APPENDIX J

Recreation Assessment – Rob Greenaway & Associates

November 2020

Trustpower Ltd

Mangorei Hydroelectric Power Scheme Reconsenting

Recreation Assessment

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Prepared for Trustpower Ltd

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Final version

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Figures

1 Executive Summary

The Mangorei Hydro Electric Power Scheme ("the Scheme") is authorised to divert up to 10m^3/s of water from the Waiwhakaiho River to Lake Mangamahoe via an intake weir and diversion structure and a 580m tunnel. A fish pass is located in the Waiwhakaiho River adjacent to the weir on the true right side of the river. Seasonal minimum flows ranging from 400L/s to 700L/s are maintained in the diversion reach. The water is returned to the Waiwhakaiho River approximately 6km downstream of the weir at Trustpower's Mangorei Power Station which features a 250m open tailrace.

This report assesses the effects associated with the continued operation of the Scheme on recreation. The Scheme is proposed to continue to operate in the same manner as currently, with some recommended modifications to the flow regime in the residual reach to address elevated temperatures and nuisance periphyton growth.

Lake Mangamahoe is an artificial lake constructed for electricity generation purposes, providing water storage for the Scheme and New Plymouth District Council's water supply. Lake Mangamahoe is owned by Trustpower Limited which has granted New Plymouth District Council a licence to use the lake shoreline as if it were a local park. Production forestry surrounds much of the Lake. New Plymouth District Council maintains the lakeshore area as a scenic recreation setting, with walking, mountain biking and equestrian tracks and picnic areas, and a shore-based fishery for brown and rainbow trout which is augmented by stock released by Taranaki Fish & Game. The Lake is the third-most popular fishery in Taranaki after the Manganui-o-te-ao and the Waiwhakaiho Rivers.

The Scheme tailrace is a central feature of the Meeting of the Waters recreation area, supporting regionally significant amenity for whitewater education, play and events. Local schools, clubs and the Taranaki Outdoor Pursuits and Education Centre (TOPEC) depend on the tailrace for their whitewater training programmes, and Trustpower has worked with these agencies to allow development of many artificial hydraulic features in the race. Trustpower is reported to have developed an excellent relationship with local whitewater groups.

Whitebaiting occurs in the River near the coast, and several parks and reserves provide access along its length.

The effect of the continued operation of the Scheme on recreation is generally positive. As noted above, the recreational opportunities afforded at the Lake and the tailrace are significant in a regional context. Interviews undertaken with recreational users identified what interviewees considered to be *potentially* adverse effects. These interview responses and the report author's own assessment have formed the basis of the assessment of potential adverse effects of Scheme operation on recreation values. The potential recreation issues identified were:

- The effects associated with the diversion of water from the Waiwhakaiho River and the creation of a 5,700m residual flow reach upstream of the Meeting of the Waters with potential effects on kayakers (due to reduced flows), anglers (due to reduced flows and habitat effects on trout) and whitebaiters (due to potential changes in habitat for inanga only as whitebaiting occurs in the River near the coast);
- The location of a weir, diversion structure and fish pass in the bed of the Waiwhakaiho River; a potential hazard to kayakers, and of interest to anglers by allowing for the passage of trout above and below the weir; and
- Effects on trout from varying generation discharges within the littoral zone of the Waiwhakaiho River below the tailrace, and the potential for effects on whitewater activities below the tailrace from flow variability.

In response to those concerns, this assessment concludes that:

- Effects on whitewater opportunities in the residual reach of the Waiwhakaiho River due to the continued operation of the Scheme are minimal. Kayaking amenity in the mainstem of the Waiwhakaiho River depends on high flows (20m^3/s +) associated with recent rain events. The Waiwhakaiho River flows at above 20m^3/s at SH3 (above the intake) just below 6% of the time annually (based on 2013 to 2019 data), and just over 3% of the time in summer (December to February). In the residual reach, 20m^3/s flows are exceeded just over 4% of the time annually and just under 3% of the time in summer. At flows of 20m^3/s and above, interviewees indicate that flows in the residual reach do not have any effect on whitewater or kayaking opportunities.
- The Scheme has low levels of adverse effect on angling at the regional level and these are limited largely limited to the residual reach of the Waiwhakaiho River in late summer. This river reach has poor angler access. Ryder Consulting in the *Mangorei HEPS Aquatic Ecology Report* proposes enhanced flow management methods to help mitigate high summer water temperatures and to reduce excessive periphyton growth.
- Macroinvertebrate health has been assessed as similar in the River above and below the Scheme, and in the residual reach. Inanga (whitebait) were found to be present throughout the River, including the residual reach, and feeding habitat in the residual reach was found to be greater for inanga compared with a natural flow.
- Flow variability below the tailrace was not identified as an issue for whitewater activities (largely because they travel with the flow).
- While there were no major issues reported with kayakers navigating the diversion weir, additional upstream warning signage on the Trustpower diversion structure could be considered, warning users of its presence.
- The continued operation of the Scheme at Lake Mangamahoe and at the tailrace is positive for recreational interests.

2 Setting description and public access

The Mangorei Hydro Electric Power Scheme is authorised to divert up to 10m^3/s of water to Lake Mangamahoe via an intake weir and diversion structure and a 580m tunnel (Figure 1). A fish pass is located in the Waiwhakaiho River adjacent to the weir on the true right side of the river. The water is returned to the Waiwhakaiho River approximately 6kms downstream of the weir after storage in Lake Mangamahoe, passing through an intake structure on the Lake, another tunnel, twin penstocks, Trustpower's Mangorei Power Station and a 250m open tailrace. Seasonal minimum flows ranging from 400L/s to 700L/s are maintained in the diversion/residual reach.

Lake Mangamahoe is an artificial lake constructed for electricity generation purposes and provides water storage for the Scheme and New Plymouth District Council's (NPDC) water supply – supplying the area from Omata to Urenui. Lake Mangamahoe is owned by Trustpower Limited and it has granted to NPDC a licence to use the lake shoreline as if it were a local reserve (see Figure 2). NPDC manage the area as a scenic recreation setting, with walking, mountain biking and equestrian tracks, picnic areas and a shore-based fishery for brown and rainbow trout. Production forest surrounds much of the lake.

Although NPDC manage the lake area for scenic recreation purposes, it has no status as a reserve under the Reserves Act 1977 or other protection for recreation access. It is subject to a reserve management plan prepared in 2011. Two titles in the south are Local Purpose (Cemetery) Reserves, only one of which is partly developed for that purpose. It is through these cemetery reserves, and the land parcel immediately north of them, that public foot and cycle access is provided to the Trustpower diversion structures on the Waiwhakaiho River, as well as access for service vehicles. Access is also available within the bed of the River (on 'hydro parcels' administered by Land Information NZ (LINZ)).

The NPDC land at Lake Mangamahoe borders approximately 4.1km of the Waiwhakaiho River north of State Highway 3. A further 2.4km of the diversion reach is bounded by private property before reaching Department of Conservation and NPDC lands at the Meeting of the Waters (Figure 3). The NPDC lands are on the south and west banks of the River and include one section of esplanade reserve which is subject to the Reserves Act, but the remainder has no reserve status and is managed according to Council's Green Spaces Management Plan (2019).

The Taranaki Outdoor Pursuit and Educational Centre (TOPEC) is based on NPDC land east of the Mangorei Power Station, taking advantage of kayaking and rafting on the Waiwhakaiho River and the Trustpower tailrace, a local swimming hole on the River, ropes courses, and walking and orienteering in DOC's neighbouring Meeting of the Waters Scenic Reserve.

The Scenic Reserve and the 40-minute Araheke Bush Loop walk within it is accessed via a pedestrian bridge over the Waiwhakaiho River opposite the TOPEC facilities. There is also a short 20-minute 'Meeting of the Waters Walk' on the western side of the River.

A bridge across the downstream end of the tailrace and a short concrete path provide access for swimming in the Waiwhakaiho River and spectating whitewater sports.

The New Plymouth training facility of Hearing Dogs NZ is located on Trustpower land immediately to the west of the powerhouse. Road access to most of the NPDC parcels is via an easement over Trustpower land.

Figure 1: Mangorei Hydro Electric Power Scheme location and main features

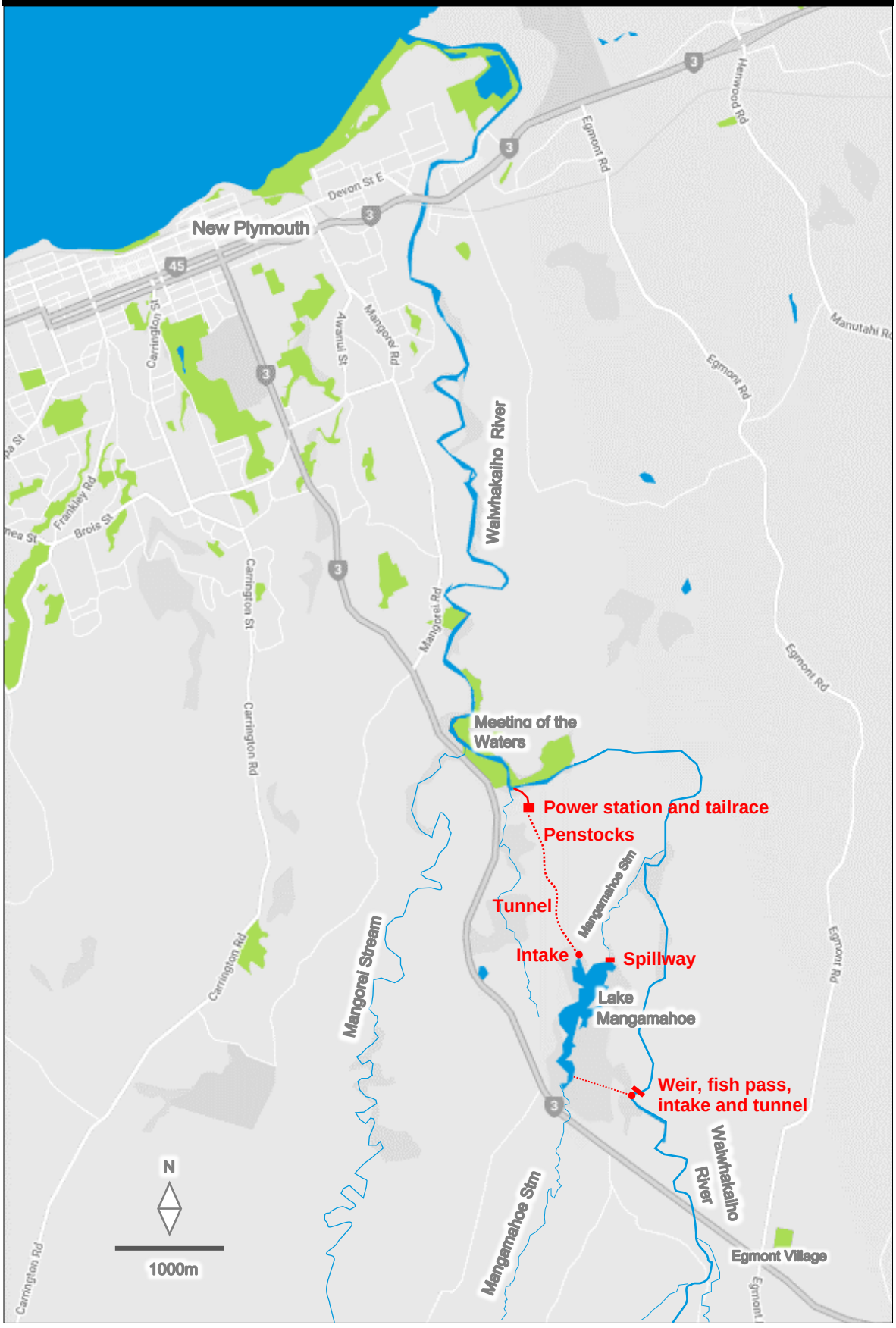


Figure 2: Land ownership at Lake Mangamahoe

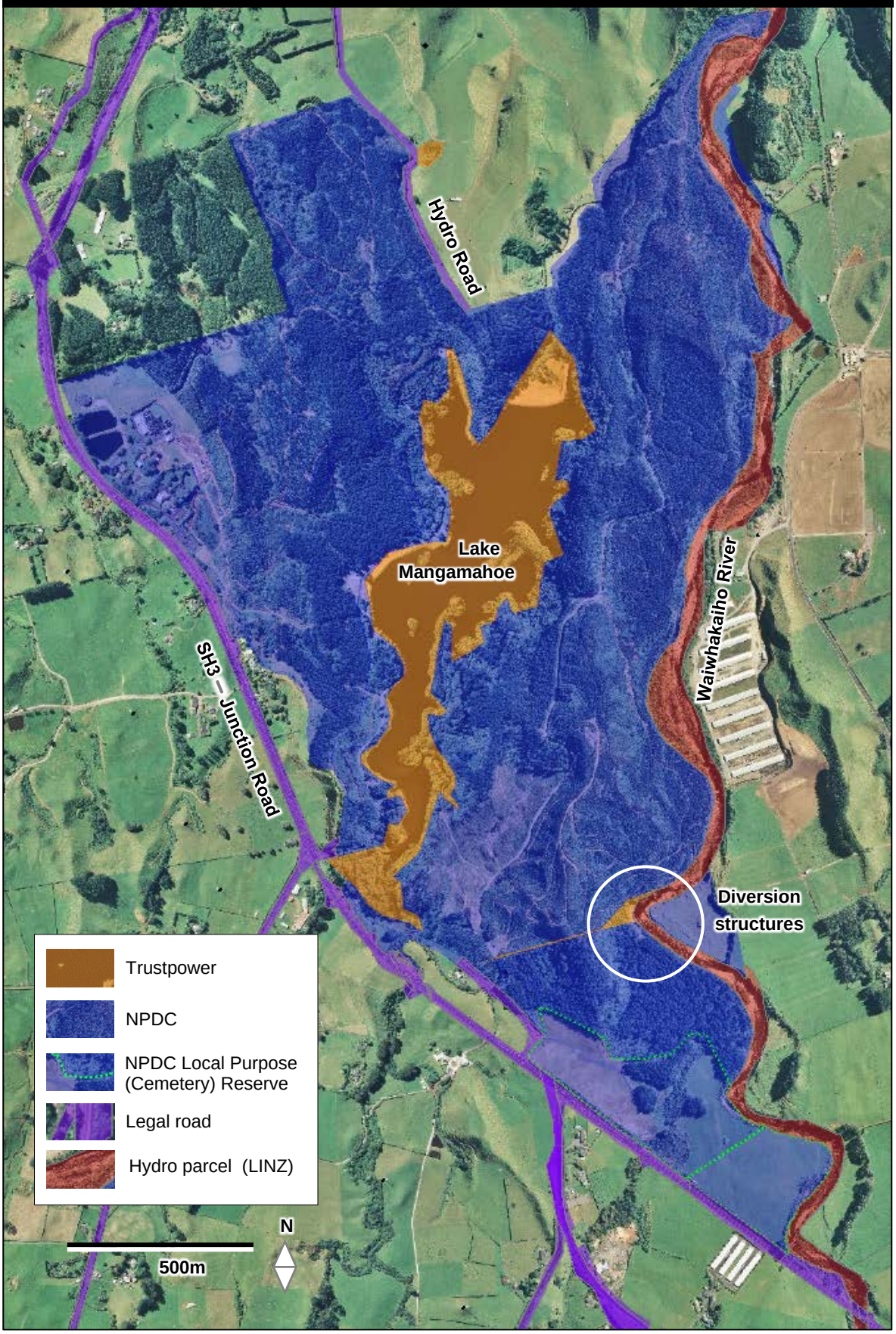
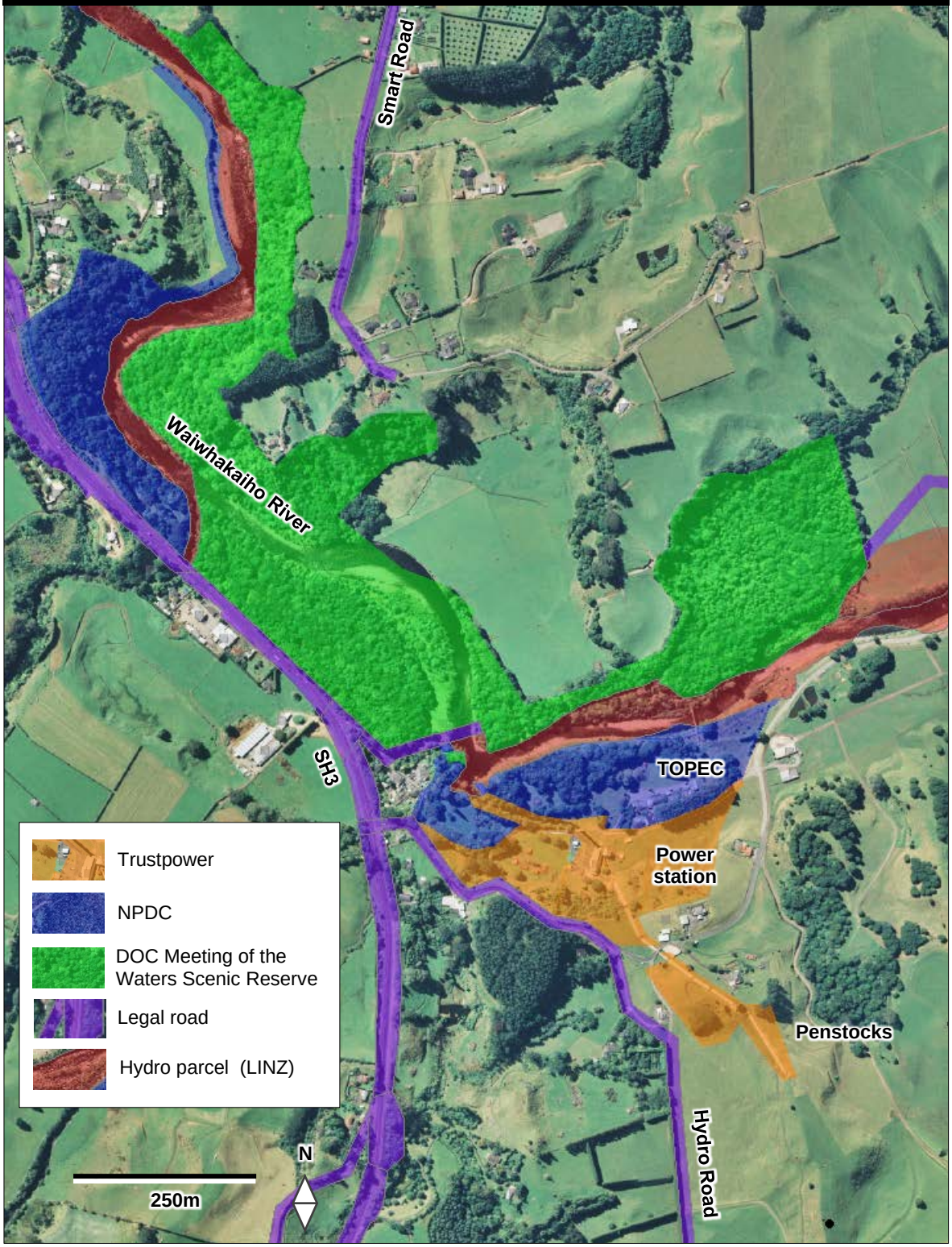


Figure 3: Land ownership at Meeting of the Waters



3 Plans and strategies

This section considers regional recreation planning material in relation to recreation values on the Waiwhakaiho River.

