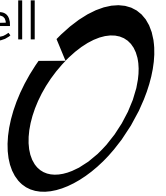




APPENDIX D

Natural Character, Landscape and
Visual Assessment – Boffa Miskell

Boffa Miskell



Mangorei Hydro Electric Power Station



Natural Character, Landscape and Visual Assessment

FINAL

November 2020



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Executive Summary

The Mangorei Hydro Electric Power Scheme is located within the Waiwhakaiho River catchment east of State Highway 3, between approximately 6 and 9km to the south of New Plymouth. The scheme diverts water from the Waiwhakaiho River into the artificially constructed Lake Mangamahoe, from where it is directed through an intake to penstocks that carry the water through to the Mangorei Power Station. Generation water from the Mangorei Power Station is returned back to the Waiwhakaiho River, at a site known as the Meeting of the Waters, approximately 6km downstream of the original diversion. From this point the river flows north to Lake Rotomana and its discharge into the Tasman Sea approximately 11km further downstream. The artificially created Lake Mangamahoe (which is also a source of water for New Plymouth) contains an earth dam and concrete spillway at its northern end which discharges into the Mangamahoe Stream bed (an old tributary of the Waiwhakaiho River).

This report assesses the effects associated with the continued operation of the Scheme on the natural character, landscape and visual amenity values of the water bodies, their margins and where applicable surrounding environment, including the mid and lower reaches of the Waiwhakaiho River (to the coast), Lake Mangamahoe, and the Mangamahoe Stream. It is proposed that the Scheme 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.

Natural character values of the Waiwhakaiho River and its margins vary throughout the various river reaches from Moderate-High upstream of the intake structure to SH3, to Moderate-Low for the remaining reaches to the sea. Lake Mangamahoe and its margins also has Moderate-Low natural character values, while the Mangamahoe Stream, below the lake dam has Low values.

The Scheme is set within a landscape characterised by undulating and rolling rural land that descends to the coast as the river winds its way through productive farmland and the residential / urban outskirts of New Plymouth. The land cover in the rural area is predominately covered in pasture but also consists of a mix of indigenous scrub and bush, and exotic forest along parts of the riverbank. The hilly terrain surrounding the lake supports a diverse mix of exotic commercial plantation forest, ornamental exotic trees and regenerating native vegetation. The lake and its surrounds, and the Meeting of the Waters Scenic Reserve provide valuable recreational assets to the district, including scenic walks, mountain biking, horse riding, water sports, fishing, sightseeing, and picnic areas for visitors. These natural and man-made landscapes have a range of qualities associated with water and vegetation that enhance the visual amenity of the surrounds and the experience for the general public.

The primary natural character impacts of the Scheme are associated with the continuation of the reduced flow in the 6km reach of the Waiwhakaiho River from the intake structure to the tailrace, and the legacy effects associated with the damming and impounding of the Mangamahoe Stream to create Lake Mangamahoe. These changes to the flow regime, morphology, vegetation and habitat of the river and lake have reduced the natural character values which had historically been modified due to settlement and associated vegetation clearance, water abstraction, farming and urbanisation. With the continued operation of the Scheme in accordance with the proffered conditions of consent, the modification to the natural character attributes of the Waiwhakaiho River and margins will remain broadly as they have been in the past, apart from variations due to climatic conditions and other natural events. In this regard, the existing natural character values for each river reach and Lake Mangamahoe are anticipated to remain generally consistent. Ongoing natural character effects will vary between Neutral and Moderate adverse across the various river reaches depending on the presence of structures, the resultant modified flow rates and associated ecological conditions. Within Lake Mangamahoe the ongoing natural character effects are considered to be Low beneficial due to the water and lake margin vegetation creating a valued ecological habitat that offsets the man-made nature of the lakebed, presence of structures and modified water level regime.

In relation to the physical landscape and landscape character the main changes resulting from the Scheme are characterised by the 37ha Lake Mangamahoe and associated parkland, as well as structures, tunnels, above ground pipes, and a water race and buildings in and around the lake and river. These elements and features and the ongoing effects generated by their scale and form are overall considered to be Neutral, with any adverse effects of the power station, in-stream and lake structures compensated for by the landscape quality and character of the lake and river side scenic reserve.

