martinborough
3879513	Part Section 90 Moroa DIST	
3908465	Part Section 106 Moroa DIST	State Highway 53 Featherston
3970774	Part Section 91 Moroa DIST	State Highway 53 Featherston
4040353	Lot 2 DP 51369	State Highway 53 Featherston
4051402	Part Section 90 Moroa DIST	State Highway 53 Featherston
8080161	Lot 1 DP 536255	1110 State Highway 53 Featherston
3835898	Part Owhanga Block	State Highway 53 Featherston
7770822	Lot 2 DP 509322	110 Phillips Line Featherston
6698947	Lot 2 DP 337526	13 Wards Line Martinborough
3759545	Part Section 89 Moroa DIST	Wards Line Martinborough
3761309	Part Section 120 Moroa DIST	Wards Line Martinborough
3761357	Lot 1 DP 72078	419 Wards Line Greytown
3812689	Part Section 68 Moroa DIST	296 Wards Line Martinborough
3824639	Part Section 88 Moroa DIST	296 Wards Line Martinborough
3841591	Part Section 68 Moroa DIST	296 Wards Line Martinborough
3859607	Part Lot 12 DEEDS 181	296 Wards Line Martinborough
3859612	Part Lot 11 DEEDS 181	296 Wards Line Martinborough
3886446	Section 67 Moroa DIST	296 Wards Line Martinborough
4002451	Lot 2 DP 6548	296 Wards Line Martinborough
4039508	Lot 1 DP 90225	Wards Line Martinborough
4051374	Lot 1 DP 50347	Wards Line Martinborough
4056664	Part Section 87 Moroa DIST	Wards Line Martinborough
4058348	Section 121 Moroa DIST	296 Wards Line Martinborough
4065993	Lot 1 DP 89852	296 Wards Line Martinborough
4065997	Lot 1 DP 6548	296 Wards Line Martinborough
7315155	Lot 2 DP 437298	296 Wards Line Martinborough
4062450	Lot 1 DP 83820	49 Wards Line Martinborough
7745370	Lot 1 DP 501191	464 Wards Line Martinborough
3950754	Part Lot 1 DP 6992	595 Wards Line Martinborough
3761183	Part Section 21 Moroa SETT	Battersea Road Martinborough
6571400	Lot 2 DP 310472	228 Battersea Road Featherston
7315154	Lot 1 DP 437298	228 Battersea Road Featherston

Battersea Drain

Parcel ID	Legal Description	Location
7432048	Lot 2 DP 451235	228 Battersea Road Featherston
3972006	Lot 1 DP 76032	177 Battersea Road Martinborough
3898813	Lot 2 DP 14285	Wards Line Martinborough
3905185	Lot 3 DP 78705	1 Pharazyns Road Featherston
6569722	Lot 4 DP 309117	541 Bidwills Cutting Road Greytown
3907578	Part Lot 15 DP 877	Bidwills Cutting Road Greytown
3815238	Lot 2 DP 32240	796 State Highway 53 Featherston
3827149	Part Section 26 Moroa DIST	796 State Highway 53 Featherston
7575263	Lot 2 DP 482506	Battersea Road Martinborough
3823145	Section 42 Pahautea SETT	2344 Kahutara Road Featherston
4066012	Lot 6 DP 78705	Duddings Line Featherston
3985592	Lot 2 DP 89681	264 Phillips Line Featherston
3985277	Lot 1 DP 12740	848 Bidwills Cutting Road Greytown
3994794	Lot 1 DP 41260	120 Phillips Line Greytown
4062445	Part Section 64 Moroa DIST	176 Wards Line Martinborough
6534754	Lot 3 DP 303986	886 Bidwills Cutting Road Martinborough
3840528	Part Section 91 Moroa DIST	State Highway 53 Featherston
3924841	Lot 9 DP 82707	State Highway 53 Featherston
7020188	Lot 1 DP 389792	State Highway 53 Featherston
6696465	Lot 1 DP 337109	529 Bidwills Cutting Road Greytown
3903538	Part Section 72 Moroa DIST	198 Wards Line Greytown
3961710	Part Section 61 Moroa DIST	304 No 1 Line Featherston
3905180	Lot 5 DP 78705	Phillips Line Featherston
7575262	Lot 1 DP 482506	101 Battersea Road Martinborough
3824659	Lot 1 DP 89681	2214B Phillips Line Featherston
3816975	Lot 9 DEEDS 224	100 Fenwicks Line Greytown
3817282	Part Lot 7 DEEDS 181	Wards Line Martinborough
3861804	Section 19 Moroa SETT	157 Battersea Road Martinborough
6655678	Lot 1 DP 328222	35 Battersea Road Martinborough
6655679	Lot 2 DP 328222	Battersea Road Martinborough
7745372	Lot 3 DP 501191	Wards Line Martinborough
7745373	Lot 4 DP 501191	Wards Line Martinborough
3782353	Section 7 Block VIII Wairarapa SD	222 Te Maire Road Featherston
3920880	Section 9 Block VIII Wairarapa SD	222 Te Maire Road Featherston
3992990	Section 5 Block VIII Wairarapa SD	222 Te Maire Road Featherston
4003977	Section 6 Block VIII Wairarapa SD	222 Te Maire Road Featherston
3803779	Section 20 Moroa SETT	162 Wards Line Greytown
3824375	Part Section 66 Moroa DIST	2527 Wards Line Martinborough
3901275	Lot 8 DEEDS 181	2527 Wards Line Martinborough
3916517	Lot 2 DP 2608	2527 Wards Line Martinborough
4058387	Lot 9 DEEDS 181	2527 Wards Line Martinborough
3991831	Part Section 2 Block VIII Wairarapa SD	Bicknells Road Featherston
3782875	Lot 2 DP 22068	191 No 1 Line Featherston
3854631	Part Kaitara Block	47 Glenmorven Road Greytown

Battersea Drain

Parcel ID	Legal Description	Location
7242556	Lot 1 DP 420621	Bidwills Cutting Road Greytown
7242557	Lot 2 DP 420621	47 Glenmorven Road Greytown
3750574	Part Section 42A Greytown SM FM SETT	381 Bidwills Cutting Road Greytown
6696466	Lot 2 DP 337109	535 Bidwills Cutting Road Greytown
3748076	Lot 2 DP 40480	112 Wards Line Martinborough
3901508	Part Section 16 Moroa DIST	112 Wards Line Martinborough
3919798	Lot 1 DP 40480	112 Wards Line Martinborough
3951830	Lot 1 DP 14285	112 Wards Line Martinborough
4055606	Lot 2 DP 30218	112 Wards Line Martinborough
4062445	Part Section 64 Moroa DIST	112 Wards Line Martinborough
7575264	Lot 3 DP 482506	112 Wards Line Martinborough
3745801	Lot 8 DP 991	18 Pharazyns Road Featherston
3757433	Lot 3 DEEDS 224	18 Pharazyns Road Featherston
3953652	Lot 9 DP 991	18 Pharazyns Road Featherston
6534756	Lot 5 DP 303986	Bidwills Cutting Road Martinborough
3785845	Part Section 1 Block VIII Wairarapa SD	50 Bicknells Road Featherston
3841615	Part Lot 12 DEEDS 224	839A State Highway 53 Featherston
3964327	Lot 11 DEEDS 224	839A State Highway 53 Featherston
3952639	Part Lot 2 DP 50347	176A Wards Line Martinborough