3.1 Department of Conservation

The **Conservation Management Strategy** (CMS) for the Wanganui Conservancy 1997 – 2008, although dated, remains current. It refers to the Waiwhakaiho River as being part of one of the larger catchments in the Taranaki ring plain (along with the Stony and Waingongoro) and one of the few with an estuary (along with the Waiongana and Waitara), noting the River "is an important area for whitebait spawning and was once an important lamprey fishery." (p476)

In describing river-based recreation in the Conservancy, the CMS states: (p361)

> *The Conservancy provides a number of important opportunities for canoeing. These range from multi-day journeys on the Whanganui, Rangitikei and Mokau Rivers to short day trips on the Manawatu, Whangaehu, Waitara, Waiwhakaiho and Manganui Rivers. Scenery ranges from remote bush country and dramatic river gorges to rural countryside. Sections of the rivers range in difficulty from Grade 1, (easy, suitable for family groups) through to Grades 4 and 5, (very difficult to extreme, suitable only for experienced canoeists or rafters).*
>
> *Jetboating occurs on the Whanganui, Rangitikei, Manawatu and other rivers. The Manganui o te Ao and Rangitikei are the main rivers for white-water rafting in the Conservancy and are also important for trout fishing.*

The CMS notes in general terms, in relation to the Egmont Ecological District: (p128)

> *Removal of water from rivers for hydro-power generation, water supply, horticulture, agriculture, and industry significantly reduces river flows and damages aquatic ecosystems, fisheries, recreation, intrinsic and cultural values.*

3.2 New Plymouth District Council

The NPDC refers to the management of its reserves adjacent to the Waiwhakaiho River in its **Green Space Management Plan** (2019), identifying several relevant areas from the Meeting of the Waters downstream. For the reserves at the Meeting of the Waters, the Plan notes: (p101)

> *The site history relates to the New Plymouth Borough Council's power generation plant which has water piped from Lake Mangamahoe and down a steep slope to the power station turbines (now owned by Trustpower), the outflow from the plant emerging into the tail race to converge with the Waiwhakaiho River. The general area is known as 'Meeting of the Waters' and includes some large reserve areas belonging to the Department of Conservation, accessed from Waiwakaiho Road and also on the other side of the river, accessed from a pedestrian bridge just upstream of TSB TOPEC. The Energy Companies Act 1992 brought about the separation of local authorities from their power generation activities and as a consequence Lake Mangamahoe and the Meeting of the Waters area resulted in a number of land transfers and easements.*
>
> *The Council acquired the land in 1929, 1935 and 1941. There is an esplanade reserve along the river and the remaining land parcels are without reserve status. This land combined with the neighbouring Department of Conservation land, is an important recreational resource in the district….*
>
> *The TSB TOPEC site was formerly managed by YMCA Camp Huinga who had been facilitating outdoor activities at this site since 1954. TSB TOPEC was formed in 1986 and in 1988 The YMCA agreed to their taking over the YMCA Camp Huinga site.*

Polices in the Green Space Management Plan relevant to the River include:

> *6.8.3.2 Policies and management objectives….*
>
> *b) It is anticipated that TSB TOPEC will continue to lease part of this area as an outdoor pursuits and training centre…*
>
> *e) The activities of the kayak club in the tail race area of Meetings of the Waters are acknowledged and anticipated to continue, as well as their use of the private access road to access the tail race near to the convergence of the Waiwhakaiho River.*

The Green Space Management Plan also refers to the facilities in the reserve area as forming part of the proposed 'Taranaki Traverse', a long-term project to develop a mountain to sea walking and cycling experience along the Waiwhakaiho River from its mouth to Egmont National Park.

The Green Space Management Plan refers to numerous but discontinuous esplanade reserves between Burgess Park and the sea (p97). There are no specific references to in-river values for these reserves in the Plan.

The NPDC **Historic Reserves Management Plan** (2010) describes Burgess Park – which is immediately downstream of and adjacent to the Meeting of the Waters at the confluence of the Mangorei Stream – as having a walkway and parking facilities.

The NPDC **Lake Mangamahoe Management Plan** (2011) notes: (p4)

> *The plan recognises that the primary purpose for the Council holding land at Mangamahoe is for water catchment or forestry; these purposes take precedence over any recreational activities. The New Plymouth District Council (NPDC) Bylaw 2008, Part 15 Water Supply, identifies the land at Lake Mangamahoe as a catchment area with restrictions on activities….The management plan refers to Lake Mangamahoe as a park, the definition not being a legal one but of common usage; of a large public area of land used for recreation.*

The Lake Mangamahoe Management Plan notes that, (p15) "*In 2011 the Council … initiated a request to the Minister for Land Information New Zealand to approve the land held by the Council at Lake Mangamahoe to have a secondary purpose of recreation under section 191 of the Public Works Act 1981*." There is, however, no subsequent reference in the NZ Gazette to this having been achieved.

In terms of management responsibility for the Lake and its surrounds, the Lake Mangamahoe Management Plan states: (p14)

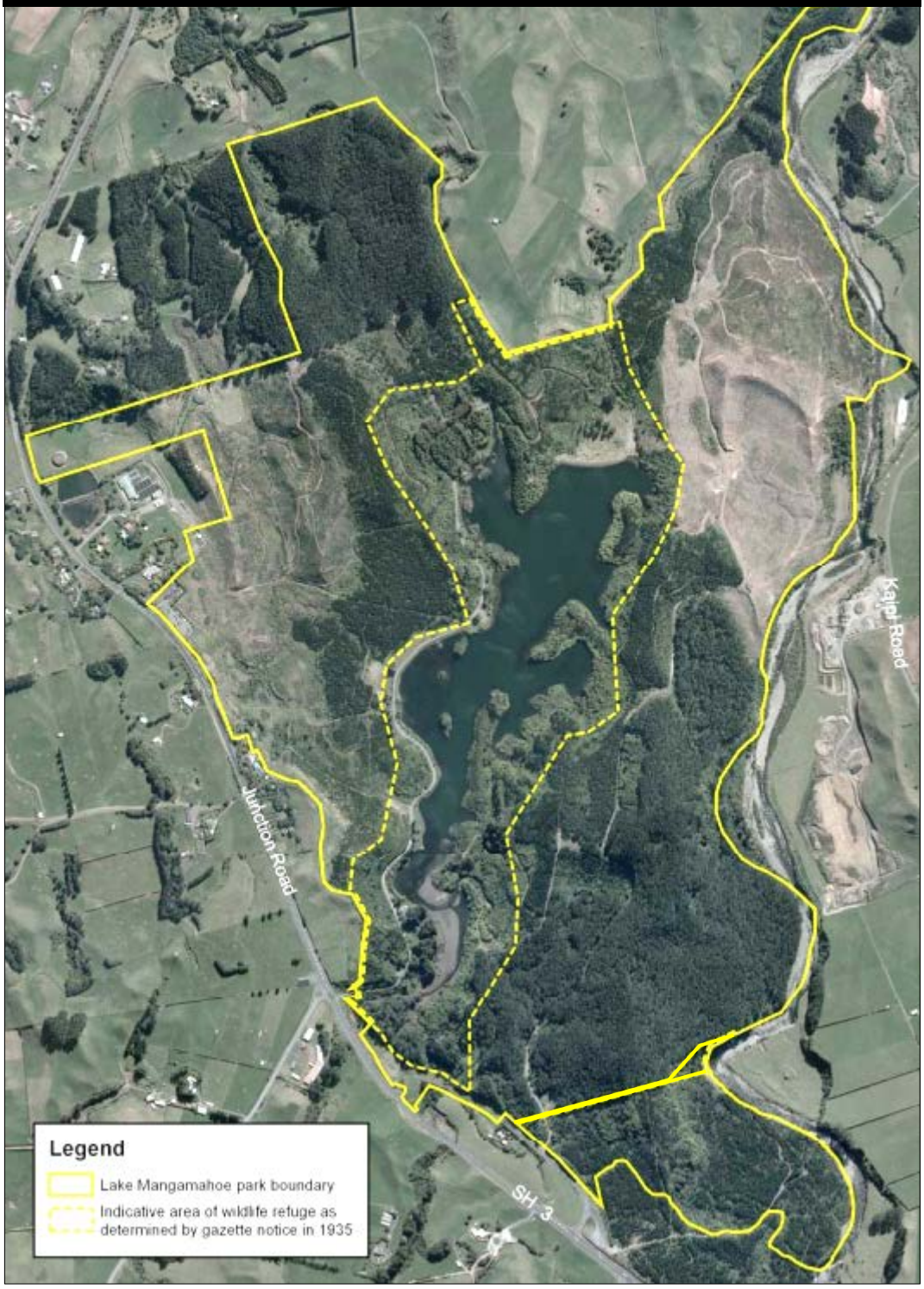
> *The 1998 Agreement between Trustpower (Powerco at that time) granted a licence with rights in perpetuity to the Council, to use the land belonging to Trustpower excepting the reservoir (the lake) and the islands within the reservoir, known as the park strip, as if it were a local purpose reserve under the Reserves Act 1977, or for such public amenity as may be approved by Trustpower. The Council is obliged under the agreement at its expense to maintain and manage the park strip, including vegetation and keeping the lake clear or trees, eroding soil and other debris, as well as drainage.*
>
> *The Council is obliged at its expense to keep and maintain in good order, all roads and access ways in the park strip and plantation reserve (the plantation reserve being land owned by the Council contained in the agreement that is planted in production forestry). The agreement specifies Trustpower and the Council is to annually agree upon a budget of expenditure across a five-year period for the repair and maintenance of these roads and access ways. Any works undertaken by the Council that may affect Trustpower's ability to use the reservoir, require consent from Trustpower.*

The Council is to give at least 14 days' notice of any intended removal of forestry trees. Trustpower can request the removal of forestry trees from the park strip and has the right to remove these trees if the Council does not approve. The Council is obliged to seek consent from Trustpower when planting any trees or undertaking any earthworks, improvements or developments on the park strip.

The license does not create any lease tenancy or interest in the land comprising the park strip, for the Council.

Figure 4, taken from the Lake Mangamahoe Management Plan – with a minor update to clarify the land boundary with Trustpower near the diversion structures on the Waiwhakaiho River – shows the

Figure 4: Lake Mangamahoe park boundary showing 1935 wildlife reserve



total extent of the area covered by the Plan, and an area declared a wildlife sanctuary in 1935 under the then Animals Protection and Game Act 1921-22. This is now a wildlife refuge protected under section 14 of the Wildlife Act 1953. The Lake Mangamahoe Management Plan notes, (p19), "*Some of the land parcels around the perimeter of the refuge have been altered so that the actual extent of the refuge needs clarifying*." The effect of the sanctuary, according to the Lake Mangamahoe Management Plan is: (p19)

> *Care must be taken to ensure waterfowl are not disturbed or interfered with, and prior to their spawning run consideration must be given to trout which generally congregate at the south end of the lake. Restrictions have been placed on the use of boats on Lake Mangamahoe (including any launch, boat, canoe, or similar craft, whether propelled by mechanical power or not) with a permit being required from the Department of Conservation who administer the Act, before their use on the lake.*

The Lake Mangamahoe Management Plan's general policies (p32) identify Lake Mangamahoe as being suitable for "*the following recreation and leisure activities*:"

- Mountain bike riding
- Horse riding
- Walking and running
- Rogaining (long distance cross-country orienteering)
- Orienteering
- Fly fishing
- Emergency training
- Wildlife viewing
- Picnicking
- Dog walking except within the Wildlife Refuge and within 200m from the lake edge
- Other informal active and passive recreation

The Lake Mangamahoe Management Plan notes: (p9):

> *Trout were released into Lake Mangamahoe soon after it was formed and the lake has been open to trout fishing by licensed anglers since 1933. The lake supports a self-sustaining population of wild brown trout and a rainbow trout population maintained by hatchery reared fish released annually by Fish & Game NZ. The Lake Mangamahoe trout fishery is of regional significance.*

There is no reference to managing specific lake levels or water quality in the Management Plan.

The **Operative New Plymouth District Plan** (2013 update 8g) defines the Waiwhakaiho River – along with 24 other rivers and streams – as a Priority Waterbody, "*identified primarily for natural character and/or public access/recreation purposes*." (p76). The **Proposed New Plymouth District Plan** (Sep 2019) identifies 58 rivers and streams and four lakes as Significant Waterbodies (in Schedule 9), including Lake Mangamahoe and the Waiwhakaiho River for: biodiversity, ecological or natural character values; recreational, public, access, scenic or amenity values; cultural values; and water quality values.

3.3 Taranaki Regional Council

The Taranaki Regional Council's (TRC) **Regional Fresh Water Plan** for Taranaki (2001) identifies the Waiwhakaiho River in three reaches as a river catchment with "high natural, ecological and amenity values" for the following values: (Appendix 1A)

Waiwhakaiho River (upper reaches – Egmont National Park to Lake Mangamahoe)

Water quality: Excellent to good water quality; MCI excellent to very good, average 130.

Recreational and fishery values: Access for native fish through most of river. Highly valued angling river. Tributaries provide important native fish habitat.

Aesthetic and scenic values: Highly rated for aesthetic and scenic values.

Comments: Median flow of 4050l/s at Egmont Village. Shallow river. Numerous small rapids and continuous water movement. There are several pools along this section. 39% riparian cover over all reaches of the river, upper reaches consisting of exotic trees or pasture and introduced grasses or weeds.

Waiwhakaiho River (middle reaches – Lake Mangamahoe to Audrey Gale Park)

Water quality: Excellent to good water quality; MCI excellent to very good, average 130.

Recreational and fishery values: Access for native fish through most of river. Highly valued angling river. Very highly rated for recreational uses and values. Tributaries provide important native fish habitat.

Aesthetic and scenic values: Highly rated for aesthetic and scenic values.

Comments: Median flow of 5900l/s at Audrey Gale Park. Series of continuous rocky rapids with segments of swiftly flowing turbulent white water. Eddies and pools occur below the rapids. 39% riparian cover over all reaches of the river, middle reaches consisting of mixed vegetation including indigenous.

Waiwhakaiho River (lower reaches – Audrey Gale Park to river mouth)

Water quality: No comment

Recreational and fishery values: Access for native fish through most of river. Highly valued angling river. Very highly rated for recreational uses and values, including whitebaiting. Tributaries provide important native fish habitat.

Aesthetic and scenic values: No comment.

Comments: Median flow of 5900l/s (estimate) at river mouth is one of the highest of ring plain rivers. Slower moving section of the river with some rapids and pools. 39% riparian cover over all reaches of the river, lower reaches consisting of barren or introduced grasses and weeds.

Lake Mangamahoe and the Mangamahoe River are not discussed in the Plan. The Mangorei Stream is noted in Appendix 1A as, "*Important for maintaining water levels and flows in lower Waiwhakaiho River*."