In terms of visual amenity due to the wide public use and enjoyment of Lake Mangamahoe, the Meeting of the Waters Scenic Reserve and associated walking trails, there will continue to be Moderate-High beneficial effects as the Scheme continues to operate under its current regime.

In terms of the relevant statutory provisions, the ongoing management of the Scheme in accordance with the conditions of consent will maintain the same level of effects on the natural character and landscape values identified; provide benefits for the community in terms of power generation, landscape quality and visual amenity; and provide for public access and recreational opportunities adjacent to the river and the Lake Mangamahoe parkland, which will continue to mitigate the adverse visual amenity effects resulting from the Scheme.

1.0 Introduction

1.1 Scope of the Report

Boffa Miskell Limited (BML) has been engaged by Trustpower to undertake a landscape, natural character and visual assessment for the proposed consenting of the Mangorei Hydro Electric Power Scheme (“the Scheme”). This assessment considers the waterbodies and surrounding landscape associated with the Scheme including the mid and lower reaches of the Waiwhakaiho River (to the coast), Lake Mangamahoe and the Mangamahoe Stream.

The report comprises three interrelated assessments (landscape, natural character and visual amenity) of the potential effects of the Scheme. The scope and methodology of the assessments have been informed by the relevant statutory requirements, the nature and scale of the Scheme, and the existing and potential effects on the environment. The assessments address the following:

- Natural character assessment - considers effects on the elements, patterns and processes of natural character of the waterbodies and their margins;
- Landscape assessment - considers effects on the physical landscape resource and character of the catchments in proximity to the Scheme corridor;
- Visual amenity assessment – considers effects on the visual amenity values of the waterbodies and their visual context.

Natural character, landscape and visual effects result from natural or induced change in the components, character or quality of a landscape. Usually these are the result of landform or vegetation modification or the introduction of new structures, activities or facilities into the landscape.

The assessments are based on the existing environment, which comprises the water bodies, their margins and surrounding landscape in their current state, which have adapted over the past 70-80 years to the Scheme flow regimes and modifications first implemented in the 1930s. Ongoing and potential effects of the proposed consenting are assessed against this current state.

1.2 Methodology

Relevant Guidance

This assessment has been undertaken by professional landscape consultants with reference to the Quality Planning Landscape Guidance Note¹ and its signposts to examples of best practice, which include:

- Best Practice Note 10.1, Landscape Assessment and Sustainable Management, New Zealand Institute of Landscape Architects (2010).
- Guidelines for Landscape and Visual Impact Assessment 3rd Edition, Landscape Institute (UK) and IEMA (2013).

Effects Ratings and Definitions

An outline of the effects ratings and definitions used in this assessment is provided in the Boffa Miskell: Natural Character, Landscape and Visual Effects Assessment Methodology (11 February 2019) attached as Appendix 1. In summary, the significance of effects identified within this assessment are based upon a seven-point scale which includes very low; low; moderate-low; moderate; moderate-high; high and very high ratings.

¹ <http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape/landscape-assessment>

A rating of moderate-low equates to ‘no more than minor’ in terms of the Resource Management Act (1991) terminology².

The nature of natural character, landscape and visual effects generated by any particular proposal can be:

- positive (beneficial), contributing to the quality, character and visual amenity of the environment;
- negative (adverse), detracting from the quality, character and visual amenity of the environment; or
- neutral (benign), with essentially no effect on existing quality, character or visual amenity of the environment.

Desktop Study and Site Visit

Prior to conducting the assessment, a desktop study was completed which included a review of the relevant information relating to the landscape and visual aspects of the project. This information included:

- LINZ Map data, Aerial photography, Google Earth and Streetview; and
- Regional and District Plan data.

Following the desktop study, site visits were initially undertaken with the Trustpower team in September and October 2018, and subsequently in February 2020, in order to understand the Scheme, river characteristics and surrounding landscape context.