East Pukio Drain

Parcel ID	Legal Description	Location
3854261	Section 19 Block XVI Wairarapa SD	756 Lake Ferry Road Martinborough
4027814	Lot 2 DP 88335	756 Lake Ferry Road Martinborough
4045587	Part Lot 1 DP 10964	Lake Ferry Road Martinborough
6688517	Lot 2 DP 334824	Lake Ferry Road Martinborough
4064504	Section 31 Block XVI Wairarapa SD	759 Lake Ferry Road Martinborough
3755071	Part Pukio 2 Block	150 Pukio East Road Martinborough
3927549	Part Pukio 1 Block	150 Pukio East Road Martinborough
3932456	Section 103 Wharekaka DIST	150 Pukio East Road Martinborough
3933135	Section 22 Block XVI Wairarapa SD	150 Pukio East Road Martinborough
4002860	Part Pukio 3 Block	150 Pukio East Road Martinborough
6717055	Lot 2 DP 341592	150 Pukio East Road Martinborough
6935940	Lot 9 DP 373573	150 Pukio East Road Martinborough

Longbush Drain

Parcel ID	Legal Description	Location
3774357	Lot 1 DP 18109	Riddells Road
3956867	Lot 1 DP 81677	30 Riddells Road
4017098	Lot 3 DP 18109	Riddells Road
4063811	Lot 5 DP 18109	Riddells Road
3745522	Lot 1 DP 80206	502 Millars Road
3745526	Lot 2 DP 80206	502 Millars Road

Longbush Drain

Parcel ID	Legal Description	Location
3745528	Lot 3 DP 80206	502 Millars Road
6523844	Lot 1 DP 302653	502 Millars Road
3825593	Lot 4 DP 80206	1284 Longbush Road
6709084	Lot 3 DP 339329	1284 Longbush Road
3774357	Lot 1 DP 18109	Riddells Road
3949990	Lot 1 DP 75694	Riddells Road
4017098	Lot 3 DP 18109	Riddells Road
4045891	Part Section 40 Ahiaruhe DIST	Riddells Road
4053443	Part Section 40 Ahiaruhe DIST	Riddells Road
4063811	Lot 5 DP 18109	Riddells Road
7145510	Lot 1 DP 414571	1023 Longbush Road
4000898	Lot 1 DP 52811	5 Eringa Road
6709082	Lot 1 DP 339329	5 Eringa Road
6916673	Lot 2 DP 378545	1053A Longbush Road
3809635	Part Lot 3 DP 6030	1510 Longbush Road
7767993	Lot 3 DP 505727	1510 Longbush Road
3857085	Lot 1 DP 61851	1049 Longbush Road
6916674	Lot 3 DP 378545	1053 Longbush Road
6709083	Lot 2 DP 339329	300 Eringa Road
3757514	Lot 2 DP 75694	1142 Longbush Road
3882884	Part Section 2 Block VIII Huangarua SD	1142 Longbush Road
3962511	Part Section 3 Block VIII Huangarua SD	1142 Longbush Road
6916672	Lot 1 DP 378545	1065 Longbush Road
6835466	Lot 2 DP 364622	1190 Longbush Road
3799688	Lot 2 DP 71063	Longbush Road
3818596	Lot 3 DP 71063	Longbush Road
4049193	Lot 3 DP 29156	Longbush Road
7767994	Lot 4 DP 505727	1496 Longbush Road
3825719	Lot 4 DP 86678	1077 Longbush Road
7145511	Lot 2 DP 414571	1017 Longbush Road
6835465	Lot 1 DP 364622	1188 Longbush Road

Manaia Drain

Parcel ID	Legal Description	Location
3807242	Lot 1 DP 45880	293 Manaia Road RD 5 Masterton
3999324	Lot 2 DP 77480	48C Nursery Road Masterton
6523280	Part Section 129 Masterton Small Farm SETT	45 Holdsworth Road Masterton
6874674	Lot 1 DP 366743	45 Holdsworth Road Masterton
3856886	Lot 3 DP 45880	329 Manaia Road RD 5 Masterton
4002492	Part Section 31 Manaia DIST	143 Manaia Road RD 5 Masterton
3842256	Lot 1 DP 61819	47 Holdsworth Road Masterton
3985884	Lot 1 DP 52885	256 Manaia Road RD 5 Masterton
4046001	Lot 1 DP 63354	191 Manaia Road RD 5 Masterton

Manaia Drain

Parcel ID	Legal Description	Location
3890270	Section 99 Manaia DIST	200 Manaia Road RD 5 Masterton
4026412	Part Section 17 Manaia DIST	150 Manaia Road RD 5 Masterton
6579617	Lot 1 DP 312281	248 Manaia Road RD 5 Masterton
6579618	Lot 2 DP 312281	208 Manaia Road RD 5 Masterton
3841648	Lot 1 DP 77287	109 Nursery Road Masterton
3970930	Section 97 Manaia DIST	310A Manaia Road RD 5 Masterton
3949557	Lot 2 DP 45726	283 Manaia Road RD 5 Masterton
4003092	Part Section 11 Masterton SM FM SETT	211-231 Queen Street Masterton
3782096	Lot 1 DP 89591	190 Manaia Road RD 5 Masterton
3810029	Section 106 Manaia DIST	Manaia Road RD 5 Masterton
3813071	Lot 1 DP 87088	Manaia Road RD 5 Masterton
3890547	Lot 1 DP 63336	139A Makoura Road Masterton
7854862	Lot 3 DP 511563	354C Manaia Road RD 5 Masterton
3750791	Lot 2 DP 80429	243 Manaia Road RD 5 Masterton
3786293	Lot 2 DP 63354	191B Manaia Road RD 5 Masterton
3810029	Section 106 Manaia DIST	115 South Road Masterton
3813071	Lot 1 DP 87088	115 South Road Masterton
3985887	Section 16 Manaia DIST	134 Manaia Road RD 5 Masterton
3752159	Lot 1 DP 88046	9 Andrew Street Masterton
4012592	Lot 2 DP 45880	313 Manaia Road RD 5 Masterton
3766302	Lot 1 DP 52627	221 Manaia Road RD 5 Masterton
3810467	Lot 3 DP 51881	21 Andrew Street Masterton
3848048	Section 107 Manaia DIST	63 Manaia Road RD 5 Masterton
3991779	Lot 4 DP 80429	243D Manaia Road RD 5 Masterton
3985885	Part Section 20 Manaia DIST	262A Manaia Road RD 5 Masterton
3883793	Lot 7 DP 89591	172 Manaia Road RD 5 Masterton
3982003	Part Section 100 Manaia DIST	208 Manaia Road RD 5 Masterton
3911405	Lot 1 DP 80429	243C Manaia Road RD 5 Masterton
3824947	Lot 1 DP 52995	88 Manaia Road RD 5 Masterton
3905939	Lot 1 DP 54018	110 Manaia Road RD 5 Masterton
8044300	Lot 3 DP 540772	218 Te Whiti Road RD 5 Masterton
3778331	Lot 2 DP 86408	294 Manaia Road RD 5 Masterton
3769450	Lot 1 DP 18457	143 Makoura Road Masterton
3911404	Lot 3 DP 80429	243A Manaia Road RD 5 Masterton
6523278	Lot 1 DP 302638	39 Holdsworth Road Masterton
7854861	Lot 2 DP 511563	354A Manaia Road RD 5 Masterton
3944238	Part Lot 2 DP 56039	Manaia Road RD 5 Masterton
3875343	Lot 2 DP 89591	172E Manaia Road RD 5 Masterton
3789155	Lot 2 DP 51881	31 Andrew Street Masterton
4018114	Lot 2 DP 63336	141 Makoura Road Masterton
4018105	Section 30 Manaia DIST	137 Manaia Road RD 5 Masterton
3758347	Lot 5 DP 80429	243B Manaia Road RD 5 Masterton
3840154	Lot 6 DP 80429	
4046001	Lot 1 DP 63354	191A Manaia Road RD 5 Masterton