The 2016 TRC report *Freshwater bodies of outstanding or significant value in the Taranaki region - Review of the Regional Fresh Water Plan for Taranaki* sought to identify water bodies that contain outstanding or regionally significant instream values. The Review found the Waiwhakaiho River to be (noting that in some contexts the River was described as a 'catchment'[1] and in others a specific waterbody):

- One of 20 rivers and streams in the Region to be regionally significant for their aesthetic and scenic values;

[1] *"Catchment may include one or more specific waterbodies identified in the main body of the report, i.e. a number of identified rivers, lakes or streams lie within a specific catchment*." (p86)

- One of 12 rivers and streams in the Region to be regionally significant for contact recreation, specifically at Merrilands Domain, Burgess Park/Meeting of the Waters Scenic Reserve ("power house pool"), Rimu Street extension at Strandon, and adjacent to Lake Rotomanu;
- One of 18 rivers and streams in the Region to be regionally significant for trout fishing, including the River main stem, Mangorei Stream, Kai Auai Stream, Lake Rotomanu and Lake Mangamahoe;
- One of 20 rivers and streams in the Region to be regionally significant for whitebaiting, 1km upstream of the mouth;
- One of 51 rivers and streams in the Region to be regionally significant for native fishery habitat values (banded kokopu, giant kokopu, koaro, inanga, lamprey, longfin eels, short jawed kokopu – some of which have recreation value), including the River main stem, Araheke Stream, Kai Auahi Stream, Korito Stream, Mangamahoe Stream, Manganaha Stream, Mangaone Stream, Mangaotukutuku Stream, Mangawarawara Stream, Mangorei Stream, Taruawakanga Stream and an unnamed wetland.

The Waiwhakaiho 'catchment' was one of nine in the Region – from 77 identified in the Review – with 'outstanding or significant freshwater values' for all of the six values assessed: Aesthetic and scenic values; Contact recreation; Fisheries - trout or whitebait; Spawning habitat - trout or inanga; Native fisheries; and Cultural, spiritual and historical associations. However, only four rivers and lakes in the Region were found to be "*outstanding and/or needing to be maintained in their high natural state*": (p21)

- Hangatahua (Stony) River
- Maketawa and Ngatoro streams
- Lake Rotokare
- Upper Manganui River (provisionally)

Lake Mangamahoe was only referenced in the Review as part of the Waiwhakaiho catchment.

5 Activity descriptions from literature

Appendix 1 contains a summary of published data relating to recreation, by activity, for the Waiwhakaiho catchment. The key findings are:

Trout fishing

- Angling effort in the Taranaki Region tends to be thinly dispersed over approximately 50 waterbodies, with, for the 2014/15 season, only three surpassing 1,000 angler days individually: the Manganui-o-te-ao River (at 1,230 angler days in 2014/15); the Waiwhakaiho River (1,210 angler days) and Lake Mangamahoe (1,210 angler days). The Waiwhakaiho catchment, including Lake Rotomanu with 730 angler days, contributed more than a third of all angler days across the Region.
- Lake Mangamahoe is open to shore-based fishing only (no boats) for the full year, while the Waiwhakaiho River is only open all year in the lower reaches in New Plymouth downstream of Rimu Street. Otherwise the season for the River is from 1 October to 30 April.
- Published angling guides recommend fishing in the Waiwhakaiho River upstream of Lake Mangamahoe and below the Scheme tailrace, with the residual reach providing the 'occasional fish'. One notes, "*The lower reaches often fish well early in the morning before the power station discharge begins. The river's proximity to New Plymouth means it is heavily fished*."

Kayaking and rafting

- The Waiwhakaiho River is one of the five main whitewater kayaking rivers in Taranaki, along with the Stony, Mangorei and Manganui Rivers and Kiri Stream. The Waiwhakaiho is navigable from the National Park to the sea, and flow recommendations are for after rainfall at 20m^3/s, although it is possible to 'scrape by with less'.
- There is no advertised commercial rafting on the Waiwhakaiho River, but it is offered by TOPEC as one of their adventure activities, as well as on the Manganui and Waitara Rivers.

Swimming

- There are no published data to show the scale and location of swimming in Taranaki. Bathing water quality on the Waiwhakaiho River is monitored at the Merrilands Domain (4km from the coast) and adjacent to Lake Rotomanu at the coast. TRC ranked monitored sites by relative water quality standards for contact recreation for the region, placing the Waiwhakaiho River at Merrilands 6th and near the coast at 15th (out of 16 waterbodies).

Jet boating

- There is no uplift of the 5 knot Maritime Rule for boat speeds on the Waiwhakaiho River, and so no jet boating.

Whitebaiting

- The whitebait fishing season for Taranaki (and most of New Zealand) opens on 15 August and runs until 30 November. Fishing is only permitted between 5:00 am and 8:00 pm, or between 6:00 am and 9:00 pm when New Zealand Daylight Saving is being observed.
- Recreational whitebaiting is generally a poorly researched activity. No recent quantification of whitebaiting activity in Taranaki has been located for this report, with the most comprehensive study dating from 1981 and prepared by the Taranaki Catchment Commission. This reported whitebait catches up to 4 or 5 km upstream of the coast, with up to 76 whitebaiters counted.

Hunting

- There is little literature about hunting in the study area. Hunting is not permitted on Lake Mangamahoe, but otherwise the season extends from 4 May to 30 June (in 2019).

Terrestrial recreation

- Lake Mangamahoe provides the main public mountain bike trails in Taranaki and the main public equestrian setting in, at least, the New Plymouth District. The reserve land to the west of the Lake is a dedicated bridle zone and the eastern side is a mountain bike park, with all tracks shared with runners and walkers. Section 3.2 includes more detail about recreation amenity and management at Lake Mangamahoe.
- Two walking tracks are provided by the Department of Conservation at the Meeting of the Waters – the 45 minute Araheke Bush Loop Walk and the 20 minute Meeting of the Waters Walk.
- The Waiwhakaiho Pathway, developed by NPDC, follows parallel to the lower Waiwhakaiho River from opposite Skeet Place to Raiomiti Street.

6 Interview summaries

Key recreational users were identified and interviewed or contacted via email to gain an understanding of users' perceptions of the quality and nature of the recreational experience on the Waiwhakaiho River, Lake Mangamahoe and adjacent recreation settings, and the perceived effect of the Scheme on their experience.

Full interview summaries are provided in Appendix 1 (not all wished to be quoted). Interviewees indicated a variety of perceptions about changes to recreation values over time, with regard to water quality. Key points include:

- For kayaking and rafting, the Mangorei tailrace is potentially the most significant whitewater resource in Taranaki (and further afield), without which there would be little whitewater education in the region and certainly no school programmes. The tailrace is one of the few 'park and play' whitewater venues close to a centre of population nationally, and which is available most of the time. Access along the length of the tailrace allows for effective supervision of users, and there is a safe run-out into the Waiwhakaiho River.
- The tailrace has been developed by the New Plymouth Kayak Club with the cooperation of Trustpower to provide a series of hydraulic features suitable for beginners practicing basic skills (at around 4 m^3/s) to advanced playboating (at around 7m^3/s). Trustpower is considered very favourably by the kayaking community for its cooperation in this development, and by sharing information about flows, and providing suitable flows when possible for events and education programmes.
- The Waiwhakaiho River is one of the main kayaking rivers in Taranaki, but requires rainfall to be of any real value (at least 20m^3/s at Egmont Village). At these flows, the residual reach, weir and diversion structures are not impediments. The weir has not caused any significant issue for kayakers (although one kayaker was reported to have had difficulties exiting the hydraulic feature below the weir), but could be a hazard if someone was not aware of it and was surprised. Additional signage upstream could be useful.
- Below the Meeting of the Waters, the Waiwhakaiho can be run by kayaks and rafts when the Scheme is generating at 7 or 8 m^3/s, but use is generally rain-dependent.
- The Waiwhakaiho River is a regionally significant trout fishery, with the occasional rainbow caught. The residual reach between the Scheme intake and the Meeting of the Waters is a valued early-season fishery, but access is not easy and so use is not high. As the season progresses, water temperatures rise and periphyton growths tend to increase, and fishing quality decreases. Increased base flows to reduce summer water temperatures and flushing flows to clear periphyton would improve the angling amenity through the summer season. Flow variability due to the generation regime was considered to reduce habitat in the River below the tailrace.
- Lake Mangamahoe is also a regionally significant trout fishery, with a natural population of brown trout, while Fish & Game release around 300 hatchery-reared rainbows each year. The stability of the lake level maintains quality habitat. Sedimentation has shallowed the upper reaches of the Lake since its construction, and while this has been good for wildfowl, habitat for trout is considered by Fish and Game to be more important.

7 Effects on recreation of the operation of the Mangorei HEP Scheme

The effects of the operation of the Scheme for recreation can be considered to be broadly positive due to Lake Mangamahoe offering a significant park setting and one of the region's most popular trout fisheries, and the development of the Scheme tailrace as a key feature of whitewater activity in Taranaki.

Interviews undertaken with recreational users identified what interviewees considered to be *potentially* adverse effects. These interview responses and the report author's own assessment have formed the basis of the assessment of potential adverse effects of Scheme operation on recreation values. The potential recreation issues identified were:

- The effects associated with the diversion of water from the Waiwhakaiho River and the creation of a 5,700m residual flow reach upstream of the Meeting of the Waters with potential effects on kayakers (due to reduced flows), anglers (due to reduced flows and habitat effects on trout) and whitebaiters (due to potential changes in habitat for inanga only as whitebaiting occurs in the River near the coast);
- The location of a weir, diversion structure and fish pass in the bed of the Waiwhakaiho River; a potential hazard to kayakers, and of interest to anglers by allowing for the passage of trout above and below the weir; and
- Effects on trout from varying generation discharges within the littoral zone of the Waiwhakaiho River below the tailrace, and the potential for effects on whitewater activities below the tailrace from flow variability.

There are no adverse effects of the continued operation of the Scheme on Lake Mangamahoe considering that no changes are proposed to its operational regime, and it is currently supplying a valued recreation resource.

There are no indications that the operation of the Scheme has effects on kayaking and rafting in the Waiwhakaiho River, as whitewater amenity above and below the intake depends on recent rainfall and flows above 20m^3/s. At these flows, the residual reach is reported to be quite useable. Below the Meeting of the Waters, the River is described as runnable when the Scheme is generating at least 7 m^3/s, or has a baseflow of 13m^3/s.

The Waiwhakaiho River flows at above 20m^3/s at SH3 (above the intake) just below 6% of the time annually (based on 2013 to 2019 data provided in the Tonkin & Taylor *Reconsenting of Mangorei Hydroelectric Power Scheme Hydrology Report*), and just over 3% of the time in summer (December to February). In the residual reach, 20m^3/s flows are exceeded just over 4% of the time annually and just under 3% of the time in summer. The tailrace discharge exceeds 7m^3/s 28% of the time annually and 13% of the time in summer. A flow of at least 13m^3/s is available downstream of the tailrace 14% of the time annually and just over 6% of the time in summer. At SH3, 13m^3/s is available just over 12% of the time annually and 5% of the time in summer.

These changes in flow availability represent minor changes in whitewater availability; and interviewees reported no issues with the Scheme operation in the Waiwhakaiho River. The weir and diversion structures were similarly considered easily navigable and of little difference to natural in-river features, although considering one reported minor incident with a kayaker at the weir, additional up-river signage would be prudent.

Effects of residual flow and flow variability on fish habitat are considered by Ryder Consulting in the *Mangorei HEPS Aquatic Ecology AEE.* This recommends additional flows during elevated temperatures in the residual reach when summer water temperatures exceed 25ºC, and the implementation of a flushing flow regime between 1 November and 30 April when periphyton levels

in the residual reach exceeds guideline levels. Both these proposals could reduce the availability of kayaking flows in the Scheme tailrace by diverting water from the Scheme.

Inanga (whitebait) were found to be present throughout the River, including the residual reach, and feeding habitat in the residual reach was found to be greater for inanga compared with a natural flow.

Flow variability downstream of the Scheme tailrace was found to maintain similar macroinvertebrate populations to those in the residual reach and, in recent summers, to that above the Scheme intake – being typically indicative of 'poor' macroinvertebrate community health. The Scheme discharge was also found to have a positive cooling effect on water temperature and a flushing effect on periphyton. No changes to the generation pattern have been recommended.

The fish pass was found to be functioning well in the Ryder Consulting report *Fish Passage and Fish Screening at the Mangorei HEPS*.

8 Conclusion

The Mangorei HEP Scheme has created two regionally significant recreation resources – the fishing and park setting at Lake Mangamahoe, and the whitewater opportunity in the Scheme tailrace. The latter underpins much of the whitewater amenity in the region, and further afield, by supplying an important kayaking and rafting education, play and event setting. Trustpower has developed a positive relationship with the whitewater community by providing advice about likely flows in the tailrace and maintaining minimum flows when possible. The whitewater community appears to recognise and accept the constraints on flow availability considering the Scheme's dependency on inflows.

Effects on whitewater opportunities in the Waiwhakaiho River are minimal due to the need for high rainfall events to provide amenity. The ability to use the residual reach of the River in these conditions is not affected.

The Scheme has a positive contribution on fishing at Lake Mangamahoe, while the residual reach of the Waiwhakaiho River has poor angling access. The Scheme and a low levels of adverse effect on angling at the regional level in the residual reach of the Waiwhakaiho River in late summer. Enhanced flow management methods are proposed to help minimise high water temperatures and to reduce excessive periphyton growth in the residual reach.

Scheme effects on recreation below the tailrace, considering flow variability, are minor.

Overall, the Scheme contributes positively to the recreation opportunities in the region.

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Appendix 1: Literature review

Trout fishing

The Taranaki Fish & Game Region, with – according to the Fish & Game Council's periodic national angler survey (Unwin 2016) – 9,010 angler days in the 2014/15 season – and 0.7% of the national total – has the lowest level of angling activity nationally after Northland (with 1,600 angler days). By comparison, the Taupo Conservancy featured 127,700 angler days and 10% of the national angler effort in 2014/15. Taranaki also had the second lowest estimated level of angling by overseas visitors at 170 angler days, compared with 60 in Northland.

Angling effort in the Taranaki Region tends to be thinly dispersed over approximately 50 waterbodies, with, for the 2014/15 season, only three surpassing 1,000 angler days individually: the Manganui-o-te-ao River (at 1,230 angler days in 2014/15); the Waiwhakaiho River (1,210 angler days) and Lake Mangamahoe (1,210 angler days). The Waiwhakaiho catchment, including Lake Rotomanu with 730 angler days, contributed more than a third of all angler days across the Region (Unwin 2016).

Angling effort on the Waiwhakaiho River was estimated to be similar to 2007/08 in the 2014/15 season, with 1,240 angler days, but previously-measured seasons were much less popular at 340 angler days in 2001/02 and 540 in 1994/95. Lake Mangamahoe had a little less variability with, in the 2007/087 season, 1,920 angler days, 830 angler days in 2001/02 and 1,380 in 1994/95 (Unwin 2009). Teirney *et al* (1984), in the first series of national angler surveys, reported 1,113 angling 'visits' (same as an angler day) for the 1980/81 season, making it the most popular river in the equivalent, at the time, of the Taranaki Fish & Game Region (lakes were not surveyed at the time and only fishing licence holders in Taranaki were surveyed).