Relevant background information which has been drawn on for this assessment has from the following reports:

- Reconsenting of Mangorei Hydroelectric Power Scheme: Hydrology Report - prepared by Tonkin and Taylor Ltd, November 2020
- Mangorei HEPS Consent Renewal: Lake Mangamahoe Sediment Assessment - prepared by Tonkin and Taylor Ltd, November 2020
- Mangorei HEPS Aquatic Ecology AEE - prepared by Ryder Environmental Ltd November 2020
- Mangorei Hydroelectric Power Scheme: Applications for Resource Consents and Assessment of Environmental Effects prepared by Mitchell Daysh (2020)
- Mangorei Hydroelectric Power Scheme Reconsenting: Recreation Assessment, prepared by Greenaway and Associates (November 2020)
- Mangorei HEPS Terrestrial Ecology Assessment of Effects, prepared by Ryder Environmental Ltd November 2020.

1.3 Scheme Location and Landscape Context – (Refer to Figures 1-4 in Appendix 2)

The Mangorei hydro and water supply scheme is one of New Zealand’s oldest operating power stations with the original station being constructed in 1904, the first Mangamahoe dam built in 1914 and the 25m high current dam constructed in 1931 to form the 37ha Lake Mangamahoe.

The Scheme is located east of State Highway 3 between approximately 6 and 9km south of New Plymouth city centre. The Scheme diverts water from the middle reaches of the Waiwhakaiho River via an intake structure and tunnel to the southern end of Lake Mangamahoe. At the northern end of the lake, an intake structure takes the water to the power station via a tunnel and penstocks before it re-enters the Waiwhakaiho River at the “Meeting of the Waters Scenic Reserve” through a tailrace approximately 6km downstream from the river diversion. From this point the river flows north to Lake Rotomana and its discharge into the Tasman Sea approximately 11km downstream. The artificially created Lake Mangamahoe (which is also a source of

² Noted as a point of reference rather than for any notification or non-complying activity threshold under S104D.

water for New Plymouth) contains an earth dam and concrete spillway at its northern end which discharges into the Mangamahoe Stream bed (an old tributary of the Waiwhakaiho River).

Located on the northeast edge of the Taranaki ring plain, the broader landscape context features bush-clad Mt Taranaki and its lower developed slopes which are dissected by many bush-clad rivers and streams. The streams and river valleys are incised into the landscape and create a distinctive pattern in the Taranaki landscape. The Waiwhakaiho River catchment emanates from near the summit of Mt Taranaki and collects water over a 136km² area.

The Scheme is located on the lower flatter plains in a predominately modified landscape primarily consisting of rolling topography, with high production pasture, exotic woodlots, shelter belts, and areas of regenerating indigenous vegetation characteristic of the surrounding area. Pockets of mature and regenerating indigenous bush are often found in the steep sided stream and river gullies, on forestry borders and adjoining Lake Mangamahoe.

Pastoral farming and agriculture are the predominant land uses within this landscape in the mid to lower river catchment. The settlement of farms, dwellings and associated utility buildings form a distinctive pattern bordering the local roads in the area. Aside from the city of New Plymouth, several townships such as Egmont Village and Inglewood service the wider district and rural areas. Other activities in the nearby area include, a wastewater treatment plant, quarry and gravel extraction plant, green houses, timber processing, and poultry farms.

2.0 Proposal Description

2.1 Introduction

As outlined in the AEE³ Trustpower is seeking the necessary resource consents from the Taranaki Regional Council for the continued operation and maintenance of the Mangorei HEPS in response to the forthcoming expiry of the existing resource consents for the Scheme in June 2021.

The key activities that comprise the continued operation and maintenance which Trustpower is seeking resource consents for, are summarised as follows:

- The diversion and abstraction of up to 10 m³/s of water from the Waiwhakaiho River via a diversion weir and intake structure;
- The continued occupation and maintenance of a diversion weir and fish pass in the Waiwhakaiho River;
- The discharge of water from the Waiwhakaiho River via a tunnel to Lake Mangamahoe;
- The continued damming of the Mangamahoe Stream via a dam structure to form Lake Mangamahoe and the regulating of levels in the lake;
- The abstraction of up to 864,000 m³/s of water per day from Lake Mangamahoe via an intake diversion structure, tunnel and penstocks for the purposes of electricity generation at the Mangorei Power Station;
- The discharge of up to 150 m³/s of water from Lake Mangamahoe (in emergency conditions) via a spillway to the Mangamahoe Stream; and
- The discharge of up to 864,000 m³ of water per day, to the Waiwhakaiho River via a tailrace from the Mangorei Power Station.