Manaia Drain

Parcel ID	Legal Description	Location
3765944	Section 102 Manaia DIST	310 Manaia Road RD 5 Masterton
4051382	Section 21 Manaia DIST	310 Manaia Road RD 5 Masterton
4048145	Part Section 9 Masterton SM FM SETT	33 Makoura Road Masterton
3775380	Part Lot 1 DP 32976	86 Nursery Road Masterton
3936100	Lot 3 DP 59472	86 Nursery Road Masterton
4003092	Part Section 11 Masterton SM FM SETT	86 Nursery Road Masterton
3766329	Lot 4 DP 45880	341 Manaia Road RD 5 Masterton
3984800	Lot 1 DP 86408	298 Manaia Road RD 5 Masterton
3887720	Section 95 Manaia DIST	354 Manaia Road RD 5 Masterton
3765292	Section 96 Manaia DIST	338 Manaia Road RD 5 Masterton
3960462	Lot 1 DP 45726	Manaia Road RD 5 Masterton
3948436	Lot 1 DP 56039	50 Holdsworth Road Masterton
4055066	Part Manga-A-Kuta Block	59 Nursery Road Masterton

Okawa Drain

Parcel ID	Legal Description	Location
3816455	Lot 1 DP 63864	Kahutara Road Featherston
3852033	Te Awaawaroa 1,1C4 Block	100 Buicks Road Featherston
3867970	Te Awaawaroa 1,1C5 Block	100 Buicks Road Featherston
3902236	Te Awaawaroa 1,2F Block	
3922914	Lot 1 DP 34746	100 Buicks Road Featherston
3982684	Te Awaawaroa 1,1B2 Block	100 Buicks Road Featherston
3771708	Part Te Awaawaroa 1,1C6&1,1C7,2 Block	Buicks Road Featherston
3882267	Stopped Road Survey Office Plan 37505	
3865990	Part Potaka-Kuratawhiti 2 Block	1309 Kahutara Road Featherston
3953902	Potaka-Kuratawhiti 1 Block	1309 Kahutara Road Featherston
4023534	Potaka-Kuratawhiti 3A&3B1 Block	Kahutara Road Featherston
4023534	Potaka-Kuratawhiti 3A&3B1 Block	1309 Kahutara Road Featherston
3940460	Potaka-Kuratawhiti 3A&3B2 Block	Buicks Road Featherston
3908105	Lot 2 DP 34746	107 Buicks Road Featherston
3995910	Part Tapuaeharuru Block	107 Buicks Road Featherston
4012436	Lot 1 DP 60051	107 Buicks Road Featherston
3939311	Te Awaawaroa 1 Subs 1C6 and 1C7 No 1 Block	Buicks Road Featherston
6935935	Lot 2 DP 373573	Lake Ferry Road Martinborough
3982685	Te Awaawaroa 1,1B1 Block	106 Buicks Road Featherston
3995910	Part Tapuaeharuru Block	106 Buicks Road Featherston
3986373	Part Whangaehu South Block	

Otahoua Drain

Parcel ID	Legal Description	Location
3903652	Lot 2 DP 88045	339 Te Ore Ore Settlement Road Masterton
3901873	Part Whangaehu North Block	51 Caves Road RD 6 Masterton

Otahoua Drain

Parcel ID	Legal Description	Location
3903651	Lot 1 DP 88045	614 Te Ore Ore Bideford Road Masterton
4064484	Lot 3 DP 88045	337 Te Ore Ore Settlement Road Masterton
4066852	Part Lot 3 DP 6308	614 Te Ore Ore Bideford Road Masterton
3847169	Lot 2 DP 90349	Te Ore Ore Settlement Road Masterton
3847155	Part Lot 1 DP 7674	463 Masterton Castlepoint Road Masterton

Taumata Drain

Parcel ID	Legal Description	Location
3933900	Crown Land Survey Office Plan 21298	
4033804	Lot 1 DP 79329	191 Taumata Island Road
4019468	Lot 1 DP 33705	332 Taumata Island Road
4018470	Lot 2 DP 67542	208 Taumata Island Road
3987682	Section 1 Block XV Tiffin SD	121 Taumata Island Road
3925107	Lot 1 DP 41104	131 Taumata Island Road
4046083	Lot 1 DP 67542	200 Taumata Island Road
3898375	Part Taumata 2 Block	
3759624	Part Taumata 3 Block	331 Taumata Island Road
3766621	Lot 3 DP 7572	331 Taumata Island Road
6627308	Lot 2 DP 322065	331 Taumata Island Road
3750939	Lot 2 DP 16973	114 Taumata Island Road
3787230	Lot 2 DP 79329	114 Taumata Island Road
4065774	Part Manohawea 3 Block	114 Taumata Island Road
3881004	Lot 2 DP 12138	303 Taumata Island Road
3985344	Lot 1 DP 12138	303 Taumata Island Road
4041952	Lot 3 DP 12138	303 Taumata Island Road

Te Whiti Drain

Parcel ID	Legal Description	Location
7550337	Lot 2 DP 479525	121 Te Whiti Settlement Road RD 4 Masterton
7550336	Lot 1 DP 479525	Te Whiti Settlement Road RD 4 Masterton
3823810	Lot 2 DP 41007	186 Te Whiti Settlement Road RD 4 Masterton
3754310	Part Section 35 Tauweru DIST	267 Te Whiti Settlement Road RD 4 Masterton
3803517	Lot 2 DP 80530	267 Te Whiti Settlement Road RD 4 Masterton
3835179	Section 38 Tauweru DIST	267 Te Whiti Settlement Road RD 4 Masterton
3839380	Lot 2 DP 86713	267 Te Whiti Settlement Road RD 4 Masterton
3850762	Section 36 Tauweru DIST	267 Te Whiti Settlement Road RD 4 Masterton
3913263	Section 44 Tauweru DIST	267 Te Whiti Settlement Road RD 4 Masterton
3917701	Section 39 Tauweru DIST	267 Te Whiti Settlement Road RD 4 Masterton
6695164	Lot 2 DP 336527	267 Te Whiti Settlement Road RD 4 Masterton
6709804	Lot 2 DP 339764	267 Te Whiti Settlement Road RD 4 Masterton
3823809	Lot 1 DP 80530	206 Te Whiti Settlement Road RD 4 Masterton
3904807	Lot 1 DP 63308	173 Te Whiti Settlement Road RD 4 Masterton