Lake Mangamahoe is open to shore-based fishing only (no boats) for the full year, while the Waiwhakaiho River is only open all year in the lower reaches in New Plymouth downstream of Rimu Street. Otherwise the season for the River is from 1 October to 30 April (New Zealand Gazette Anglers' Notice for Fish and Game Regions 2019). Figure 5 shows the seasonal pattern of angling on the entire Waiwhakaiho River for the 2013/14 and 2007/08 seasons, with similar patterns of reasonably consistent effort from October to March. Figure 6 shows a more consistent pattern through the year for Lake Mangamahoe, with an apparent aberration in August and September in

Figure 5: Waiwhakaiho River angler days by season (Unwin 2016 & 2009)

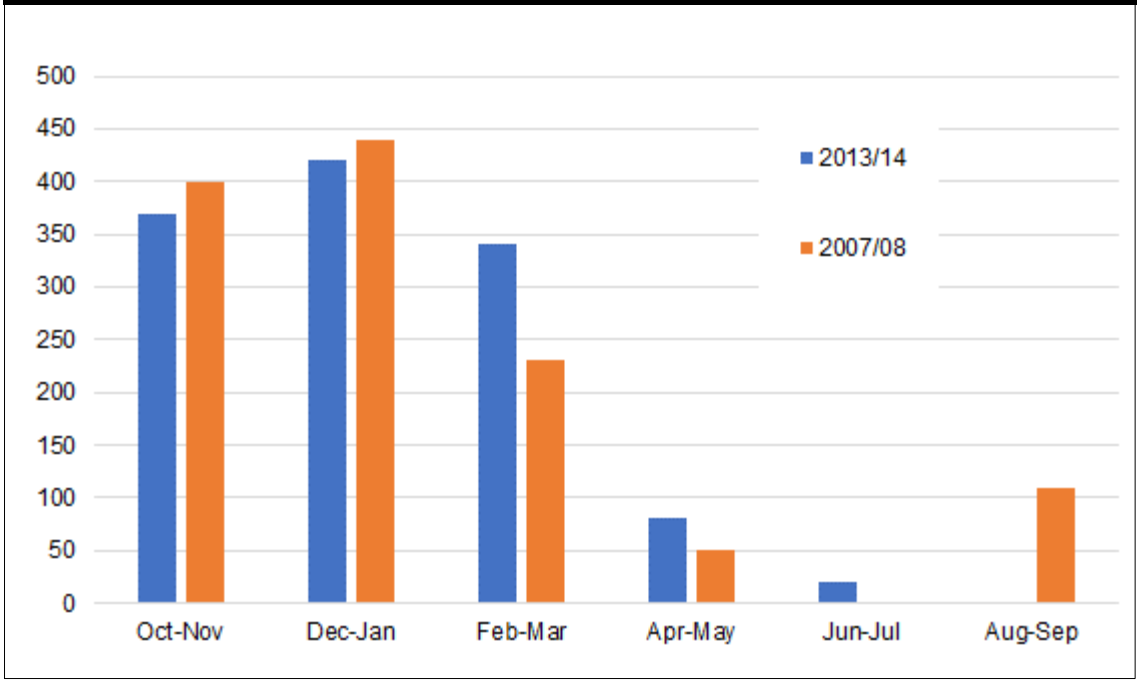
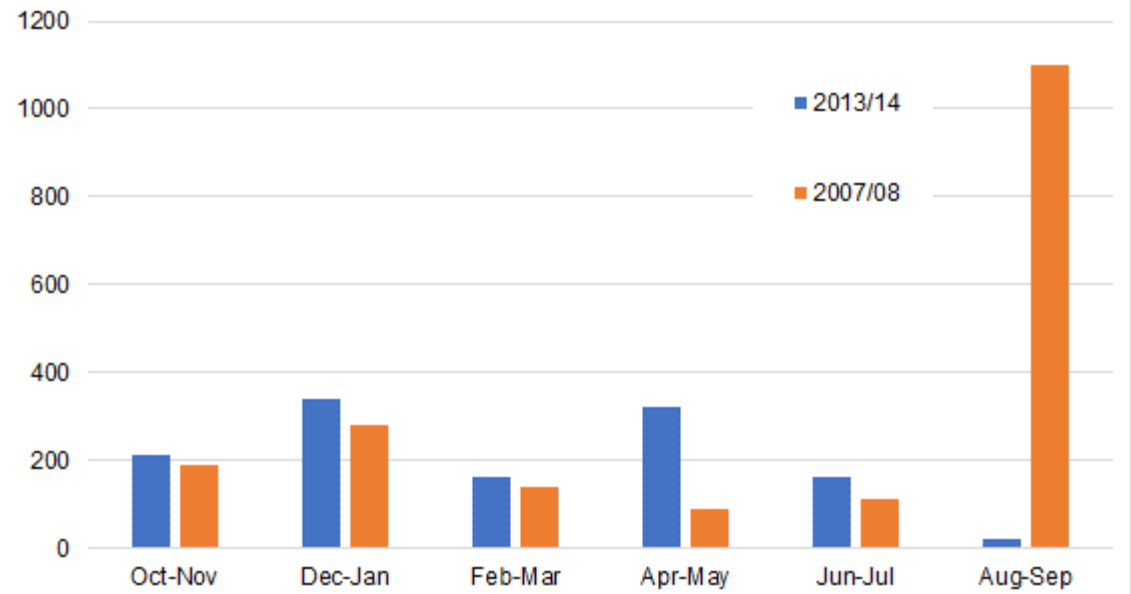


Figure 6: Lake Mangamahoe angler days by season (Unwin 2016 & 2009)



2008. The margin of error for the count of 1,110 angler days in that period is reported to be quite high at ±840 (Unwin 2009) and may represent an extrapolation from an unusually high level of activity by a small number of anglers.

Unwin (2013) is a survey of relative national angling river values based on an update of the survey methodology used in the national angler surveys of the 1979/81 season (Richardson *et al* 1984, for example) and a pilot survey undertaken in the Otago and Nelson/Marlborough F&G regions (Unwin 2009). The survey was distributed online to a random sample of 11,923 whole-season and family licence holders for the 2011/2012 angling season. Parallel telephone surveys on non-respondents in the Southland, Wellington, and Hawkes Bay regions were completed to test for sample bias.[2]

Respondents were asked to identify rivers they had fished over the last 3-5 years, to rate their enjoyment of the fishery on a scale from 1 (least enjoyable) to 5 (most enjoyable), and to identify up to three reasons, from a list of ten, why they fished each river. These were: Close to home, Close to holiday home, Easy access to river, Plenty of fishable water, Scenic beauty, Wilderness feeling, Angling challenge, Expect good catch rate, Chance to catch trophy fish, Other (including a brief description). No lakes were considered in the study.

Summary scores for enjoyment level, and for nine of the ten reasons why respondents fished each river (excluding "Other"), were generated for all rivers. The enjoyment level was calculated as the numerical average of the individual 1-5 ratings. Scores for each reason (or attribute) were generated by expressing the number of respondents who had nominated that reason as a fraction of the total number of respondents who had fished each river, yielding an attribute score from 0-1.

The Waiwhakaiho River was ranked (out of 13 popular rivers in Taranaki):

- 2nd for level of use,

[2] Unwin (2013) reported: "Online respondents were more active than telephone respondents, fishing more rivers (11.9 vs. 4.2 rivers per respondent, respectively), in more regions (2.4 vs. 1.5 regions per respondent, respectively), but were more conservative when ranking rivers according to their level of enjoyment. A likely explanation is that respondents who took the effort to respond to the online survey, who represent only 14.9% of the recipients, were more committed anglers than telephone respondents, who represented 71% - 92% of those interviewed. The pooled online responses therefore provide comparative data on New Zealand rivers as assessed by a large pool (1,650) of experienced river anglers, akin to the views of an expert panel."

- 9th for enjoyment,
- 2nd for close to home,
- 7th for close to holiday home,
- 5th equal for ease of access,
- 6th for area fishable,
- 12th for scenic beauty,
- 27th for wilderness feeling,
- 11th for angling challenge,
- 5th for anticipated catch rate,
- 6th equal for anticipate large fish.

Table 1 shows these data as their individual measure and compares them with the means for all Taranaki and New Zealand rivers. The Waiwhakaiho River stands out for its value as a river 'close to home' and for a relatively low rating for 'wilderness feeling'.

Table 1: Values of New Zealand angling rivers - Taranaki. Source: Unwin (2013).	**Total responses**	**Mean Enjoyment Score**	**Close to home**	**Close to holiday home**	**Ease of access**	**Area of fishable water**	**Scenic beauty**	**Wilderness feeling**	**Angling challenge**	**Anticipate good catch rate**	**Anticipate large fish**	**Other**
Waiwhakaiho River	36	2.22	83%	6%	39%	28%	17%	3%	22%	19%	3%	8%
Mean all Taranaki rivers	26	2.42	54%	7%	35%	32%	26%	16%	34%	17%	3%	8%
Mean (all NZ rivers)	41	2.38	27%	10%	33%	29%	32%	25%	32%	16%	8%	4%

Fish & Game Taranaki briefly describes fishing in the region on its website:[3]

> *Most Taranaki trout fisheries have their source within the Egmont or Tongariro National Parks and provide a high-quality angling experience in a scenic and un-crowded environment.*
>
> *Even the most popular Taranaki fisheries have a low level of angling use by national standards.*
>
> *More than 40 small to medium sized trout streams radiate from the base of Mt Taranaki.*
>
> *These rivers and streams can provide quality 'sight fishing' opportunities for brown trout, which while often not present in great numbers may be of large size.*
>
> *However, with only limited numbers of large trout which are often quite old, some of these fisheries cannot stand 'excessive' pressure.*
>
> *This is why we haven't listed details for many of these streams in the following information.*
>
> *Nevertheless, for those anglers prepared to explore, there are some very special opportunities hidden away with the added bonus of the peace and solitude that comes with fishing these streams.*

[3] https://fishandgame.org.nz/taranaki/freshwater-fishing-in-new-zealand/

Angling advice specific to the Waiwhakaiho River includes:[4]

> *New Plymouth's closest river is best fished in its upper reaches upstream of Lake Mangamahoe, or in the lower river below the outlet of Mangorei power station.*
>
> *The Waiwhakaiho is subject to very rapid rises in river level following heavy rainfall on the mountain – so please check rainfall and river flows … before going fishing.*
>
> *In the lower river, generation from the Mangorei power station can result in a 20cm rise in water level and an increase in flow from around two cumecs to nine cumecs, so care should be taken when crossing as you could end up stranded on the wrong side of the river….*
>
> *The upper river is characterised by good water quality, bouldery riffles, runs and pocket-water with moderately-sized pools and large brown trout…*
>
> *A favoured spot is the run and pool immediately downstream of the Mangorei Stream confluence.*
>
> *A kilometre further upstream, Waiwhakaiho Road off SH3 gives access to the "power-house pool", which is where the discharge from Mangorei power station enters the river. Over the years, some very large brown trout have been caught in this pool.*
>
> *There is a public picnic area adjacent to the carpark.*
>
> *The 6km reach upstream from the power house pool to the Mangorei hydro scheme diversion weir is subject to a 400 – 700 l/s residual flow regime during low flow periods and supports just the occasional fish.*
>
> *Early season bait fishing with a creeper or worm suspended under a bubble float is effective in the lower river, which typically fishes well in the mornings before the power station discharge begins, or in the evenings when generation ramps down.*

And Lake Mangamahoe is also described:[5]

> *Located midway between New Plymouth and Inglewood on SH3, Lake Mangamahoe is the region's most popular lake fishery, holding brown trout up to 2.6 kg and rainbows up to 2.25kg.*
>
> *Modest numbers of adipose fin-clipped hatchery rainbows are released annually to maintain the rainbow fishery.*
>
> *Trout often cruise the lake margin in shallow water and a number of bays provide good fishing.*
>
> *Lake Mangamahoe is designated fly-fishing only.*
>
> *Created in 1933 to provide water for the Mangorei hydro scheme, the lake also serves as the water supply for New Plymouth and is a Wildlife Refuge. Owing to these uses, boats are not permitted to be used on the lake….*
>
> *The lake has good water quality and clarity, which allows for a wide variety of fishing styles – from setting an ambush with a small nymph, to retrieving a lake fly up over the weed beds….*
>
> *All in all with its attractive setting and varied fishing opportunities Lake Mangamahoe is definitely worth a visit.*

[4] https://fishandgame.org.nz/taranaki/freshwater-fishing-in-new-zealand/fishing-locations-and-access/taranaki-ringplan/
[5] ibid

Kent (2006) describes the Waiwhakaiho River and Lake Mangamahoe in his comprehensive angling guide to the North Island:

> *Waiwhakaiho River*
>
> *The upper reaches of this medium-sized river fish well early in the season. Pools and rocky runs are well formed, the riverbed is composed of boulders and stones and casting is generally not a problem. Use a wading stick for river crossings. Holds around 5-10 takeable browns per kilometre of river and most are caught by blind nymph fishing. Conditions suit dry fly fishing, mostly in the evening. The river flows across farmland with patches of bush and scrub lining the banks. The lower reaches often fish well early in the morning before the power station discharge begins. The river's proximity to New Plymouth means it is heavily fished.*
>
> *Lake Mangamahoe*
>
> *This small, picturesque lake has been created for power generation by damming the Mangamahoe Stream. It lies in a beautiful setting with tree ferns growing around the perimeter and a tree-framed view of Mt Taranaki. It is a grand picnic spot. Being a wildlife refuge, the lake is home to a variety of water fowl. While the eastern shore is overgrown and difficult, the western access from the road is simple and casting is unobstructed. Browns and 'r' type rainbows have been regularly liberated into this lake and fish can sometimes be seen cruising the shallows. .. This is an ideal lake for junior or novice anglers.*

Kayaking and rafting

The New Plymouth Kayak Club identifies on its website the main kayaking rivers in Taranaki. These are shown in Figure 7 and include the Waitara, Waiwhakaiho, Manganui, Hangatahua (Stony) and Mangorei Rivers and Kiri Stream. Figure 7 shows the named river runs and the get-in and out points for each section.[6] Figure 8 shows the map detail for the Waiwhakaiho River. Online text describing the Waiwhakaiho is:[7]

> ***The Lower Waiwhakaiho*** *is a good grade II run with one grade III rapid near the start.*
>
> *Rive Gauge : Waiwhakaiho Rimu Street*
>
> *Good flow is more than 20 cumecs but can scrape down with less.*
>
> *Run from Meeting of the Waters, take out options are Audrey Gale reserve, Just below the SH3 road bridge in the Valley, or continue to the Te Rewa Rewa bridge or the sea.*
>
> ***Mid and Upper Waiwhakaiho and Kai Auahi***
>
> *The Mid Waiwhakaiho is an excellent Grade III run, the continuous nature of the rapids might make it grade IV when the level is up. Mid section is usually run from the Alfred Road bridge on the Kai Auhai Stream to the Meeting of the Waters, 8.7 kms with a drop of 120m.*
>
> *River gauge: Waiwhakaiho Egmont Village*
>
> *Good flows are from 18-80 cumecs*
>
> ***The Upper sections*** *require a bit more water (25+ on the gauge), the Kai Auahi Stream and Waiwhakaiho River are both good runs, the Waiwhakaiho has a section through a gorge with more bends so is slightly longer.*

[6] https://simon-maps.maps.arcgis.com/apps/View/index.html?appid=f6d6b00d7a7f44fe8ff66bc8398f394e&extent=173.0383,-39.7129,175.8053,-38.6883
[7] https://www.npkc.org.nz/Rivers

The drop is about 150m for both and length about 7kms to the confluence just upstream of the road bridge.

Figure 7: New Plymouth Kayak Club – identified Taranaki kayak rivers, sections, and get-ins and outs