Further detail on each of these key components, and the operating conditions proposed by Trustpower, is provided in the AEE. Below the key aspects of the project are summarised based on information in the AEE.

³ Applications for Resource Consents and Assessment of Environmental Effects prepared by Mitchell Daysh 2020

2.2 Waiwhakaiho River Diversion

Trustpower proposes to continue to divert and impound water from the Waiwhakaiho River via the existing weir and intake structure located on the true left of the river margin. The maximum rate of diversion / abstraction from the Waiwhakaiho River proposed by Trustpower is 10 m³/s (which is the same as the existing resource consent conditions), and based on historical records between 2013 and 2020 the mean diversion / abstraction from the river is approximately 3.65 m³/s, with a range of residual flows during different periods of the year within the maximum permitted by the consent conditions⁴.

This creates a length of residual river between the intake and the tailrace outfall approximately 6km downstream where the water is returned to the river where it flows for another 11km before reaching the sea.

No changes are proposed to the existing configuration or maintenance regime for the diversion weir, fish pass or intake structure, including the trash screen on the intake structure, which is designed to deflect large debris (i.e. branches, small boulders) away from the intake tunnel. Access to these structures for maintenance purposes, including the removal of boulders and debris (using machinery and / or by hand), will continue via the access track located off Plantation Road. Boulders removed from the fish pass will be placed on the true-right bank of the Waiwhakaiho River and the adjacent landholding.

2.3 Lake Mangamahoe

Trustpower proposes to discharge up to 10 m³/s of water through an outlet structure in the south-western end of Lake Mangamahoe via a 580 m long tunnel from the Waiwhakaiho River (with the mean discharge to the lake being approximately 3.65 m³/s). In addition to the water diverted from the Waiwhakaiho River the lake is fed by the upper Mangamahoe Stream and the Kent Road tributary.

The intake to the tunnels / penstocks for the Mangorei Power Station are located in the western arm at the northern end of Lake Mangamahoe. Trustpower proposes to divert / abstract up to 864,000 m³ of water per day from the lake in order to enable the continued spread of electricity generation from the Mangorei Power Station during daylight hours (8am to 6pm) – and to maximise the beneficial effect of artificial flows in the lower Waiwhakaiho River. No changes are proposed to the existing configuration or maintenance regime for the intake structure in Lake Mangamahoe.

Trustpower is also seeking to maintain the existing resource consent, which provides for a discharge up to 150 m³/s to the Mangamahoe Stream during emergencies (with no residual flow, apart from spillway discharge and seepage) via the spillway, which is conveyed to the Waiwhakaiho River approximately 1.2 km through an old dam structure in the stream.

The operating range within the lake for electricity generation is between RL149.80m to RL149.05m (i.e. a range of 750 mm below the spillway crest of the Mangamahoe Dam), as per the existing resource consents. Fluctuations in the level of Lake Mangamahoe will continue to be principally dictated by the following:

- Inflows from the Waiwhakaiho River via the diversion tunnel;
- Local catchment inflows, particular from the Mangamahoe Stream catchment upstream of State Highway 3 (which contributes approximately 0.62 m³/s as a mean flow);
- The diversion / abstraction of water for water supply purposes by the New Plymouth District Council; and
- The diversion / abstraction of water for hydro-electricity generation purposes by Trustpower.

2.4 Discharge of water to the Waiwhakaiho River

Water that is abstracted from Lake Mangamahoe is conveyed through the tunnel and penstocks to the Mangorei Power Station.

As per the maximum diversion / abstraction from Lake Mangamahoe, Trustpower proposes to discharge up to 864,000 m³ of water per day back into the Waiwhakaiho River via the tailrace below the power station (at the

⁴ Table 3.3. Reconsenting of Mangorei Hydroelectric Power Scheme: Hydrology Report prepared by Tonkin and Taylor (November 2020)

Meeting of the Waters), with a minimum continuous flow of at least 950 l/s in order to maintain the beneficial effect of flows in the lower Waiwhakaiho River.