Whakawhiriwhiri Drain

Parcel ID	Legal Description	Location
4061075	Te Awaawaroa 1,1C2 Block	100 Buicks Road Featherston
4061656	Te Awaawaroa 1,1C3 Block	100 Buicks Road Featherston
3845673	Part Lot 1 DP 4396	Kahutara Road Featherston
7497038	Lot 2 DP 466863	Kahutara Road Featherston
3821770	Lot 2 DP 52084	Pukio West Road Kahutara
7393384	Lot 2 DP 453847	Pukio West Road Kahutara
3778610	Ohaeretahi 2A4 Block	734 Pahautea Road Featherston
3858681	Ohaeretahi 2A9 Block	734 Pahautea Road Featherston
3858682	Ohaeretahi 2A10 Block	734 Pahautea Road Featherston
3858683	Ohaeretahi 2A5 Block	734 Pahautea Road Featherston
3939307	Ohaeretahi 2A8 Block	734 Pahautea Road Featherston
3945508	Part Waiotetuta 1B1 Block	734 Pahautea Road Featherston
4019665	Ohaeretahi 2A7 Block	734 Pahautea Road Featherston
4019666	Ohaeretahi 2A6 Block	734 Pahautea Road Featherston
4049283	Part Waiotetuta 1B2 Block	734 Pahautea Road Featherston
4063137	Waiotetuta 1B3 Block	734 Pahautea Road Featherston
7376026	Lot 2 DP 451475	734 Pahautea Road Featherston
3760384	Part Lot 6 DP 7959	2312 Kahutara Road Featherston
3775479	Part Section 14 Kahutara DIST	Kahutara Road Featherston
3776134	Part Lot 5 DP 7959	2312 Kahutara Road Featherston
3776155	Part Section 13 Kahutara DIST	Kahutara Road Featherston
3828456	Part Section 12 Kahutara DIST	Kahutara Road Featherston
3931872	Part Lot 4 DP 7959	Kahutara Road Featherston
3964048	Part Lot 3 DP 7959	Kahutara Road Featherston
3976134	Part Lot 1 DP 7959	Kahutara Road Featherston
4042491	Part Lot 2A DP 7959	Kahutara Road Featherston
3854788	Okawa Block	1309 Kahutara Road Featherston
3866866	Potaka-Kuratawhiti 1B2A Block	1309 Kahutara Road Featherston
3886272	Part Section 18 Kahutara DIST	1309 Kahutara Road Featherston
3900888	Lot 2 DP 15679	Kahutara Road Featherston
3947586	Potaka-Kuratawhiti 1B2B Block	1309 Kahutara Road Featherston
3980585	Section 4 Kahutara DIST	1309 Kahutara Road Featherston
3998445	Part Section 29 Pahautea SETT	692 Pahautea Road Featherston
3982686	Awaawaroa 1 3B1 & 1 3C1 Block	Pukio West Road Kahutara
3833103	Lot 5 DP 21178	662 Pahautea Road Featherston
3896858	Lot 3 DP 21178	662 Pahautea Road Featherston
3903670	Part Lot 2 DP 51750	662 Pahautea Road Featherston
3982763	Part Lot 1 DP 2864	662 Pahautea Road Featherston
3998445	Part Section 29 Pahautea SETT	662 Pahautea Road Featherston
4063200	Part Lot 4 DP 21178	662 Pahautea Road Featherston
3852130	Part Te Awaawaroa 1,3A Block	Pukio West Road Featherston
7523332	Lot 4 DP 468079	925-957 Kahutara Road Featherston
3866849	Potaka-Kuratawhiti 1C Block	Kahutara Road Featherston
3948122	Potaka-Kuratawhiti 1B1 Block	Kahutara Road Featherston

Whakawhiriwhiri Drain

Parcel ID	Legal Description	Location
4048163	Part Lot 2 DP 13857	40 Pahautea Road Featherston

Wairarapa Pump Drainage Schemes

Moonmoot Drain

Parcel ID	Legal Description	Location
3981183	Section 118 Turanganui DIST	238 Kumenga Road Featherston
277763	Part Lot 4 DP 6129	Kumenga Road Featherston
277763	Part Lot 4 DP 6129	24-24A Te Hopai Road Featherston
7005678	Lot 2 DP 388636	24-24A Te Hopai Road Featherston
3900753	Section 108 Turanganui DIST	159 Kumenga Road Featherston
3986572	Part Section 86 Turanganui DIST	159 Kumenga Road Featherston
3885038	Section 116 Turanganui DIST	121 Kumenga Road Featherston
3900754	Section 114 Turanganui DIST	121 Kumenga Road Featherston
7526509	Lot 2 DP 470556	121 Kumenga Road Featherston
3763493	Crown Land Survey Office Plan 32476	

Onoke Drain

Parcel ID	Legal Description	Location
4007309	Part Turakirae Block Survey Office Plan 19057	
4024438	Part Lot 6 DP 6776	1027-1027A East West Access Road Featherston
7588797	Lot 2 DP 481810	3133A Western Lake Road Featherston
3929439	Section 127 Western Lake DIST	3289 Western Lake Road Featherston
3935119	Section 126 Western Lake DIST	3289 Western Lake Road Featherston
3936773	Section 134 Western Lake DIST	3289 Western Lake Road Featherston
4017087	Section 132 Western Lake DIST	3289 Western Lake Road Featherston
4054020	Section 1 SO 35468	3289 Western Lake Road Featherston

Pouawha Drain

Parcel ID	Legal Description	Location
3898128	Section 120 Turanganui DIST	380 Pouawha Road Martinborough
3964067	Section 122 Turanganui DIST	380 Pouawha Road Martinborough
6583192	Lot 2 DP 312859	Pouawha Road Martinborough
3996059	Part Lot 1 DP 17247	Lake Ferry Road Martinborough
4000129	Part Lot 2 DP 17247	Lake Ferry Road Martinborough
7304320	Lot 2 DP 436783	2486 Lake Ferry Road Martinborough
7814548	Lot 2 DP 513883	2486 Lake Ferry Road Martinborough
3803373	Part Lot 1 DP 10455	Ruamahanga Bank Martinborough
4061686	Section 119 Turanganui DIST	410 Pouawha Road Martinborough
7814547	Lot 1 DP 513883	2582 Lake Ferry Road Martinborough
3803373	Part Lot 1 DP 10455	2154 Kahutara Road Martinborough
3806771	Part Lot 1 DP 7437	2154 Kahutara Road Martinborough