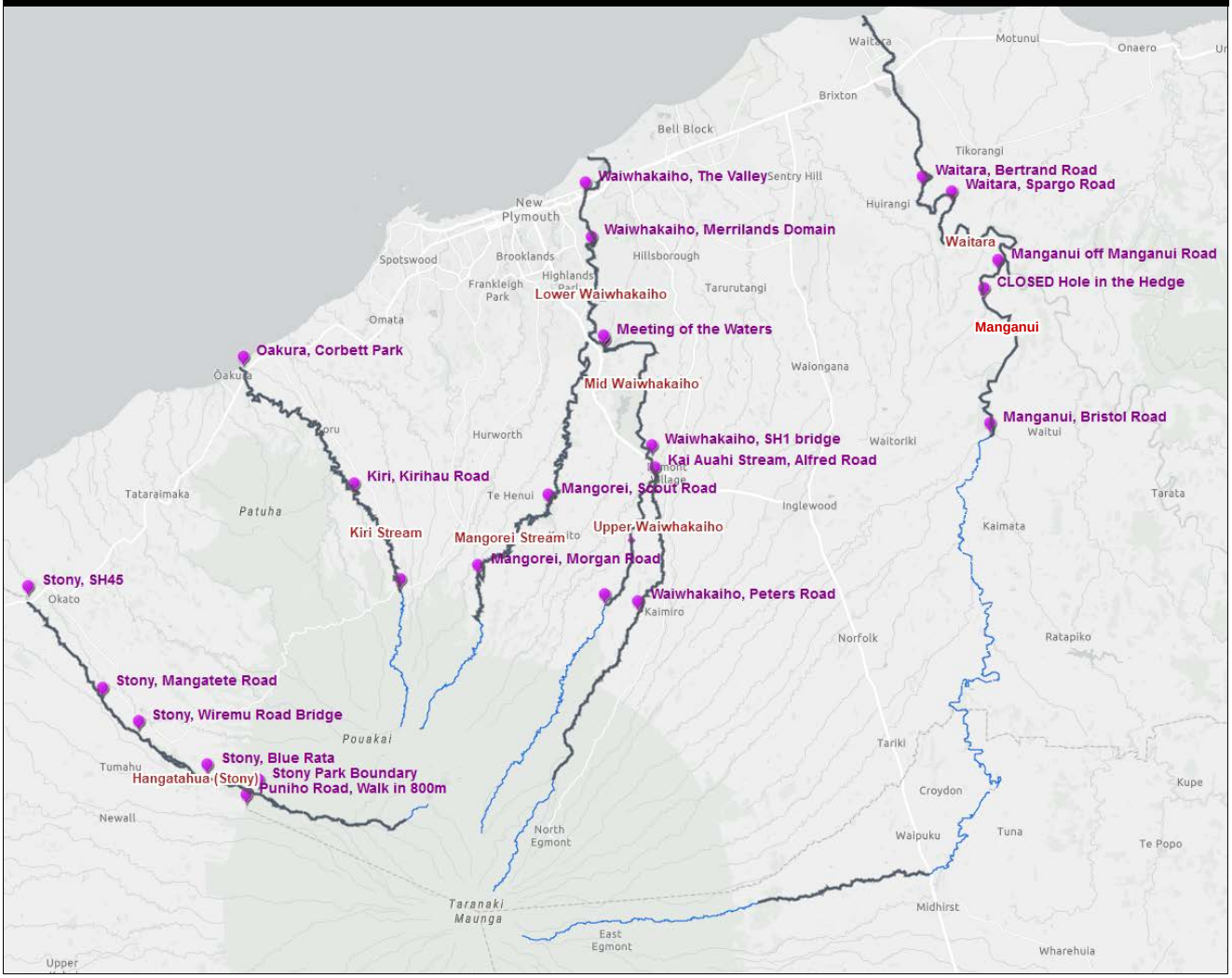
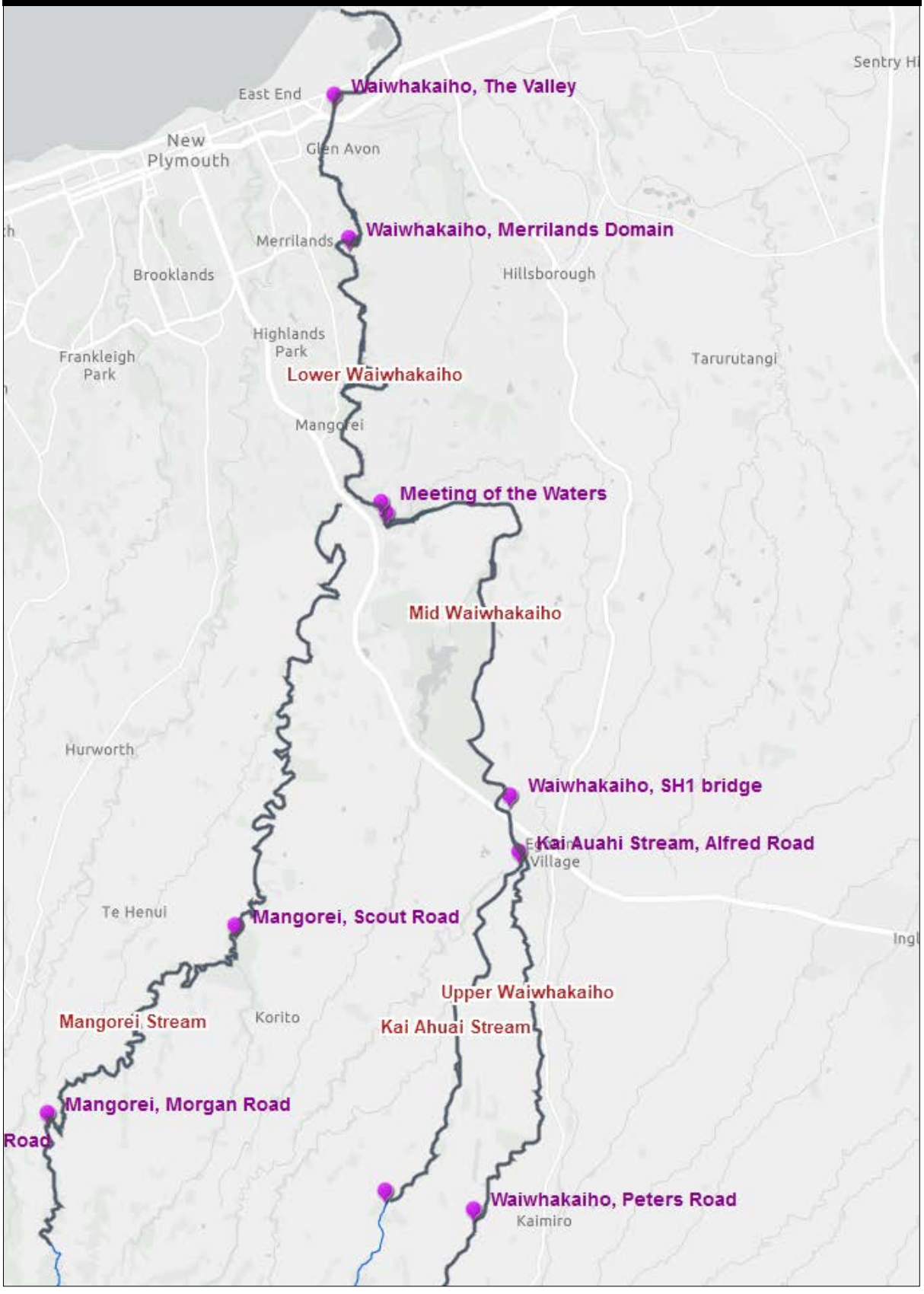


Figure 8: New Plymouth Kayak Club – Waiwhakaiho River sections, and get-ins and outs



The 5th edition of *New Zealand Whitewater: 180 Great Kayaking Runs* (Charles 2013) - the only published current popular guide for kayaking – describes the Waiwhakaiho River:

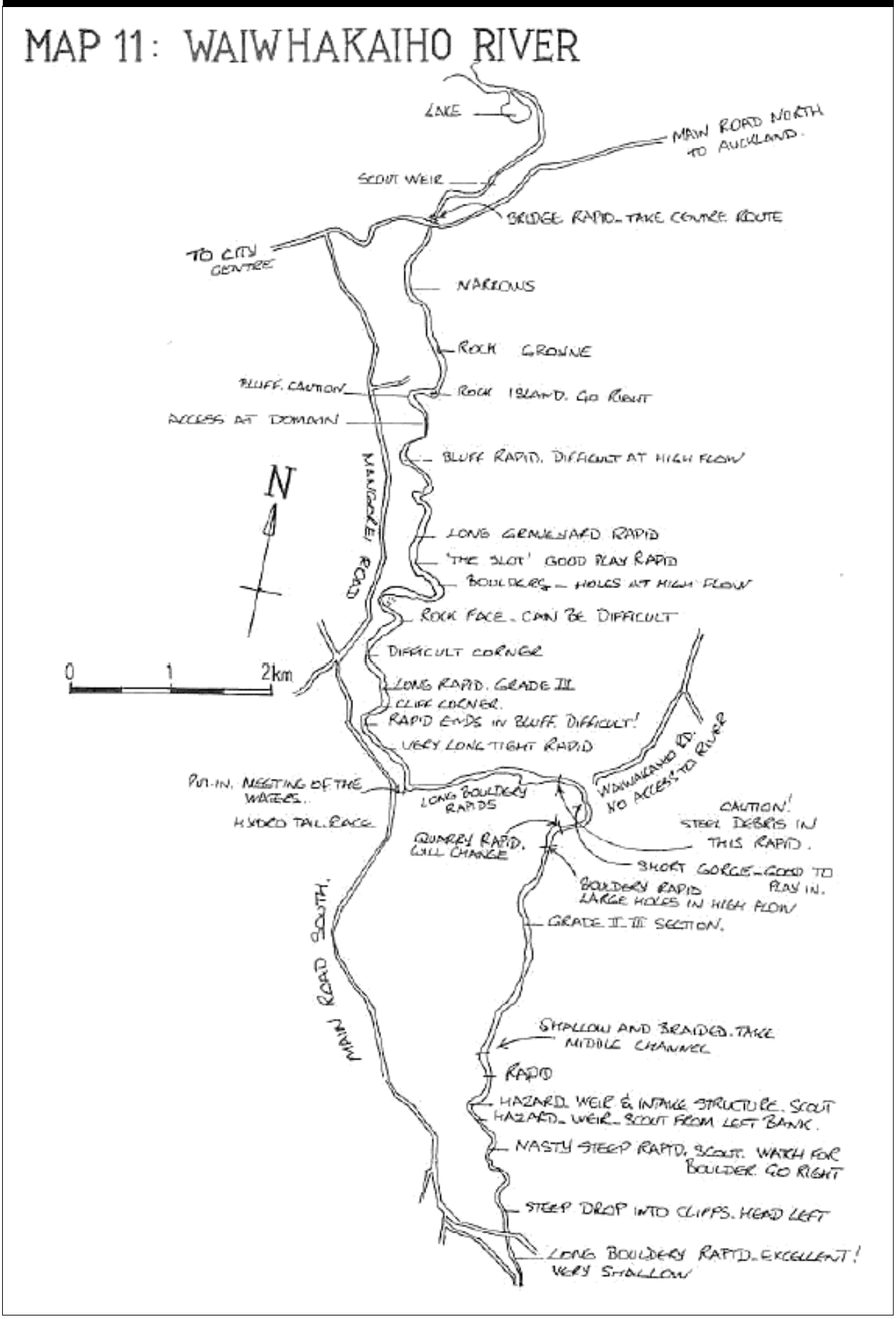
> *When the rain hits and the power station at Mangorei reports a gauge of 2.5 or more, this small river flowing off the northern slopes of Mt Taranaki turns into exciting, continuous Class III+ water.[8] As flows creep up to between 3-4, prepare for a fast moving, hard hitting, rollercoaster which is more Class IV than III . The Waiwhakaiho starts off steep, high on the mountain, but the gradient falls off rapidly as the river eases out to the Tasman Sea via the northern suburbs of New Plymouth. At normal flows the river is not feasible to run.*
>
> *From the bridge near Egmont Village down to the Meeting of the Waters, the river is steeper, faster and more technical than the lower section. The river can be run as a whole trip or split into two sections. The lower section, from the Meeting of the Waters to Mangorei Domain, is mainly Class II-III even at high flows.*
>
> *The action comes very fast on the top section with one of the most testing rapids in the first kilometre. A weir and intake structure for Lake Mangamahoe requires some caution. The right bank offers the best scouting opportunities. After this, conditions ease off with a few kilometres of bouncy Class II-III water down to a small gorge. Heralded by a quarry site on the right, the gorge ends in a sizeable drop to keep you on your toes then into boulder garden rapids for the last kilometre to the Meeting of the Waters.*
>
> *There is a slalom site and short rapid run in the tailrace water from the base of Taranaki Outdoor Pursuits and Education Centre (TOPEC). Below the Meeting of the Waters most of the difficulty lies in the style of rapids. Most have a straight upper part leading into a sharp corner where the water piles into the wall. The Slot is the crux of this section and also where you will find some of the best playing.*
>
> *TO GET TO THE TAKE OUT: The lower take out is at the SH3 bridge over the Waiwhakaiho, on the eastern exit of the city. The Meeting of the Waters take out is off SH3 about halfway between Egmont Village and New Plymouth. It is signposted on SH3.*
>
> *TO GET TO THE PUT IN: Continue south from New Plymouth on SH3 towards Egmont Village. Put in at the Waiwhakaiho Bridge just before Egmont Village.*
>
> *CLASS: III-IV*
>
> *LEVEL: 2.0-4.0 gauge (2.5 optimal)*
>
> *LENGTH: 7km to Meeting of the Waters, 7.5km to the lower bridge*
>
> *GRADIENT: Upper - 14m/km Lower - 8m/km*
>
> *TIME: 1-2hrs*
>
> *CHARACTER: Even gradient, steep continuous water in the top section.*
>
> *HOT TIP: One of Taranaki's finest.*

Egarr (1989) in an earlier and more comprehensive kayaking guide describes kayaking options on the River in more detail, with a map (Figure 9):

> *The Waiwhakaiho is a small river flowing off Mount Taranaki's northern slopes and through the northern suburbs of New Plymouth. It is a steep, stony river that needs rain to give its best whitewater. The New Plymouth City Council has a water supply and hydro scheme on*

[8] The river classes in Charles (2013) are: Class I – moving water with a few riffles and small waves. No obstructions. Class II – Easy rapids with waves up to one meter. Clear channels obvious without scouting. The ability to move your craft across the current is not necessary. Class III – rapids with high irregular waves and narrow passages. The ability to spin and manoeuvre is necessary. Class IV – Difficult rapids requiring a series of controlled moves, cross-current and spinning in confused water. Scouting often necessary and a reliable roll is mandatory.

Figure 9: Waiwhakaiho River kayaking map, Egarr (1989)



the river, which creates Lake Mangamahoe. Water craft are not permitted on the lake. With very high flows, the river can be run from the main road below Egmont Village, where almost continuous grade III and IV water[9] will be found. With lower flows the river below the hydro tailrace is a popular canoe and raft trip. For this part of the river put into the tail race at Camp Huinga (known locally as The Meeting of the Waters). The lake-out is generally at the Fitzroy Bridge, although a higher one at the Mangorei Domain is often used, as is also a lower takeout at the river mouth, at Lake Rotomanu.

To run the river, first ensure that the rocks al the lip of the tailrace pool are covered. If they are not, then the river will be too low and the journey tedious. Either the hydro scheme should be releasing water or the riverbed should be carrying extra water after rain. There is a river gauge at the powerhouse. You can phone the powerhouse (067) 89336 for flow levels. The minimum level for a trip is 1.4m. The highest flow that the river has been run at is 4.1m, when grade IV conditions were found. The ideal flow is around 2.3m, when the rocks in the tailrace pool are just covered.

Below the put-in pool there are two long bouldery rapids. Then the river slams into the banks at two points, creating some very tight and difficult conditions. The hardest rapid is said to be The Slot about midway down the run to Fitzroy, however the tight corners on bluffs in the upper part of the run account for most swims when the river is high. Except under flood conditions, all rapids have pools below them, which give time to recover before the next rapid.

The upper river from Egmont Village can only be run with very high flows; almost flood conditions, and should only be attempted by more experienced paddlers, as the rapids tend to run into each other and create one almost endless rapid of grade III+ to IV. Put in either at the main road bridge or a little higher off Alfred Road, which enables you to run a long bouldery rapid just below where Kaiauai Stream joins the river (the short distance down to this confluence can be a little marginal even in high flow periods). The worst spot on this run is a short distance below the main road bridge; a very steep rapid that needs to be scouted. Next there is the weir for the Lake Mangamahoe intake, which can be viewed from the left bank. Good bouncy rapids follow, down to the point where the river swings to the west through a short gorge ending in a drop. Throughout the gorge, you should keep to the left bank. Above the gorge is a quarry that is still taking shingle from the river. There is usually a bad rapid here. The river is always changing at this point, and should be scouted before running.

Egarr (1989) describes the Waiwhakaiho River as one of 42 ‘best river trips’ in the North Island, and one of three in Taranaki, along with the Mokau River (Totoro Gorge) and the Waitara/Manganui River (Evertt Park to Bertrand Road). He omits the Waiwhakaiho River from his list of 10 of ‘the very best of the difficult whitewater trips’ in the North Island, of grades II to V (which includes the Waitara/Manganui in Taranaki).

Egarr & Egarr (1981) is now quite dated, but represents the most comprehensive review of all river recreation throughout New Zealand and the capacity of specific rivers for various activities – noting that since 1981 recreation craft have evolved significantly – from cumbersome fibreglass kayaks to light and nimble plastic, and mini jet boats which can navigate relatively small creeks. They described recreation use of the Waiwhakaiho River (summarising its recreation value as ‘exceptional’):

[9] The river grades in Egarr (1989) are: Grade I - flat water, but can be fast-moving. Grade II - waves breaking white but without obstacles, so does not require any degree of boat handling skills. Grade III - requires precise boat handling. Generally technical boating with obstacles being either rocks, logs or stopper waves. Most paddlers will wish to inspect a grade III rapid before they run it, unless they know the river from previous trips. Grade IV: Big water, holes and hydraulics with a swim likely. The route through the rapid will be complex and prior inspection will be required.

Motor launches, Jet boats: Too small for use.

Drift boats, Rafts: Of sufficient size for only smaller rafts and drift boats from the Mangorei Stream confluence (11 km).

Canoes / kayaks: The Waiwhakaiho River receives heavy use by canoeists from the New Plymouth Electricity Department's power house to the Fitzroy Bridge. This provides 9km of Grade 2 and 3 water. The river is almost continuous rocky rapids from the power house tail race and this section has been used for the Annual New Plymouth Whitewater Race. The tail race itself has a slalom site built on it. Below the Fitzroy Bridge is a weir that is sometimes canoeable but is rather dangerous due to iron-work dumped there after construction of the new bridge. Below the bridge near the river mouth, an artificial lake is being built as a recreation area, but this is of no interest for canoeists. (Model Boat Clubs will be using it.) Above the power house there is a 6km length of dry river bed and the river above there is too shallow for use except after heavy rain.

Pack floating: A favourite Ii-lo trip is from the power house to Fitzroy Bridge. The tail race is also popular.

Swimming: Below the tail race is a huge pool that is extremely popular for swimming. There are numerous other pools that do get used and the pool below the railway bridge at Fitzroy is also in much demand.

There is no advertised commercial rafting on the Waiwhakaiho River, but it is offered by TOPEC as one of their adventure activities, as well as on the Manganui and Waitara Rivers.[10]

Swimming

There do not appear to be any published data to indicate the scale and location of swimming in Taranaki. TRC's state of the environment monitoring for freshwater contact recreational water quality (TRC, 2019) details the results of monitoring at 18 "popular contact recreational sites during each bathing season" but does not detail how these have been selected or provide any measure of relative popularity. All coastal and freshwater sites monitored for bathing water quality are shown in Figure 10, with water quality results as at January 2020.

The Waiwhakaiho River is monitored at the Merrilands Domain (4km from the coast) and adjacent to Lake Rotomanu at the coast.