3.0 Relevant Statutory Provisions

In terms of landscape, visual and natural character matters consideration has been given to the following statutory planning documents:

- National Policy Statement for Freshwater Management 2020 (“**NPS**”)
- Taranaki Regional Policy Statement (“**RPS**”);
- Regional Fresh Water Plan for Taranaki (“**Regional Plan**”); and
- Operative New Plymouth District Plan (“**ONPDP**”)
- Proposed New Plymouth District Plan (“**PNPDP**”)

There are no RMA Section 6(b) (outstanding natural features and landscapes) matters to consider.

3.1 National Policy Statement for Freshwater Management

There are no policies that are directly relevant to the assessment of natural character, landscape and visual amenity values and the NPS has not been addressed in this assessment.

3.2 Regional Policy Statement and Regional Plan

Chapter 10. Natural features and landscapes, historic heritage and amenity value, of the RPS contains a number of relevant objectives and policies in relation to the Scheme consenting proposal; while the relevant provisions in the Regional Plan are outlined in *Chapter 10: Natural, ecological and amenity values and public access*. These documents seek the following outcomes:

- The protection of natural character and natural features and landscapes of regional significance associated with Taranaki’s rivers, lakes and their margins. In protecting natural areas, regard is to be had to:
 - The value at local, regional and national scales, and the degree and significance of actual or potential adverse (including cumulative) effects;
 - The benefits to be derived from use and development at local, regional and national scales;
 - The natural area’s sensitivity or vulnerability, and capacity to accommodate change without compromising values; and
 - The degree of existing modification.⁵
- The recognition and appropriate management of natural areas that are of value for water quality and quantity; natural character, amenity, geological and geomorphological, botanical, wildlife and fishery values; and biodiversity and the functioning of ecosystems. The degree and significance of actual or potential adverse effects, including cumulative effects, on these natural areas and the efficacy of measures to avoid remedy or mitigate such effects; and the sensitivity or vulnerability of a natural feature or landscape to change, and its capacity to accommodate change, without compromising the values of the feature or landscape.⁶

⁵ RPS - NFL OBJECTIVE 1, NFL POLICY 3

⁶ RPS - NFL OBJECTIVE 2, NFL POLICY 2,

- The avoidance, remediation or mitigation of adverse effects of inappropriate use and development, on amenity values, the promotion of positive effects, and the balancing of positive effects against adverse effects. This includes the scenic, aesthetic, and recreational opportunities provided by parks, reserves, rivers, lakes, wetlands and their margins;⁷
- The protection of the natural character of rivers, lakes and wetlands from inappropriate use and development and the adverse effects of appropriate use and development;⁸
- Maintenance and enhancement of natural, (ecological) and amenity values of rivers, streams and wetlands and their margins. Adverse effects will be avoided remedied or mitigated by having regard to the topography and form of the river, lake or wetland; the natural flow characteristics, hydrological functions and natural water levels; ecosystems; water quality; and recreational, aesthetic and scenic values;⁹
- Maintenance and enhancement, as far as practicable, of the high natural, (ecological) and amenity values, of rivers and streams listed in the Regional Plan; and with adverse effects on those high values avoided, remedied or mitigated, as far as practicable.¹⁰
- The maintenance and enhancement of public access to and along rivers and lakes.¹¹

While there are no natural features and landscapes identified in the area surrounding the Scheme, both the RPS (Appendix 1)¹² and Regional Plan (Appendix 1A)¹³ identify the Waiwhakaiho River as a river or stream catchment with high natural, ecological and amenity values⁷. These are outline below in Table 1:

Table 1: Extract from Rivers and stream catchments with high natural, ecological and amenity values

River or stream	Water quality	Recreational & fishery values	Aesthetic & scenic values	Comments
Waiwhakaiho River - Egmont National Park to Lake Mangamahoe	Excellent to good water quality. MCI excellent to very good, average 130.	Access for native fish through most of river. Highly valued angling river. Tributaries provide important native fish habitat.	Highly rated for aesthetic and scenic values.	Median flow of 4,050 l/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.