Pouawha Drain

Parcel ID	Legal Description	Location
3816399	Lot 4 DP 7437	2154 Kahutara Road Martinborough
3881841	Part Lot 3 DP 7437	2154 Kahutara Road Martinborough
3887825	Part Lot 2 DP 7437	2154 Kahutara Road Martinborough
3968091	Part Lot 1 DP 6391	2154 Kahutara Road Martinborough
3819463	Part Lot 3 DP 17247	1972-1972A Lake Ferry Road Martinborough

Te Hopai Drain

Parcel ID	Legal Description	Location
3846439	Section 54 Kahutara DIST	2325B Parera Road
3963895	Lot 1 DP 49734	
3806753	Lot 1 DP 52070	24-24A Te Hopai Road Featherston
3962452	Lot 2 DP 52070	24-24A Te Hopai Road Featherston
4061685	Lot 2 DP 52151	24-24A Te Hopai Road Featherston
3791736	Section 41 Kahutara DIST	Kahutara Road Featherston
3824798	Part Section 13 Kahutara DIST	1309 Kahutara Road Featherston
4000792	Iringa B Block	1309 Kahutara Road Featherston
4000795	Iringa A2 Block	1309 Kahutara Road Featherston
4066166	Part Section 12 Kahutara DIST	1309 Kahutara Road Featherston
7992392	Lot 1 DP 531887	Kahutara Road Featherston
7992393	Lot 2 DP 531887	Kahutara Road Featherston
3809362	Lot 1 DP 25505	215A Wairio Road Featherston
4005180	Part Lot 1 DP 24517	215A Wairio Road Featherston
3878458	Part Section 15 Kahutara DIST	Kahutara Road Featherston
4000095	Part Section 40 Kahutara DIST	Kahutara Road Featherston
4039146	Section 50 Kahutara DIST	Parera Road Featherston
3960429	Lot 3 DP 52070	2334 Kahutara Road Featherston

Kāpiti weed clearance affected properties

Katihuku Drain

Parcel ID	Legal Description	Location
6767279	Lot 12 DP 345126	169 Harakeke Road Te Horo
6776545	Lot 12 DP 345127	169 Harakeke Road Te Horo
7226258	Lot 28 DP 421276	169 Harakeke Road Te Horo
7226265	Lot 35 DP 421276	169 Harakeke Road Te Horo
7391555	Katihiku X2 Block ML 452135	Swamp Road Te Horo

Mangapouri Stream

Parcel ID	Legal Description	Location
3936855	Section 180 TN OF Otaki	36 Te Rauparaha Street Otaki
6703911	Lot 2 DP 32380	27 Lupin Road Otaki
6703910	Lot 1 DP 32380	27 Lupin Road Otaki
3759943	Lot 2 DP 24497	18 Lupin Road Otaki
3975886	Lot 1 DP 42590	46B Te Rauparaha Street Otaki
4049205	Lot 1 DP 24497	16 Lupin Road Otaki
3936959	Mangapouri 3 Block	30 Bennetts Road Otaki
3941644	Section 28 Block IX Waitohu SD	30 Bennetts Road Otaki
3845969	Section 29 Block IX Waitohu SD	18 Bennetts Road Otaki
3882216	Section 30 Block IX Waitohu SD	18 Bennetts Road Otaki
3778054	Lot 2 DP 60319	11 Te Rauparaha Street Otaki
3839284	Lot 2 DP 18843	1B Aotaki Street Otaki
3777164	Lot 2 DP 44991	46E Te Rauparaha Street Otaki
7783321	Lot 26 DP 504495	Te Harawira Street Otaki
7842994	Lot 2 DP 516885	Lupin Road Otaki
3757110	Section 32 Block IX Waitohu SD	17 Bennetts Road Otaki
3782790	Part Pukekaraka Block	Convent Road Otaki
3891883	Lot 1 DP 40103	37 Raukawa Street Otaki
3780629	Lot 3 DP 60319	19 Convent Road Otaki
7699253	Lot 2 DP 476935	41 Bennetts Road Otaki
3936855	Section 180 TN OF Otaki	36 Te Rauparaha Street Otaki
4018192	Lot 1 A 2719	30 Te Rauparaha Street Otaki
4021223	Section 27 Block IX Waitohu SD	31 Bennetts Road Otaki
3968382	Lot 4 DP 24497	20 Lupin Road Otaki
4021662	Lot 1 DP 14092	49 Convent Road Otaki
3756151	Lot 1 DP 31600	46A Te Rauparaha Street Otaki
3951091	Makuratawhiti West Block	Ruakawa Street
3936855	Section 180 TN OF Otaki	36 Te Rauparaha Street Otaki
4034131	Part Lot 1 DP 60319	15 Te Rauparaha Street Otaki
3874129	Pukekaraka 5 Block	Te Rauparaha Street Otaki
3936855	Section 180 TN OF Otaki	36 Te Rauparaha Street Otaki
3778045	Section 23 Block IX Waitohu SD	45 & 48 Bennetts Road Otaki
3845925	Section 31 Block IX Waitohu SD	7 Bennetts Road Otaki
3759943	Lot 2 DP 24497	18 Lupin Road Otaki

Mangapouri Stream

Parcel ID	Legal Description	Location
4028561	Lot 3 DP 44991	46C Te Rauparaha Street Otaki
3995694	Whakahokiatapango C Block	Convent Road Otaki
3937162	Lot 1 DP 44991	46 Te Rauparaha Street Otaki
4035032	Section 191 TN OF Otaki	18 Raukawa Street Otaki
4035454	Section 129A TN OF Otaki	18 Raukawa Street Otaki
3944807	Section 181 TN OF Otaki	32 Te Rauparaha Street Otaki
3927187	Section 21 Block IX Waitohu SD	51 Bennetts Road Otaki
3785246	Makuratawhiti 1B1 Block	110 Mill Road Otaki

Mangaone Stream

Parcel ID	Legal Description	Location
3915811	Part Lot 2 DP 72327	5 Pukenamu Road Te Horo
6767269	Lot 2 DP 345126	6 Sims Road Te Horo
4054018	Part Lot 1 DP 54936	961 State Highway 1 Te Horo
3781018	Lot 1 DP 75651	166 Te Horo Beach Road Te Horo
3913425	Section 7 Block II Kaitawa SD	166 Te Horo Beach Road Te Horo
4061427	Lot 1 DP 30291	46 Te Horo Beach Road Te Horo
4031432	Lot 6 DP 72327	229 Te Horo Beach Road Te Horo
3889295	Lot 1 DP 78404	231 Te Horo Beach Road Te Horo
6854601	Lot 2 DP 367952	40 Te Horo Beach Road Te Horo
3861012	Lot 2 DP 75651	
3943571	Lot 4 DP 75651	
4014796	Lot 13 DP 72326	
3950953	Lot 14 DP 72327	
3858181	Part Ngakaroro 5B Block	35 Oriwa Crescent
3826862	Lot 19 DP 31319	7 Sims Road Te Horo
3893894	Part Lot 2 DP 60763	10 Te Horo Beach Road Te Horo
6854600	Lot 1 DP 367952	44 Te Horo Beach Road Te Horo
6767268	Lot 1 DP 345126	2 Sims Road Te Horo
3893891	Lot 2 DP 76531	12 Te Horo Beach Road Te Horo
3764526	Lot 1 DP 55792	120 Te Horo Beach Road Te Horo