At Merrilands the 2018/19 monitoring found (with reference to the Mangorei HEP Scheme in relation to exposure of cyanobacteria mats): (TRC 2019, pp20-25)

Water temperatures varied over a moderate range of 7.8ºC between early November and late March, with a maximum of 24.0ºC in early morning in late January 2019. Conductivity and turbidity results were generally indicative of very clean, clear, relatively high water quality, but moderate to widespread algal cover (up to 100% mats) was common throughout the period during flow recessions.

Considering the influence of agricultural activities, particularly dairying in the catchment, bacteriological water quality was relatively high….

Action mode was triggered on two occasions, once during a SEM [state of the environment monitoring] *survey in dry weather in early January, and once during a MfE survey after significant rainfall in mid-March. Alert mode level was exceeded on one occasion, during an SEM survey in mid-February. Follow-up surveys were carried out after both of the Action levels (the first follow up also being a routine survey), with results back at 'Surveillance' level*

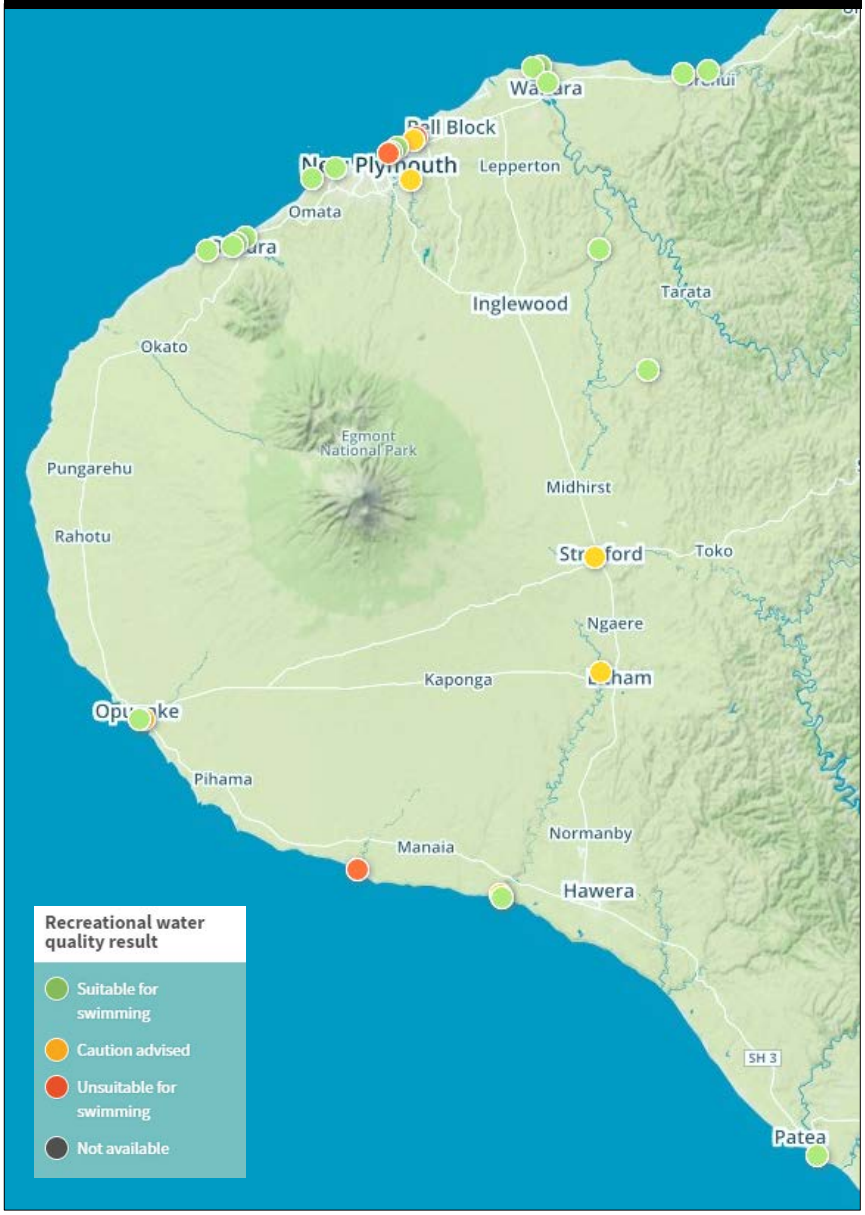
[10] https://tsbtopec.co.nz/activities/

on each occasion. Bacteriological water quality measured at this site was therefore within the acceptable standard for contact recreation usage for the majority of the survey period.

After the first elevated E. coli *result, investigations by inspection and additional water testing led to the discovery of cattle entering the river about 3 km upstream. This was addressed with the farmer concerned. Gulls were also found, bathing in the river….*

Benthic cyanobacteria coverage was generally low throughout the season with a median value of only 2%. There was one occasion where it exceeded 10% coverage (range from 0 to 19%). The 'Action' or 'Alert' level was never exceeded for percentage cover. The benthic cyanobacteria found were Microcoleus sp. *Detaching mats reached minor levels on one occasion which triggered the 'Alert' level. Minor levels of exposed mats were visible on four occasions which triggered the 'Alert' level. In total, the 'Alert' level was triggered on four occasions.*

Figure 10: Bathing quality monitoring sites and state (LAWA, Jan 2020)



The cause of the high number of exposed mats when the cover percentage was low can be attributed to the daily fluctuations in flow caused by the release of water from the upstream Mangorei hydro-electric power scheme. When the hydro scheme was not releasing water (eg, in early morning) river levels were low and mats were exposed. The mats were present on the top of boulders so that no cyanobacteria were immersed in water during these low flows. Higher flows would inundate the top of the boulders and thus stop the cyanobacteria from drying out. It appeared that other algae (green algae and diatoms) could not compete with Microcoleus sp *under this hydrological regime.*

At the Waiwhakaiho River adjacent to Lake Rotomanu, monitoring found (with some reference to the Mangorei HEP Scheme in relation to *E. coli* levels): (TRC 2019, pp26-29)

In the current survey period, water temperatures varied over a moderate range of 8.2ºC between early November and mid-March, with a maximum of 26.4ºC in mid-afternoon in mid-February 2019. Conductivity and turbidity results were indicative of clean, clear, relatively

high water quality, but significant algal cover (mainly moderate to widespread mats) was noted through the majority of the period. There were five instances of partial seawater ingress during the period.

Bacteriological water quality was poor with numbers varying over very wide ranges with a high median E. coli *value of 683 per 100 ml, particularly in comparison with numbers found at the upstream Merrilands Domain site (median: 40 per 100 ml). Individual sample* E.coli *counts exceeded 487 per 100 ml on all but four occasions, coincident with the presence of large gull populations. The marked river flow fluctuations due to increased morning HEP generation could be expected to exacerbate wildfowl (gull) faecal contamination by inundation of river shingle areas where birds roost during lower flow periods. No follow up surveys were deemed necessary as the cause of elevated counts (in the 'Action' mode) had been well documented, and permanent public warning signage was in place….*

There has been a very significant trend (p < 0.01) of increasing median E.coli *numbers over the sixteen seasons of monitoring, which is of importance given that five of these more recent seasonal medians have exceeded the 'Alert' mode and another eight are within the 'Action' mode….*

Benthic cyanobacteria coverage was generally very low throughout the season (ranging from 0 to 4%). The benthic cyanobacteria found were Microcoleum sp*. Detaching mats reached minor levels on one occasion which triggered the 'Alert' level. Minor levels of exposed mats were visible on three occasions which triggered the 'Alert' level. In total, the 'Alert' level was triggered on three occasions.*

TRC (2019, p97) ranked monitored sites by relative water quality standards for contact recreation for the region, placing the Waiwhakaiho River at Merrilands 6th and near the coast 15th:

In terms of guidelines attainment, the sites may be ranked in the following order for the 2018-2019 season:

1= Patea River at boat ramp, Patea

1= Lake Ratapiko

1= Urenui River at estuary

1= Manganui River at Everett Park

5 Waingongoro River at Eltham

6 Waiwhakaiho River at Merrilands Domain

7 Oakura River d/s SH45 bridge

8 Waingongoro River at Ohawe Beach

9 Waitara River at town wharf

10 Lake Rotomanu

11 Kaupokonui River at beach domain

12 Patea River at King Edward Park

13 Lake Opunake at boat ramp

14 Timaru Stream at Weld Road (near mouth)

15 Waiwhakaiho River adjacent to Lake Rotomanu

16 Te Hēnui Stream at mouth, East End.

Jet boating

Navigation rules on rivers and lakes in Taranaki are set by Maritime NZ rather than the TRC, which is responsible for only navigation in the port area. Jet boating is only possible on rivers where vessels are permitted to travel at more than 5 knots (just over 9.2 kph) within defined areas. Regional navigation safety bylaws generally restrict speeds to less than 5 knots within 200 metres of the shore or any structure (amongst other things), which means jet boats would never be able to get to planing speed without an 'uplift' of this restriction in areas narrower than 400 metres. The Jet Boating New Zealand *Safety/Year Book* summarises uplifts nationally and in the Taranaki Region, uplifts are limited to the Awakino, Mangaehu, Mokau, Patea, Tongaporutu and Waitara Rivers.

Whitebaiting

The whitebait fishing season for Taranaki (and most of New Zealand) opens on 15 August and runs until 30 November. Fishing is only permitted between 5:00 am and 8:00 pm, or between 6:00 am and 9:00 pm when New Zealand Daylight Saving is being observed.[11]

Recreational whitebaiting is generally a poorly researched activity. No recent quantification of whitebaiting activity in Taranaki has been located for this report, with the most comprehensive study dating from 1981 and prepared by the Taranaki Catchment Commission. This study was based on aerial and ground counts of whitebaiters, diary records kept by whitebaiters and interviews. For the Waiwhakaiho River, the study found: (p35)

> *The proximity of the Waiwhakaiho River to New Plymouth ensures that it is fished by a considerable number of whitebaiters during weekends and weekdays throughout the whitebait season. Most whitebaiting takes place within 1.5 kilometres of the river mouth (the upper limit of tidal influence) although Mr H Thatcher* [Fisheries Officer, Ministry of Agriculture and Fisheries, New Plymouth] *has reported whitebait catches up to 4 or 5 kilometres upstream. Fishing pressure is spread evenly along the lower reaches of the eastern bank of the river with the majority of whitebaiters using set nets. The depth of water at the mouth of the river restricts whitebaiting activities within the surf zone.*
>
> *Individual whitebait catches from the Waiwhakaiho River are small compared with those from the Waitara River but are comparable with those catches from the Onaero River, However, on occasions substantial quantities of whitebait are caught, for example on 22 November 1980, four fishermen caught 10 kg in just over two hours' of fishing time. Usually half a cup of whitebait is regarded as being a good catch.*
>
> *During weekends, the Waiwhakaiho River is frequently fished by more than 50 whitebaiters and up to 76 fishermen have been observed whitebaiting in the lower reaches of the river. Its heavy use despite small catches suggests that factors such as proximity to population centres and excellent vehicle access are important in attracting amateur whitebaiters.*
>
> *Local information suggests that whitebaiting is best when the river is slightly discoloured. When the river is clear whitebait can be observed migrating up the centre of the river. During such times, especially towards the end of the season, much of the fishing occurs approximately 2 kilometres upstream where the river narrows considerably. From early November, the number of whitebaiters fishing the river begins to decrease as whitebait catches decline.*

The LAWA water quality monitoring dialogue for the Waiwhakaiho River adjacent Lake Rotomanu notes, "This site is used mainly for whitebaiting (in season), and walking."[12]

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[11] https://www.doc.govt.nz/parks-and-recreation/things-to-do/fishing/whitebaiting/whitebait-regulations-all-nz-except-west-coast/

[12] https://www.lawa.org.nz/explore-data/taranaki-region/swimming/waiwhakaiho-at-rotomanu/swimsite

The 2016 TRC report Freshwater bodies of outstanding or significant value in the Taranaki region - Review of the Regional Fresh Water Plan for Taranaki identifies the Waiwhakaiho River as one of 20 rivers and streams in the Region considered to be regionally significant for whitebaiting (see section 3.3).

Hunting

There is little literature about hunting in the study area. Hunting is not permitted on Lake Mangamahoe, but otherwise the season extends from 4 May to 30 June (in 2019).

Terrestrial recreation

Lake Mangamahoe provides the main public mountain bike trails in Taranaki and the main public equestrian setting in, at least, the New Plymouth District. The reserve land to the west of the Lake is a dedicated bridle zone and the eastern side is a mountain bike park, with all tracks shared with runners and walkers. Appendix 2 includes relevant trail maps. Other public equestrian areas in the New Plymouth District are largely confined to coastal beaches.[13] The only other mountain bike park in Taranaki is at Busing Forest on Kent Road, less than 4km south east of Lake Mangamahoe.

Two walking tracks are provided by the Department of Conservation at the Meeting of the Waters – the 45 minute Araheke Bush Loop Walk and the 20 minute Meeting of the Waters Walk (Figure 11 on page 38).

The Waiwhakaiho Pathway, developed by NPDC, follows parallel to the lower Waiwhakaiho River from opposite Skeet Place to Raiomiti Street (see Appendix 2).

The New Plymouth Mountain Biking Club operates counters on the Mangamahoe mountain bike tracks, showing reasonably consistent use throughout the year and a monthly average of, for example, up to 1400 rides on one popular track (Sweet Spot, data for October to December 2019).[14] Otherwise there are no track count data for other settings in the study area; but relative levels of use of trails and tracks by runners and cyclists can be shown via Strava data.

Strava is a social media application which uses GPS records from subscribers' smartphones uploaded to a central database, allowing speed and time comparisons with other cyclists, runners, kayakers and swimmers (for example), and the monitoring of individual activity or training targets.

Strava essentially tags active people in an area and monitors where and how they recreate. Its greatest strength is therefore in showing the relative value of settings for different forms of recreation. The results are shown in 'heatmaps' which indicate relative levels of use of settings for cycling and running. Data for the heatmaps show use over a rolling 24 month period, with the images used here captured in April 2020. The brighter the colour of a trail (the 'hotter' it appears) the more use it receives.

Figure 11 shows the heatmap for running at Lake Mangamahoe and the Meeting of the Waters. This indicates the popularity of the equestrian and mountain bike trails for running, particularly those near the Lake, and the use of Hydro Road to link the Meeting of the Waters trails. Running a reasonable proxy for walking. Figure 12 shows the heatmap for cycling, indicating the high use of the mountain bike trails to the east of the Lake and relatively low activity at the Meeting of the Waters.

Figure 13 shows the heatmap for running near the lower Waiwhakaiho River, from the Meeting of the Waters to the Sea. This indicates the high popularity of Pukerua Park and Te Henui Walkway and the relatively low use of the Waiwhakaiho River, with parallel access only from the Skeet Place access. Figure 14 shows the cycling heatmap for the same area, indicating the relative importance

[13] See: https://www.taranakiequestriannetwork.co.nz/places-to-ride-bylaws.html
[14] https://npmtb.co.nz/trails-maps/trail-use/

of the Te Henui Walkway, very little activity at Pukerua Park and cyclists using the same paths as runners beside the Waiwhakaiho River.