⁷ RPS - AMY OBJECTIVE 1 and 2, AMY POLICY 1

⁸ Regional Plan - OBJ 3.1.3

⁹ Regional Plan - OBJ 3.1.2, OBJ 3.1.5, POL 3.3.1

¹⁰ Regional Plan - POL 3.1.4

¹¹ Regional Plan – OBJ 3.2.1

¹² RPS Appendix 1: Rivers and stream catchments with high natural, ecological and amenity values

¹³ Regional Plan Appendix 1A: Rivers and stream catchments with high natural, ecological and amenity values

Waiwhakaiho River – Lake Mangamahoe to Audrey Gale Park	Excellent to good water quality. MCI excellent to very good, average 130.	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.	Very highly rated for aesthetic and scenic values.	Median flow of 5,900 l/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.
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3.3 New Plymouth District Plan (Operative and Proposed)

There are no Outstanding or Regionally Significant Landscapes or Outstanding Natural Features identified in ONPDP and no Outstanding Natural Character Areas or Natural Features and Landscapes identified in the PNPDP within or surrounding the Scheme.

Both plans reference the preservation of natural character of rivers, lakes and wetlands as a resource management issue and encourage public access along priority / significant waterbodies. Both the Mangorei Stream and the Waiwhakaiho River are identified as priority / significant waterbodies with ecological natural character, cultural, amenity, scenic and recreational values.

Neither the ONPDP or the PNPDP identify the manmade Mangorei Lake as a priority or significant waterbody.

4.0 Natural Character Assessment

4.1 Definition and Approach

This assessment of natural character applies to the potentially affected freshwater bodies and their margins, as defined in RMA Section 6(a)¹⁴. While the RMA does not provide a definition of natural character at a Department of Conservation workshop¹⁵ a definition was agreed by participants and has now also been adopted into a NZCPS guidance note¹⁶.

¹⁴ Section 6(a)) considers natural character as a matter of national importance: *...the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development*

¹⁵ Department of Conservation (2011) Natural Character and the NZCPS: National Workshop – Summary and Discussion Outcomes

¹⁶ NZCPS 2010 Guidance note Policy 13: Preservation of natural character

Natural character comprises the natural elements, patterns and processes of waterbodies and their margins, and how they are perceived and experienced. This assessment interprets natural character as being the degree of naturalness of waterbodies and their margins' consistent with the above definitions:

The degree or level of natural character within an environment depends on:

1. *The extent to which the natural elements, patterns and processes occur*
2. *The nature and extent of modification to the ecosystems and landscape / seascape.*

The degree of natural character is highest where there is least modification

The effect of different types of modification upon natural character varies with context and may be perceived differently by different parts of the community.

The process to assess natural character involves an understanding of the many systems and attributes that contribute to a waterbody including biophysical and experiential factors. This can be supported through the input of technical disciplines such as river hydrology and morphology, aquatic and terrestrial ecology, and landscape architecture, which as outlined above have all been drawn on for this assessment.

The natural character effects assessment involves the following steps:

- Description and assessment of the existing level of natural character;
- Description of any anticipated change to the natural character and the ongoing / future level of natural character; and
- Consideration of the significance of the effects.

Table 1 below describes the attributes and qualities used to describe and assess the level of natural character of the identified waterbodies / reaches, recognising that the active bed and margin have differing attributes and qualities.

Table 1: Natural Character Attributes

<i>Biophysical (Active bed and margins)</i>
<p>Active Bed</p> <ul style="list-style-type: none"> • <i>Flow Regime and Lake Levels – how natural / modified are the flows or lake level changes (dams, diversions, altered flow pattern / lake levels).</i> • <i>River or lake morphology- active bed shape, including sedimentation, structures and human modifications.</i> • <i>Aquatic ecology - Indigenous taxa assemblages, ecosystem functioning, Presence / absence of exotic aquatic flora and fauna, including presence of pest species. Periphyton and Macro invertebrates provide indication of water quality.</i> • <i>Water quality (if available).</i>
<p>Margins</p> <ul style="list-style-type: none"> • <i>Morphology- river bank or lake shore shape, including sedimentation, structures and human modifications.</i> • <i>Riparian vegetation and habitat – indigenous vegetation and fauna (birds, lizards), as well as presence of pest species.</i>
<i>Experiential</i>
<ul style="list-style-type: none"> • <i>Human perception of naturalness of waterbody. The expression of the biophysical attributes.</i> <ul style="list-style-type: none"> ○ <i>How natural does the area appear (dominance of human activity).</i> ○ <i>The remote / untamed experience.</i> ○ <i>Experiential attributes such as sound of water, smells, feel and transient values.</i>