Ngatoko Drain

Parcel ID	Legal Description	Location
4042024	Lot 1 DP 61641	Old Coach Road Otaki
4035716	Lot 5 DP 15133	3A Atkinson Avenue Otaki
4012724	Lot 9 DP 63193	114 Riverbank Road Extension Otaki
3830830	Lot 86 DP 762	23 Kiharoa Street Otaki
3914769	Lot 1 DP 41261	39 Atkinson Avenue Otaki
3873142	Lot 7 DP 15133	
3762963	Lot 1 DP 60188	149 Rangiuru Road Otaki
3848123	Lot 2 DP 60188	112 Riverbank Road Extension Otaki
3860746	Lot 1 DP 15133	3 Atkinson Avenue Otaki

Ngatoko Drain

Parcel ID	Legal Description	Location
4009859	Takapu B Block	
4022006	Lot 1 DP 60840	Old Coach Road Otaki
3771988	Lot 10 DP 63193	116 Riverbank Road Extension Otaki
3936162	Part Lot 1 DP 54428	23 Atkinson Avenue Otaki

Ngatotara Drain

Parcel ID	Legal Description	Location
6821916	Lot 2 DP 362218	Forest Lakes Road Otaki
3876757	Lot 2 DP 6225	Forest Lakes Road Otaki
3925190	Lot 1 DP 6225	Forest Lakes Road Otaki
3969686	Lot 11 DP 82886	157 Taylors Road Otaki
7262538	Lot 2 DP 420352	243 State Highway 1 North Otaki
3857596	Lot 5 DP 86784	184A Taylors Road Otaki
3819746	Lot 9 DP 86784	184 Taylors Road Otaki
3895487	Lot 7 DP 86784	184C Taylors Road Otaki
4017514	Lot 3 DP 82886	158 Taylors Road Otaki
7262537	Lot 1 DP 420352	245 State Highway 1 North Otaki
3818420	Lot 3 DP 72910	81 Forest Lakes Road Otaki
4059606	Lot 10 DP 82886	147 Taylors Road Otaki
3901942	Lot 5 DP 78358	99 Taylors Road Otaki
3886842	Lot 4 DP 86784	168 Taylors Road Otaki
3793819	Part Pukehou 4D2B Block	156 Waiorongomai Road Otaki
3821472	Pukehou 4D1A1 Block	156 Waiorongomai Road Otaki
3825127	Pukehou 4D2A Block	156 Waiorongomai Road Otaki
3941623	Part Pukehou 4D1B Block	156 Waiorongomai Road Otaki
3986067	Part Lot 1 DP 41119	156 Waiorongomai Road Otaki
3988850	Pukehou 4F4B2 Block	156 Waiorongomai Road Otaki
4056061	Pukehou 4D1A2A Block	156 Waiorongomai Road Otaki
3754101	Pukehou 4D1A2B Block	103 Taylors Road Otaki
3913093	Paruauku 1B2B Block	Taylors Road Otaki
3980473	Lot 1 DP 80927	103 Taylors Road Otaki
3992096	Lot 6 DP 86784	184B Taylors Road Otaki
4010060	Pukehou 6 Block	Golf Link Row Otaki
4062516	Lot 8 DP 86784	184D Taylors Road Otaki

Pahiko Drain

Parcel ID	Legal Description	Location
3819192	Lot 1 DP 81314	170-74182-88 Swamp Road Te Horo
3825716	Lot 1 DP 62630	133 Te Waka Road Te Horo
3747070	Katihiku 3C4 Block	Lethbridge Road Te Horo
3829422	Katihiku 1B Block	Lethbridge Road Te Horo
3986378	Pukerarauhe 1 Block	Swamp Road Te Horo
7391554	Katihiku X1 Block ML 452135	Swamp Road Te Horo

Pahiko Drain

Parcel ID	Legal Description	Location
3996569	Lot 5 DP 49815	State Highway 1 South Otaki
3790234	Part Lot 20 DP 3285	86 Swamp Road Te Horo
3870977	Ngakaroro 3B7D1 Block	199 Swamp Road Te Horo
3804210	Lot 3 DP 77203	190 Te Waka Road
3829423	Lot 1 DP 53870	Lethbridge Road Te Horo
3909815	Part Ngakaroro 3F Block	Lethbridge Road Te Horo
4022004	Part Lot 22 DP 3285	190 Te Waka Road, Otaki 5581
4060557	Part Lot 21 DP 3285	190 Te Waka Road Otaki

Powles Drain

Parcel ID	Legal Description	Location
6767278	Lot 11 DP 345126	31-35 Sandown Road Te Horo
6781877	Lot 11 DP 345125	169 Harakeke Road Te Horo
7226240	Lot 10 DP 421276	81 Harakeke Road Te Horo
7226241	Lot 11 DP 421276	87 Harakeke Road Te Horo
7226239	Lot 9 DP 421276	77 Harakeke Road Te Horo

Pukenamu Drain

Parcel ID	Legal Description	Location
6526574	Lot 22 DP 91189	188-190 Pukenamu Road Waikanae
6526574	Lot 22 DP 91189	188 Pukenamu Road Te Horo
7247929	Lot 21 DP 414735	7 Mahurenga Lane Te Horo
8160138	Lot 8 DP 512385	
3876063	Lot 17 DP 87207	38 Puruaha Road Te Horo
6526565	Lot 13 DP 91189	29 Puruaha Road Te Horo
7555920	Lot 10 DP 471199	64 Pukenamu Road Te Horo
4037132	Lot 16 DP 87207	88 Pukenamu Road Te Horo
7247930	Lot 22 DP 414735	56 Puruaha Road Te Horo
3746581	Lot 1 DP 33771	33 Puruaha Road Te Horo
3844577	Lot 2 DP 45072	35 Puruaha Road Te Horo

Rangiuru Stream

Parcel ID	Legal Description	Location
3946111	Lot 2 DP 48513	130 Rangiuru Road Otaki
4037785	Lot 1 DP 5719	50 Rangiuru Road Otaki
3803572	Lot 9 DP 32424	40 Kapiti Lane Otaki
3888004	Lot 88 DP 762	12 Atkinson Avenue Otaki
3888004	Lot 88 DP 762	32 Atkinson Avenue Otaki
3987752	Lot 89 DP 762	32 Atkinson Avenue Otaki
3780648	Part Lot 90 DP 762	98 Rangiuru Road Otaki
3884368	Lot 13 DP 32424	34 Kapiti Lane Otaki
7440806	Lot 2 DP 460001	41A Rangiuru Road Otaki
3886149	Lot 11 DP 32424	36 Kapiti Lane Otaki