Figure 11: Strava heatmap for running, Lake Mangamahoe and MOTW

Figure 12: Strava heatmap for cycling, Lake Mangamahoe and MOTW

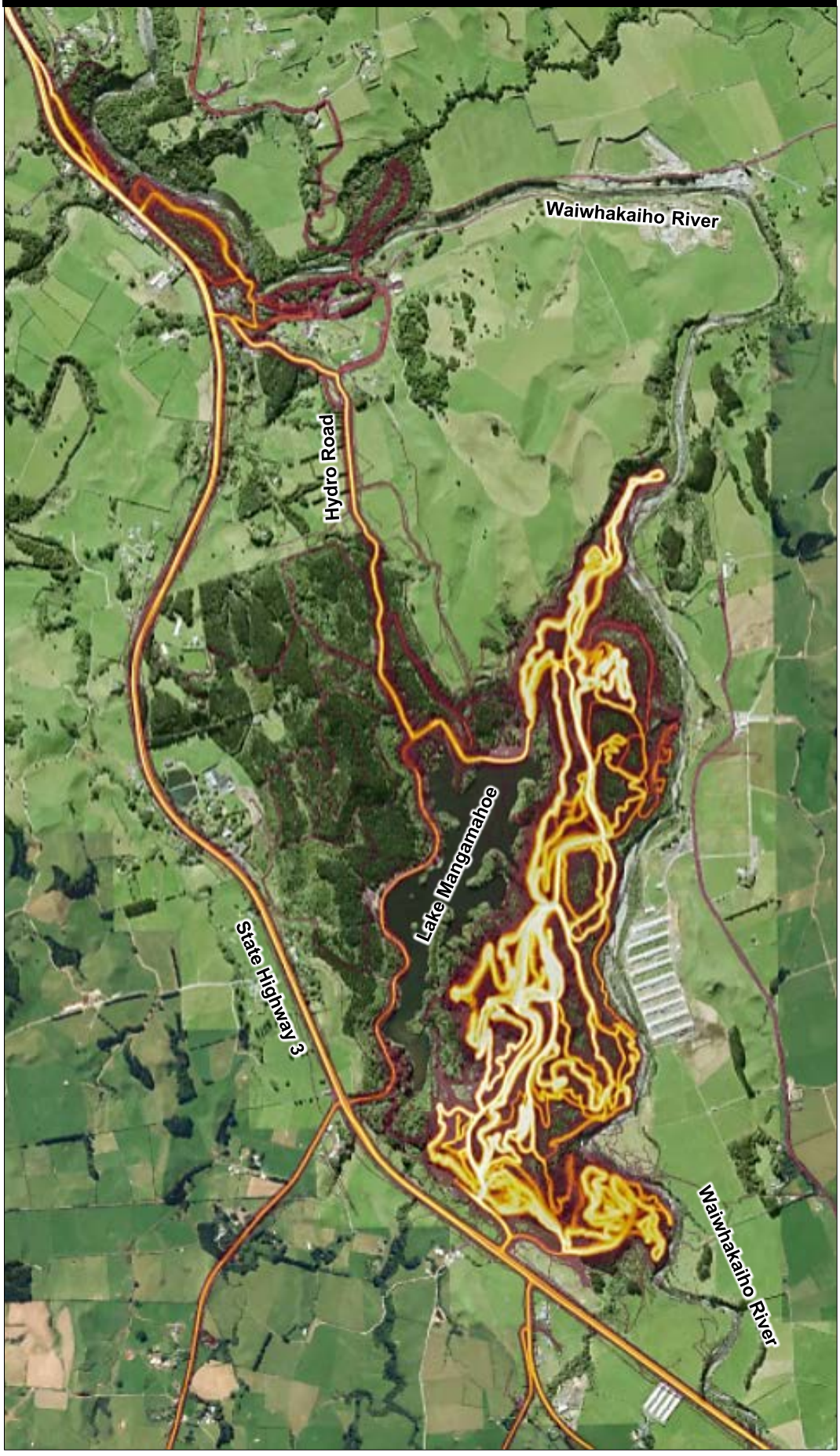


Figure 13: Strava heatmap for running, lower Waiwhakaiho River

Figure 14: Strava heatmap for cycling, lower Waiwhakaiho River

Appendix 2: Interview summaries

These summaries are based on telephone interviews with each individual, and have been emailed to each for review and confirmation. In the case of the Taranaki Fish & Game Council, the summary is largely penned by Allen Stancliff subsequent to an interview.

Chris Harvey – New Plymouth Kayak Club and New Plymouth Boy's High School

The club holds meets every Thursday at the Mangorei tailrace, offering slalom, play boating, river rescue training and beginner and intermediate lessons. The race is also used casually quite frequently at other times when running.

Trustpower usually holds a good flow for two hours every Thursday, with the amount of water depending on how much water is available. If no flow is available, someone from Trustpower will normally phone a designated member of the club to let them know beforehand. The summer of 2019/20 was quite dry.

The available flow range suits a variety of skill levels:

- 7 cumecs approximately is great flow for advanced playboating moves, providing a large-scale retentive play-hole (one that you can easily stay in).
- 6 cumecs is often preferred by advanced level kayakers as it allows easier boat control
- 5 cumecs provides great flow for intermediate level kayakers practising spins
- 4 cumecs is a great flow for beginners practicing edge control (controlling kayak direction and stability by using the bottom corners (the edge) of the kayak hull)

The race is a highly valued kayaking resource – world class really – and the most valuable and heavily used kayaking resource in the region – and wider, including Wanganui and the Waikato. The closest equivalent is the Wero Whitewater Park in Auckland. There are few 'park and play' sites like this available nationally where flow is reliable, they are close to a city, are accessible from a car, easily accessible along their length and are safe. The high level of safety means a couple of kayakers can use it without the need for a larger group to manage risk.

Compared with the Hawea Whitewater Park with its two waves, the tailrace offers more features and a greater variety of training options, with its different flows and ability to practice ferry glides and safe river rescue.

The Club holds an annual Paddle Fest over a weekend late in the year, with participants from the Waikato, Auckland, Hillary Outdoors (OPC) and the wider region staying for the two days. Trustpower is notified well in advance and guarantees water for the weekend.

New Plymouth Boys High also rely on the race for its kayaking programme, with 30 to 40 students annually, and more year-groups likely to take up the programme in the future. The school course is fully dependent on the race.

The physical works within the race have been carried out by the Club and have made the race into the quality kayaking resource that it is. This has included installing gabion baskets and weirs to create eddies, waves and holes (as per graphic below from the Club's website). Trustpower has been very cooperative in this development work, so long as the structures do not back-up flow into the upper tailrace, affecting generation. Works can occur when Trustpower shuts off flow.

The Club is currently working to complete more riparian planting along the race to improve water quality, considering adjacent farming activity, as well as replacing the slalom gates with a safer and more easily managed wire and pulley system. More formal walking tracks and a more easy and formal launching area are also planned – limiting impacts on vegetation by having everyone entering the race at the same site, and sticking to formed paths. A BBQ area is on the drawing board.

The other key whitewater resources in the region are the Waitara, Waiwhakaiho, Manganui, Stony and Mangorei Rivers and Kiri Stream. The Club describes and promotes these settings via its website.

The mid Waiwhakaiho River is a popular run requiring 18 to 80 cumecs, with some good grade 3 and 4 features. It's close to home and relatively safe and is probably the most used section of the River. The weir and diversion structures have not been a problem, although some rough concrete on the fish pass needs to be avoided. The intake is in a large pool and quite an obvious structure and can easily be avoided. If a kayaker was swept over the weir unaware, it could be a problem, but all users know it's there. More signage upstream could be useful, however.

The smell of the chicken farm on the mid Waiwhakaiho River can be pretty revolting, and there is always the worry of generally poor water quality when kayaking at the Meeting of the Waters – if you end up falling out and swimming.

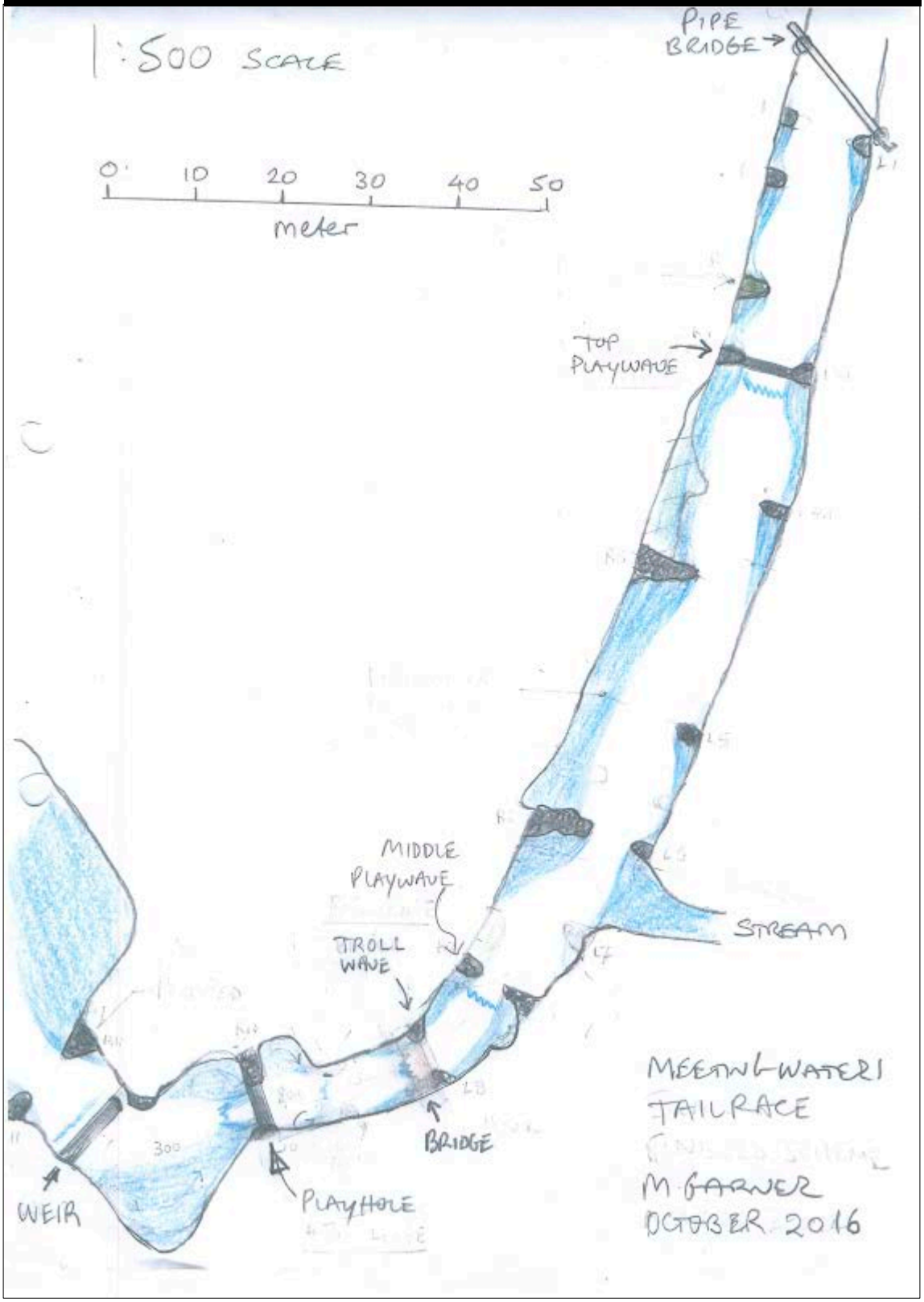
There is a gauge on the Waiwhakaiho River near the SH3 bridge near Egmont Village – 1.4m is about the same as 20 cumecs. The Club refers to the Taranaki Regional Council website for flow data.

The Waitara River is also highly valued since it tends to hold water for longer after rain. Most other rivers are rain-dependent and the windows for use are quite narrow – you need to get out there quickly after rain.

The Manganui also holds water and is a good grade 2 or 3. The recommended get-in on the Manganui is Bristol Road near Everett Park (more than 10kms downstream from the Motukawa Scheme diversion) and Chris has never kayaked near the Scheme intake. The Club website refers to the upper Manganui this: "The upper sections have been run from the Park boundary to SH3 but has a lot of overhanging vegetation and is not of the quality of the upper Waiwhakaiho, more just an exploration run." The Motukawa Scheme intake is downstream of SH3.

The normal get-out for the Manganui and Waitara near the Waitara/Manganui confluence (the 'Hole in the Hedge') is over private land and has recently been closed. This requires a longer run on both rivers and has been a problem for kayakers.

Figure 15: Tailrace features, New Plymouth Kayak Club



Grover Worsfold, Director, Taranaki Outdoor Pursuits & Education Centre (TOPEC)

TOPEC uses the Mangorei tailrace for water safety courses, swift water rescue training, self-rescue, rafting and kayaking – most of which offer NCEA credits. The race is an ideal setting. At low flows the channel can be checked for hazards, and with the ease of getting out at the bottom and the short distance back to the get-in, training can be repeated in the same setting until students catch on. Staff can also allow students to operate rafts solo since they can easily follow their progress and reach them if required. Once students have reached a certain competency they can self-guide down the tailrace with staff "covering" them to ensure a safe experience.

Generation flows suit the range of activities offered, and the Meeting of the Waters setting includes other recreation and training opportunities, such as swimming below the tailrace and bush and trail activities in the reserve. The site is also ideally close to town and schools.

TOPEC has a very good relationship with the generation team at Trustpower and regularly communicate to see what's planned for flows in the tailrace when it's being used. TOPEC staff like to know how many turbines are working and what the timing for generation is likely to be, especially when they have a full day of teaching booked – and always get the information needed. TOPEC recognises that the Scheme's operation is dependent on the availability of water and have other options when generation is low or ceases, such as using the eddy at the tailrace confluence. The race is safest when flowing at a high rate – students are less likely to try to stand up and get their feet caught.

The tailrace is generally used for teaching between 9am and 4pm, so generation later than 6pm is of no value for training purposes.

Rafting in the race is possible when the Scheme is generating at full rate, and just below. Rafting is also offered in the river below the tailrace. Not a lot of kayaking is offered, and they usually use sit-on-tops. Rafting below the race depends on flow, and if the race is operating at 8m^3, they're usually good to go – but it is an infrequent activity.

Once or twice a year TOPEC staff might kayak (sometimes using duckies – inflatable kayaks) or raft the river above the tailrace, getting in at Alfred Rd, getting out at TOPEC. That requires a bit of rainfall. Anything above 20m^3/s on the SH3 gauge is good, which might be 30m^3/s at Rimu Street. Staff can keep an eye on those two gauges to check that the river is dropping before starting the run (to avoid entering the river on a rising flow).

The tailrace is used casually over summer when its operating – surfing and boogie boards. Grover observes that casual users generally have poor protective gear compared to that used by TOPEC.

Slalom is run every Thursday evening. The slalom club has been responsible for managing some bank erosion by installing gabions at the first wave on the race. TOPEC staff recently removed an exposed rusty pipe from the bank.

New Plymouth Boys High School is another regular user.

The Regional Council has fenced off the top of the race which has reduced the chance of cows dropping pats into it. Water quality is very good, and they regularly swim in the hole below the race. Water quality seems a lot better than at Merrilands.

Peter Van Lith, Canoe and Kayak (retailer), Yakity Yak Kayak Club Taranaki

The Mangorei tailrace is an important regional resource for kayak training. Trustpower is very helpful with letting it run when they can. They only limitation is the availability of water. Flows are generally good in early January but can be less frequent from mid-January through to March and sometimes April. All rain dependent. If the tailrace is not generating the Waiwhakaiho is also normally low, so the catchment is generally not suited to kayaking when there's been insufficient rain.

The Waitara River would be the only other suitable training water in the region, but that requires shuttles and a time commitment. The race is the only park and play option.

Need about 20 m^3/s (SH3 at Egmont Village) to run the Waiwhakaiho River from the upper sections, so it needs to have been raining a fair amount. Never had any trouble kayaking over the weir – just need a good stroke to propel the boat over the main part of the weir or take an easier route to the side. An inexperienced paddler could get caught under the weir and recirculated, but it would be easy to get a rope to the person or a couple of boats end-to-end to pull them out. Peter has heard of one chap who got stuck in the weir and was pulled out by the latter method, but has otherwise not heard of any issues. The weir does not increase the general risk of kayaking on the Waiwhakaiho and does not change its grading.

Peter has never run out of water below the weir when kayaking the Waiwhakaiho, or really noticed a difference in flow in the residual reach. The river gets a bit more channelled below the weir, so the flow is more confined.

Below the Meeting of the Waters the Scheme normally needs to be generating at 7 m^3/s to run the river. This means it's easy to pick when to do the run since you just need to check the discharge – which is a bit of an advantage over waiting for natural flows, which require rain. 13 m^3/s is the minimum. Effects of generation aren't really apparent once you've started the run. It's mostly a grade 2 experience with a couple of grade 3s, which can be portaged if the team aren't up to it. Good for school groups.

The normal Manganui River run starts at Bristol Road below the Motukawa intake and would usually finish at site called the 'hole in the hedge' on Everett Road across private land. The landowner has recently started refusing access and the get-out is now at the confluence of the Waitara and Manganui via Manganui Road. Peter has never kayaked the upper section with the Scheme intake and has not noticed any effect on flow from the Scheme. It is just a matter of checking the TRC flow data and seeing if it's suitable. The Manganui is generally very clear and scenic – grade 2 or 3.

The Waitara River runs normally start at the Manganui confluence with get-out options at Spargo Road and Bertrand Road. There might be a few cumecs variation in the flow courtesy of the Motukawa Scheme, but there is no effect on kayaking.

The other main kayaking rivers – the Kiri, Oakura and Stony – are of higher grade (although the Oakura is a bit easier than the other two) and are steeper with more hazards – and are not run as often as the rivers affected by the Schemes.

Allen Stancliff, Taranaki Fish & Game Council

Waiwhakaiho River trout fishery values

The Waiwhakaiho River catchment supports a regionally significant fishery for brown trout, with the occasional rainbow trout also present. The river is located close to New Plymouth city and there is reasonable access to the lower reaches in particular, via a number of NPDC recreation reserves. Currently, there is little consumptive water use from the upper Waiwhakaiho and its Kaiauai Stream tributary upstream of the Trustpower diversion weir and this is important in helping to maintain trout fishery values and ecosystem health.

Residual flow reach

Prior to the 1991 renewal of consents, flow in the 6 km residual flow reach consisted of approximately 50 L/s of seepage immediately below the weir during low flow periods, plus a small amount of additional flow down to the confluence with Araheke Stream and the power station outlet. At this time, there were concerns about high summer water temperatures throughout the reach and low oxygen levels in some of the pools. There was little habitat available for trout and anglers avoided the reach. Adult trout were able to move through the reach during freshes and they may have been able to move upstream past the diversion weir in freshes via the gravel bar on the true right bank of the weir.