4.2 Existing Natural Character - (Refer to Figures 5-9 in Appendix 2)

The natural character of many rivers, lakes and wetlands in Taranaki have been modified to varying degrees by human activities. Those water bodies with the greatest degree of natural character occur in the upper reaches of ring plain streams, the forested headwaters of the hill country rivers, and wetlands within Egmont National Park. Rivers, lakes and wetlands of the mid and lowlands have been modified to varying degrees through vegetation clearance, farming, urban development, water abstraction for irrigation, and damming and diversion for hydro power.

The Scheme's waterbodies have been delineated into the following reaches for assessment purposes:

- River Reach One – Waiwhakaiho River SH3 to weir / intake;
- River Reach Two - Waiwhakaiho River weir / intake;
- River Reach Three - Waiwhakaiho - downstream of weir / intake to tail race;
- River Reach Four – Waiwhakaiho - downstream of tail race to sea / estuary;
- Lake Mangamahoe – lake and margins;
- River Reach Five - Mangamahoe Stream below the dam / spillway.

4.2.1 River Reach One: Waiwhakaiho River – SH3 to Weir / Intake - (Refer to Figure 6 in Appendix 2)

The Waiwhakaiho River downstream from SH3 / Egmont Village and upstream of the weir is typical of the middle reaches of the river which pass through developed farmland. Beyond the immediate river margin, old river courses and terraces are evident. The 1.5 km reach generally has a swiftly flowing single channel with rapids and small pools within a relatively narrow rocky and gravel bed. Vegetated islands occur in the bed at some locations and a mix of indigenous vegetation, exotic forestry and pasture are present along the river margins.

This reach of the Waiwhakaiho River has a **Moderate-High** level of natural character due to a combination of the unmodified riverbed, river flows, intact river margin landform, mix of vegetation, remote experiential values, and somewhat degraded aquatic ecological values. This is based on the Aquatic Ecology Assessment which found through more recent monitoring that some indicators of water quality (nutrients, clarity and bacteria), periphyton growth and macroinvertebrate scores were all indicative of degraded health above the weir / intake¹⁷.

Waiwhakaiho River –SH3 to Weir / Intake		
Existing Natural Character Description	Rating	M-H
Biophysical - Active Bed		
<ul style="list-style-type: none"> • Minimal modification to natural flows, with mean flow at SH3 / Egmont Village of 7.85 m³/s (mean monthly flow) 	H	
<ul style="list-style-type: none"> • Riverbed unmodified by structures other than SH3 Bridge and continues to be shaped by natural processes. 	H	
<ul style="list-style-type: none"> • Aquatic ecology indicative of more recent degraded health – water quality, periphyton growth and MCI scores, but with a diverse range of fish species including migratory native fish, and high densities of trout. 	MH	

¹⁷ Mangorei HEPS Aquatic Ecology AEE – Section 3

Biophysical – River Margins

- The river channel is confined to the incised bed with a range of steep banks and low river terraces, which appear to be able to contain flood waters. There are no apparent modifications or need for bank reinforcement. H
- High level of riparian cover, banks and margins support dense woody vegetation predominantly indigenous and some exotic forest and pest plants. There are some margins where pasture extends to into the river margins. Indigenous vegetation present in a fragmented mosaic of native and exotic communities. Some successional stages present. Resembling moderate levels of natural pattern and process, however, surrounding landscape of pasture and exotic forest is of low value. M
- Bird habitat broadly follows vegetation and is of moderate value. Note that the marginal vegetation will provide habitat (roosting, feeding ('sentinel' sites), nesting habitat) for birds typically associated with water (e.g. kingfisher, waterfowl, welcome swallow). M

Experiential

- When experienced from within the riverbed, the river feels predominantly natural, and remote with the sounds, smell and dynamic sight of the swiftly flowing water. From within the river corridor the densely vegetated and sometimes high riverbanks largely block any experience of the developed / modified farmland beyond. The experience of clear water flowing noisily over and around the rocks, rapids and into pools has high experiential value for the river users. H
- Transient experiences of high floods and quickly changing water levels express the natural and unmodified river character.