Rangiuru Stream

Parcel ID	Legal Description	Location
3765771	Lot 4 DP 3364	143 Tasman Road Otaki
3776191	Lot 2 DP 3364	143 Tasman Road Otaki
3780065	Lot 3 DP 3364	130 Tasman Road Otaki
3795577	Hurihangataitoko 4 Block	Rangiuru Road Otaki
3800507	Lot 5 DP 3364	131-137 Tasman Road Otaki
3818943	Lot 7 DP 3364	131-137 Tasman Road Otaki
3845943	Lot 1 DP 3364	143 Tasman Road Otaki
3858140	Hurihangataitoko 3 Block	Rangiuru Road Otaki
3874683	Lot 6 DP 3364	131-137 Tasman Road Otaki
8001477	Lot 2 DP 536209	
3834588	Lot 8 DP 32424	42 Kapiti Lane Otaki
3883744	Lot 10 DP 32424	38 Kapiti Lane Otaki
4022028	Lot 7 DP 32424	44 Kapiti Lane Otaki

Sages Drain

Parcel ID	Legal Description	Location
7079957	Lot 16 DP 405220	39 Paul Faith Lane Te Horo
7079958	Lot 17 DP 405220	57 Paul Faith Lane Te Horo
3752985	Lot 12 DP 72326	181 Te Horo Beach Road Te Horo
7079956	Lot 15 DP 405220	41 Paul Faith Lane Te Horo
3899606	Lot 2 DP 89581	151 Te Horo Beach Road Te Horo
3764407	Lot 11 DP 72326	153-157 Te Horo Beach Road Te Horo
3857421	Part Section 2 Pukenamu SETT	153-157 Te Horo Beach Road Te Horo
3899606	Lot 2 DP 89581	153-157 Te Horo Beach Road Te Horo

Te Awahohonu Drain

Parcel ID	Legal Description	Location
7207243	Part Lot 57 DP 1429	56B Rahui Road Otaki
3807440	Lot 1 DP 21882	128 Mill Road Otaki
3780535	Part Lot 3 DP 16560	26 County Road Otaki
7693460	Makuratawhiti 10A1 Block	142 Mill Road Otaki
3781855	Lot 1 DP 26270	192 Mill Road Otaki
4036817	Part Lot 13 DP 14570	14B Hariata Street Otaki
4022366	Lot 4 DP 27022	150 Mill Road Otaki
7714946	Section 2 SO 502720	262 Main Highway Otaki
3964437	Lot 4 DP 16560	12 County Road Otaki
4021745	Lot 16 DP 71367	20 Millhaven Place Otaki
3794475	Part Lot 1 DP 3101	156 Mill Road Otaki
3893178	Lot 2 DP 81333	86 Rahui Road Otaki
3994501	Haruatai 24 Block	214 Mill Road Otaki
3748000	Lot 4 DP 24442	194 Mill Road Otaki
3988007	Section 11 Block IX Waitohu SD	194 Mill Road Otaki
4036817	Part Lot 13 DP 14570	14A Hariata Street Otaki

Te Awahohonu Drain

Parcel ID	Legal Description	Location
4048782	Lot 2 DP 14294	75 Freemans Road Otaki
3833193	Section 4 Block IX Waitohu SD	206 Mill Road Otak
3865832	Lot 1 DP 14294	102 Rahui Road Otaki
3979807	Part Lot 1 DP 10229	192 Mill Road Otaki
4024468	Lot 17 DP 2464	192 Mill Road Otaki
3829166	Lot 14 DP 23897	124 Rahui Road Otaki
3986976	Lot 10 DP 23897	124 Rahui Road Otaki
3818227	Lot 45 DP 1429	57 Freemans Road Otaki
3756904	Haruatai 2A Block	260C Mill Road Otaki
3805383	Haruatai 2B Block	260C Mill Road Otaki
3955120	Part Moutere 8A Block	260B Mill Road Otaki
3959367	Haruatai B Block	260C Mill Road Otaki
3908197	Lot 8 DP 23897	112 Rahui Road Otaki
3916028	Lot 15 DP 23897	128 Rahui Road Otaki
3783375	Lot 1 DP 13164	52 Rahui Road Otaki
3916028	Lot 15 DP 23897	126 Rahui Road Otaki
3790973	Lot 6 DP 16560	58 Rahui Road Otaki
3750932	Lot 2 DP 24442	200 Mill Road Otaki
3845999	Part Section 82 Block IX Waitohu SD	Mill Road Otaki
3984116	Awahohonu C Block	
4035336	Pareomatangae A Block	
7927012	Lot 23 DP 525606	
3953738	Lot 8 DP 16560	64 Rahui Road Otaki
3914040	Lot 3 DP 24442	204 Mill Road Otak
3794456	Lot 23 DP 48347	37 Oriwa Crescent Otaki
3893100	Lot 20 DP 48347	43 Oriwa Crescent Otaki
3986976	Lot 10 DP 23897	116 Rahui Road Otaki
4031286	Lot 4 DP 26968	136A Mill Road Otaki
4062279	Lot 9 DP 23897	114 Rahui Road Otaki
3760951	Part Haruatai 12A Block	202 Mill Road Otak
4011462	Lot 1 DP 16238	66 Rahui Road Otaki
3918934	Lot 2 DP 14684	160 Mill Road Otaki
3942516	Lot 1 DP 23138	140 Mill Road Otaki
3851818	Lot 24 DP 48347	35 Oriwa Crescent Otaki
7660469	Section 2 SO 490562	50 Rahui Road Otaki
3875840	Lot 19 DP 48347	45 Oriwa Crescent Otaki
3946070	Makuratawhiti 8B2B1 Block	152 Mill Road Otaki
4028258	Lot 17 DP 48347	49 Oriwa Crescent Otaki
3747887	Lot 15 DP 71367	22 Millhaven Place Otaki
3806049	Lot 11 DP 71367	30 Millhaven Place Otaki
7207242	Part Lot 57 DP 1429	56A Rahui Road Otaki
3911756	Section 3 Block IX Waitohu SD	208 Mill Road Otak
3793958	Lot 12 DP 71367	28 Millhaven Place Otaki
3859569	Lot 15 DP 26701	55 Freemans Road Otaki