Following the 1991 renewal of consents for a 5-year term, a residual flow regime of 400 L/s for 6 months and 600 L/s for 6 months was implemented. The current residual flow regime was implemented following the September 1996 renewal, being:

- at least 400 L/s between 1 May and 31 October;
- at least 600 L/s between 1 November and 31 December and during April;
- at least 700 L/s between 1 January and 31 March.

Feedback from anglers indicates that a valued early season fishery for brown trout has developed in the residual flow reach under the improved flow regime. Angling use of the reach is not high, in part because the access isn't particularly easy with anglers either walking upstream from the meeting of the waters reserve, downstream from the weir, or via a NPDC road through Mangamahoe forest. The adult brown trout that are present in spring (Oct – Nov) are well-conditioned and of good size.

Anglers report that early in the angling season (which starts on 1 October each year) there can be good numbers of sensitive mayfly and stonefly species present in the residual flow reach as a result of frequent winter/spring freshes re-populating the reach from upstream and cooler water temperatures. However, the quality and abundance of the invertebrate fauna reduces in summer as the frequency of freshes decreases and water temperatures and riverbed periphyton growth increase. For example, the photos below were taken during a survey of this reach in mid-December 2018 and highlight just how suffocating the periphyton can become.

Angling use of the residual flow section is low at the height of summer, owing to warm water temperatures, very extensive periphyton growth and few trout (fish may move upstream out of this reach when water temperatures get too high).

Flow gauging by the TRC indicates there is very good compliance with residual flow conditions, with flows often exceeding the minimum requirement. While the fish pass at the diversion weir takes a hammering in floods, its low gradient U-shaped design and easy-to-find entrance at the downstream edge of the weir works well.

In our view, an increase in the residual flow requirement from 600 L/s to 700 L/s is warranted in the month of December (consistent with January to March) to moderate water temperature increases. It is also critical that a flushing flow regime based on natural freshes is implemented over summer and autumn with the aim of reducing periphyton proliferation in the residual flow reach (e.g. if there hasn't been a fresh over the diversion weir for 30 days then the first fresh after that is allowed to flow over unimpeded (i.e. no abstraction)).

Lower Waiwhakaiho Downstream of the Mangorei Power Station outlet

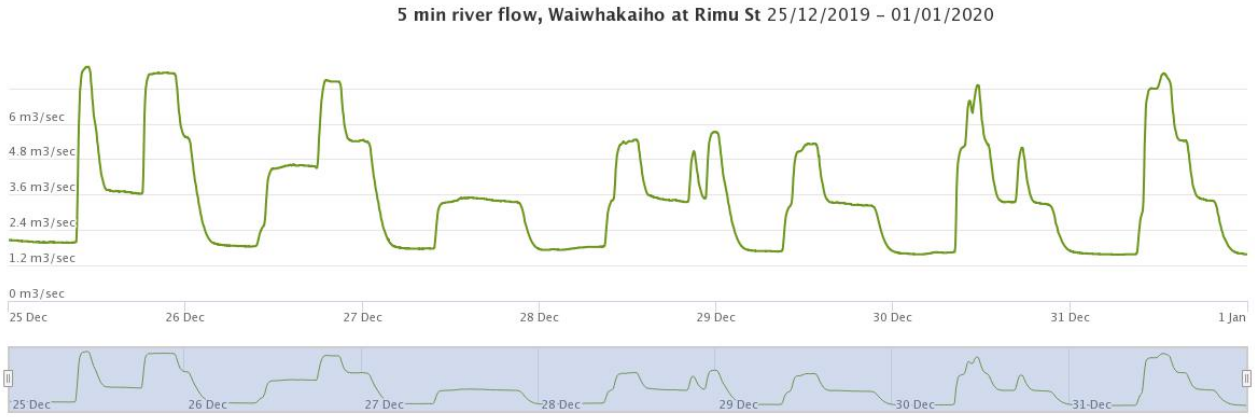
This section of the river has deep pools and runs that provide good habitat for trout and some large brown trout are caught, particularly in spring. However, the productivity of the reach is adversely affected by the daily fluctuating flows that result from power station operation (see graph). These fluctuations can range up to at least six times the daily minimum flow.

During low flow periods, these fluctuations result in a significant area along the margins of the lower river that is alternately inundated and then de-watered on a daily or even twice daily basis. This regular drying produces a varial zone of greatly reduced productivity along each river margin. The photo below shows the extent of exposed riverbed along the true left margin in mid-December 2018.

As in the residual flow reach upstream, macroinvertebrate quality is generally highest in winter and spring when an increased frequency of freshes and floods, reduced periphyton proliferation and cooler water temperatures result in a greater proportion of sensitive mayfly, stonefly and caddis species being present. Periphyton proliferation can be an issue in the lower river at any time of the year, but biomass tends to be less than in the lower section of the residual flow reach, likely as a result of the higher flows from power station generation sloughing off mature periphyton growth from the riverbed.

In addition to the residual flow provided below the Trustpower diversion weir, the Mangorei Stream tributary (and to a lesser extent Araheke Stream) is an important contributor to baseflow in the lower Waiwhakaiho, particularly when the power station is shut down. At such times, the baseflow in the river at Rimu Street can drop as low as 1.3 m^3/s. In our view the fluctuating flow regime, as highlighted in the graph below, has a significant detrimental effect on habitat stability and productivity in the 10.5

km of river downstream of the Mangorei power station discharge and we ask that options for a more natural flow regime are explored.



Lake Mangamahoe

Trustpower-owned Lake Mangamahoe supports a regionally significant fishery for brown and rainbow trout. The fishery has been restricted to fly fishing only since its inception in 1933 and it is one of the most popular fisheries in the region, owing to its location close to New Plymouth, scenic setting and the fishery being open to angling all year.

The brown trout in the lake fishery are all wild and result from spawning in Mangamahoe Stream and the upper Waiwhakaiho River. The rainbow trout population is maintained by Fish & Game releases of around 300 hatchery reared fish annually. Trout are generally in good condition and grow to 1.5 – 2 kg. Two casting platforms have been constructed at the lake to improve angler access to the fishery.

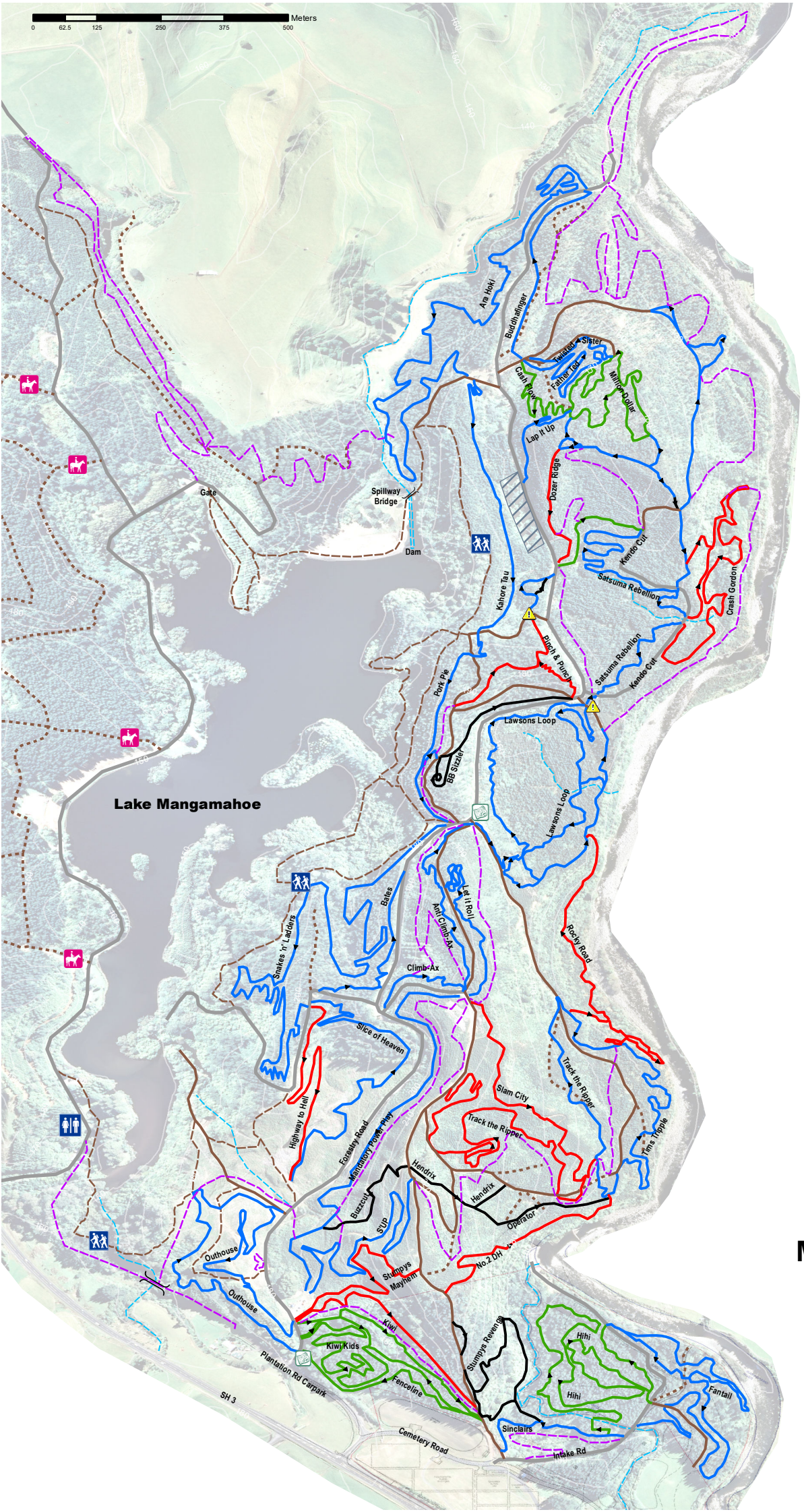
The current operating regime doesn't produce large fluctuations in the lake level and this is beneficial to the maintenance of the productivity of the trout fishery. The lake level has not been routinely

lowered for weed control in recent years and from a F&G perspective this is a good thing and strongly supported.

The upper reaches of the lake have accumulated large amounts of silt over time. On one hand these extensive shallows create useful waterfowl habitat, however this also significantly reduces trout habitat and angling opportunity. From Fish & Game's perspective the trout fishery is more important and overall we support this sediment being removed to maintain lake volume.

Water	Type	Sports fish present			Trout	Fishery	Comment
Waiwhakaiho catchment		**Brown Trout**	**Rainbow Trout**	**Perch**	**Spawning**	**Significance**	
Waiwhakaiho River	mainstem	√	√		√	Regional	Highly valued for large brown trout, plus the occasional rainbow
Kaiauai Stream	tributary	√			√	Local	Highly valued for large brown trout
Mangawarawara Stm	tributary	√			√		Kaiauai tributary used for trout spawning
Mangakotukutuku Stm	tributary	√			√		Kaiauai tributary used for trout spawning
Lake Mangamahoe	hydro dam	√	√			Regional	Fly Fishing Only. Highly valued for its brown & rainbow trout. Rainbow trout maintained by stocking with hatchery fish.
Mangamahoe Stream	Lake trib.	√	√		√		Spawning stream for Lake Mangamahoe trout (mainly brown)
Mangorei Stream	tributary	√			√	Local	Important spawning area for lower Waiwhakaiho brown trout
Araheke	tributary	√			√		Waiwhakaiho tributary - lower reaches used for spawning
Lake Rotomanu	Lake	√	√	√		Local	Stocked with hatchery-reared trout.

Appendix 3: Mountain bike, walking and equestrian trail maps



Track Grading

Grade 2. Easy
- Mostly Flat with some gentle climbs and descents
- Easily avoidable obstacles

Grade 3. Intermediate
- Steep Slopes and / or avoidable obstacles
- Possibly on narrow track
- Poor Traction

Grade 4. Advanced
- Long steep climbs / descents, narrow track, poor traction
- Difficult obstacles to avoid or jump over
- Some sections may be easier to walk

Grade 5. Expert
- Technically challenging.
- Narrow track, numerous hazards
- Difficult obstacles
- Expect walking

Grade 5. Extreme
- Downhill / Freeride specific tracks
- Extremely steep sections with large drops
- Un avoidable obstacles & man made jumps

Legend

- Easy
- Intermediate
- Advanced
- Expert/Extreme
- Proposed
- Gravel Road
- Dirt Road
- Old Road
- Walking
- Caution Tracks Crossing

NEW PLYMOUTH MOUNTAIN BIKERS

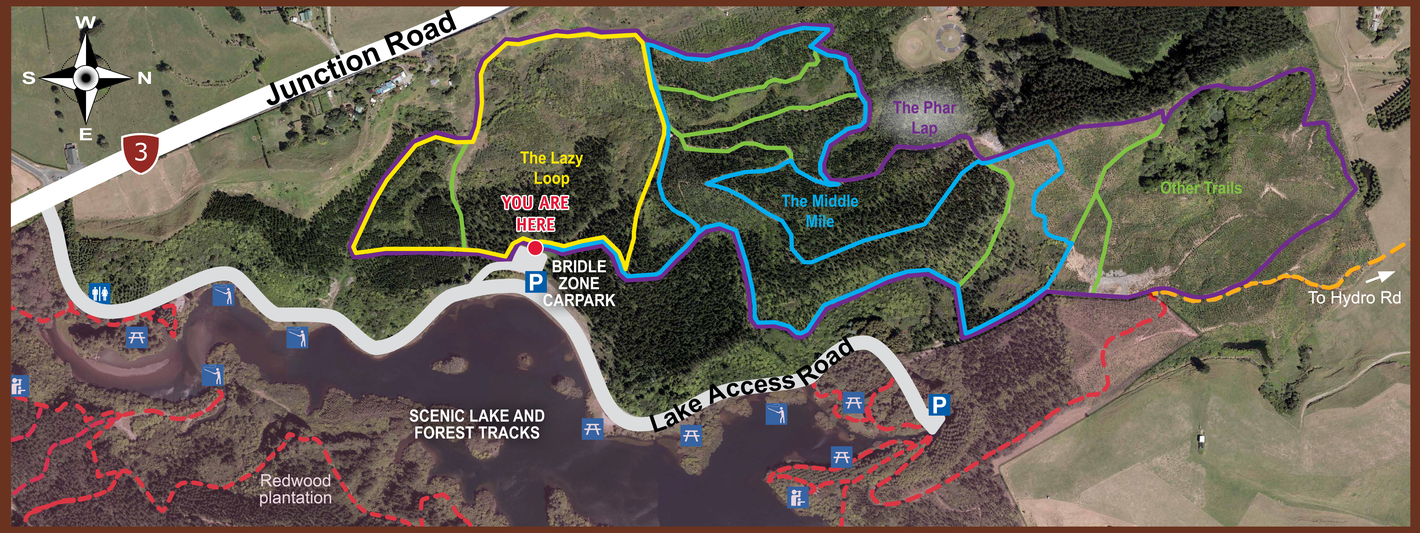
Mangamahoe Forest Mountain Bike Trails

Map updated November 2017

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

Lake Mangamahoe

BRIDLE ZONE AND TRAILS



TRAIL INFORMATION

Marked trails through the Bridle Zone display coloured coded arrows as detailed below.

- The Phar Lap (outer loop)
- The Middle Mile (centre loop)
- The Lazy Loop (western loop)
- Other Bridle Trails
- Track - shared use (walkers, bikers and horses)
- Track - shared use (walkers and bikers)

Trail management by Taranaki Equestrian Network and NPDC.

WELCOME TO LAKE MANGAMAHOE

Lake Mangamahoe offers many different recreational activities. However, the lake also has a number of operational activities occurring within the area.

For your safety and enjoyment, please read carefully the following messages:

COMMERCIAL FOREST AREA

Be aware of forestry operations and tree felling within the forest. Obey the safety signs at all times.

- Please be aware of debris hazards.
- While all care is taken you enter the forest at your own risk.
- Please respect other visitors. Control your dog and consider the use of a lead.

SHARE WITH CARE

Walkers, runners and running groups also use this facility. Greet and smile at other trail users - this ensures you have seen each other. For your own safety, keep to the marked trails, observe any signs and avoid cordoned off trails - cordons will be there for a reason.

Be considerate of others. All trail users have the right to enjoy it at their own pace. Don't block a trail, and be courteous to slower traffic. Allow others to pass safely, warning any foot traffic of a potential hazard when walking around the rear end of a horse.

BE SAFE, BE SEEN

Horses can be frightened by surprises. Pedestrians, please remain visible to horse riders at all times. Slow down and be calm when approaching horses. Horse riders, be friendly and polite if you need to provide pedestrians instructions for their own safety.

CARPARK

- Please remove your litter and horse manure from the yards and carpark.
- Be careful of your water use in summer to ensure tank water stays available to all. The water supply is rainwater for horse wash down and drinking. Not for human consumption.
- Wash down your horses alongside your horse transport rather than by the tank.
- When high use of the carpark is anticipated, please park around the perimeter of the carpark first.

WET WEATHER WARNING

Caution: The Bridle Zone may be very slippery when wet. Consider dismounting if necessary.

Share with care and enjoy the trails.

MAIN GATE OPENING HOURS

7.00am – 6.00pm Winter 7.00am – 8.30pm Daylight Saving.