Te Awahohonu Drain

Parcel ID	Legal Description	Location
3757159	Lot 7 DP 23328	38 Rahui Road Otaki
3816775	Lot 5 DP 23328	36 Rahui Road Otaki
3874596	Part Awahohonu A31 Block	24 Rahui Road Otaki
4005874	Part Lot 60 DP 1429	42 to 42A Rahui Road Otaki
3811946	Lot 19 DP 2464	Mill Road Otaki
4006778	Lot 18 DP 2464	Mill Road Otaki
4036851	Part Haruatai 10B Block	Mill Road Otaki
4046330	Lot 1 DP 9569	Mill Road Otaki
4059058	Section 86 Block IX Waitohu SD	3 Anzac Road Otaki
3917345	Part Lot 10B DP 9570	Mill Road Otaki
4062826	Part Lot 1 DP 3608	22 Anzac Road Otaki
3940526	Lot 2 DP 21862	118 Mill Road Otaki
3943592	Lot 3 DP 51992	122C Mill Road Otaki
3966754	Lot 1 DP 22627	166 Mill Road Otaki
3804673	Lot 1 DP 13589	158 Mill Road Otaki
3839269	Lot 2 DP 46728	98 Rahui Road Otaki
3776139	Haruatai 25 Block	210 Mill Road Otak
3780573	Haruatai 22 Block	218 Mill Road Otaki
3941303	Lot 5 DP 16560	60 Rahui Road Otaki
3759699	Lot 16 DP 23897	130 Rahui Road Otaki
3854233	Lot 1 DP 21862	116 Mill Road Otaki
3835387	Lot 18 DP 48347	47 Oriwa Crescent Otaki
3848715	Makuratawhiti 8B2B2 Block	152 Mill Road Otaki
3909056	Lot 2 DP 78796	68 Rahui Road Otaki
3926364	Haruatai 15B3 Block	6 Anzac Road Otaki
3991472	Lot 1 DP 24442	196 Mill Road Otaki
4053396	Lot 3 DP 26968	134 Mill Road Otaki
3860759	Lot 2 DP 23897	58 Freemans Road Otaki
3875840	Lot 19 DP 48347	39 Oriwa Crescent Otaki
3973597	Lot 21 DP 48347	39 Oriwa Crescent Otaki
4034201	Lot 22 DP 48347	39 Oriwa Crescent Otaki
4035579	Part Pareomatangae Block	Main Highway Otaki
3953687	Lot 7 DP 16560	62 Rahui Road Otaki
3783382	Lot 3 DP 23897	62 Freemans Road Otaki
3830647	Lot 1 DP 49904	222 Mill Road Otaki
3860752	Lot 3 DP 27022	148 Mill Road Otaki
3747974	Lot 3 DP 22448	134-140 Rahui Road Otaki
3829690	Part Lot 2 DP 22448	134-140 Rahui Road Otaki
3754867	Lot 5 DP 17944	228 Mill Road Otaki
3993966	Lot 6 DP 17944	228 Mill Road Otaki

Walkers Drain

Parcel ID	Legal Description	Location
3914008	Lot 2 DP 45343	86 Swamp Road Te Horo

Walkers Drain

Parcel ID	Legal Description	Location
3926396	Lot 19 DP 3285	86 Swamp Road Te Horo
7042498	Lot 2 DP 396430	86 Swamp Road Te Horo
3935657	Lot 1 DP 34461	120 Te Horo Beach Road Te Horo
3950950	Part Lot 3 DP 3725	120 Te Horo Beach Road Te Horo
6654706	Lot 1 DP 322199	120 Te Horo Beach Road Te Horo

Waimeha Stream

Parcel ID	Legal Description	Location
3938329	Lot 6 DP 21868	191 Te Moana Road Waikanae
3900146	Lot 4 DP 23483	8 Park Avenue Waikanae
4061084	Lot 1 DP 23483	2 Park Avenue Waikanae
4037368	Lot 11 DP 21044	165 Te Moana Road Waikanae
3776412	Lot 3 DP 21044	149 Te Moana Road Waikanae
3825630	Lot 2 DP 21044	149 Te Moana Road Waikanae
4006781	Lot 1 DP 26304	6 Alexander Street Waikanae
3840478	Lot 1 DP 31328	12 Alexander Street Waikanae
3791215	Lot 17 DP 27407	29 Park Avenue Waikanae
7489624	Lot 1 DP 469222	43 Park Avenue Waikanae
3855770	Lot 3 DP 23483	6 Park Avenue Waikanae
3833082	Lot 13 DP 42411	TE MOANA RD
3888606	Part Section 2 SO 36391	TE MOANA RD
3964520	Lot 16 DP 42411	
3992144	Lot 17 DP 42411	
4022034	Lot 15 DP 42411	
4048748	Part Ngarara West A26A2 Block	
4060451	Part Section 1 SO 36391	TE MOANA RD
3948656	Lot 6 DP 21044	155 Te Moana Road Waikanae
4026654	Lot 14 DP 27407	35 Park Avenue Waikanae
3906169	Lot 5 DP 22770	173 Te Moana Road Waikanae
3905492	Lot 1 DP 88658	39A Park Avenue Waikanae
3953574	Lot 13 DP 27407	37 Park Avenue Waikanae
4050653	Lot 5 DP 31328	20 Alexander Street Waikanae
3951926	Lot 26 DP 27407	44 Park Avenue Waikanae
3828830	Lot 5 DP 42411	99 Te Moana Road Waikanae
4009789	Lot 7 DP 21868	193 Te Moana Road Waikanae
6649536	Lot 2 DP 326307	18 Alexander Street Waikanae
3777305	Lot 6 DP 22770	179 Te Moana Road Waikanae
4004721	Lot 12 DP 27407	39 Park Avenue Waikanae
3824975	Lot 2 DP 88658	39B Park Avenue Waikanae
3790135	Lot 3 DP 47449	Ngarara Road Waikanae
3843925	Part Lot 21 DP 27407	
3860672	Part Lot 182 DP 6570	
3864887	Lot 14 DP 42411	
3933119	Lot 55 DP 22152	Field Way Waikanae Beach

Waimeha Stream

Parcel ID	Legal Description	Location
3952412	Part Lot 22 DP 27407	
3968322	Lot 56 DP 22152	
3997203	Lot 252 DP 7462	HUIAWA ST
4034115	Lot 25 DP 27407	
6610248	Part Lot 1 DP 23513	Park Avenue Waikanae
7489372	Section 3 SO 469229	
7836688	Lot 501 DP 513188	
7489371	Section 2 SO 469229	Te Moana Road Waikanae
3835263	Lot 2 DP 23483	4 Park Avenue Waikanae
3807432	Lot 1 DP 27407	26 Park Avenue Waikanae
3807432	Lot 1 DP 27407	26 Park Avenue Waikanae
3776412	Lot 3 DP 21044	149 Te Moana Road Waikanae
3825630	Lot 2 DP 21044	149 Te Moana Road Waikanae
3906169	Lot 5 DP 22770	173A Te Moana Road Waikanae
3912577	Lot 4 DP 22770	171 Te Moana Road Waikanae
3883309	Lot 2 DP 81719	41A Park Avenue Waikanae
3870610	Lot 15 DP 27407	33 Park Avenue Waikanae
3776412	Lot 3 DP 21044	147 Te Moana Road Waikanae
3825630	Lot 2 DP 21044	147 Te Moana Road Waikanae
4022023	Lot 10 DP 21044	163 Te Moana Road Waikanae
3877781	Lot 16 DP 27407	31 Park Avenue Waikanae
7773911	Section 18 SO 505441	32 Park Avenue Waikanae
3776412	Lot 3 DP 21044	147 Te Moana Road Waikanae
3825630	Lot 2 DP 21044	147 Te Moana Road Waikanae
3985915	Lot 1 DP 81719	41 Park Avenue Waikanae
3947835	Lot 6 DP 42411	97 Te Moana Road Waikanae
3947835	Lot 6 DP 42411	97 Te Moana Road Waikanae
4006111	Lot 4 DP 42411	97 Te Moana Road Waikanae
4043378	Part Lot 1 DP 20118	97 Te Moana Road Waikanae
4053056	Lot 1 DP 33435	97 Te Moana Road Waikanae
3784046	Lot 7 DP 21044	157 Te Moana Road Waikanae
4025948	Lot 2 DP 31328	12 Alexander Street Waikanae
3773567	Lot 10 DP 21868	203 Te Moana Road Waikanae

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