4.2.2 River Reach Two: Waiwhakaiho River - at Weir / Intake - (Refer to Figure 7 in Appendix 2)

The weir and intake occur on a right bend in the river flanked by steep vegetated slopes on the west bank and grazed farmland on an old river terrace of the east bank. The concrete weir and intake structures were built in the 1930s, and the fish passage structure was added to the weir in 1992. A maintenance access track is located in the river margin on the west bank and crosses a stream culvert near the intake. Gravel and boulders are periodically removed from behind the weir and within the fish passage channel following flood events.

This short reach of the Waiwhakaiho River has a **Moderate-Low** level of natural character. This due to the combination of moderate to high water quality and in-stream aquatic communities, modifications resulting from instream structures and access, modified river flows and margins, ongoing maintenance, and resultant moderate experiential qualities.

Waiwhakaiho River - at Weir / Intake

Existing Natural Character Description

Rating

M-L

Biophysical - Active Bed

- Flow regime is highly modified particularly at normal and low flows with the diversion of up to 10 m³/s into the intake and interrupted flows when river levels are below the weir height. L
- The riverbed morphology is highly modified by the intake and weir structure, and the need to regularly excavate gravel material from behind the weir disturbs the bed and margins. L
- Aquatic ecology indicative of more recent degraded health – based on water quality, periphyton growth and MCI scores, but with a diverse range of fish species including migratory native fish, and high densities of trout. M

Biophysical - Margins

- The river margins are modified by the maintenance access track, culvert and intake on the west bank and disturbance / spoil on the east bank. L
- Riparian margins are largely modified with no over-hanging vegetation. Vegetation is a mix of native with more extensive mixed exotic forest with native shrub understorey on true left bank, exotic pasture / weeds on true right. Overall, moderate score for vegetation and birds, as essentially very similar to upstream reach. M

Experiential

- The substantial and multiple built structures and overhead lines introduce a high level of modification, which reduces the remote nature of the river. The absence of substantial woody riparian vegetation on the east bank makes this part of the river an extension of the modified and open farmland further reducing the naturalness and remote qualities of the river corridor. ML
- Experiential attributes such as sound of water, smells, still occur but experienced within a structured environment.
- Transient experiences of high floods would not be greatly impeded by the weir.

4.2.3 River Reach 3: Waiwhakaiho River – Weir / Intake to Meeting of the Waters - (Refer to Figure 8 in Appendix 2)

The 6km reach is flanked by developed farmland, the Lake Mangamahoe forestry block (with mountain bike and walking trails) and indigenous forest remnants. Other activities adjacent to the river in this reach of the river include, a chicken production unit, gravel extraction (quarry) operation, landfill, TOPEC settlement and the Mangorei power station. The Mangamahoe Stream once discharged into this reach of the river but was dammed to form Lake Mangamahoe as part of the Scheme. A swing bridge crosses the river at the TOPEC site to provide access to the northern Meeting of the Waters Scenic Reserve, just upstream of the power station tailrace.

This reach of the Waiwhakaiho River has a **Moderate-Low** level of natural character due to the reduced river flow, largely modified river margins with limited native vegetation, moderate aquatic health and water quality, and low experiential qualities due to adjacent land use activities.

Waiwhakaiho River – Weir / Intake to Meeting of the Waters

Existing Natural Character Description	Rating	M-L
Biophysical - Active Bed		
<ul style="list-style-type: none"> Flow Regime is modified by the diversion of water from the river system into the hydro stream with mean flow of 4.20 m³/s. High flows and floods still occur. 	M-L	
<ul style="list-style-type: none"> The riverbed morphology is largely unmodified by structures, but the supply and movement of rocks and gravels downstream are reduced by the weir. 	M-L	
<ul style="list-style-type: none"> Higher nitrogen concentrations, higher periphyton biomass, generally lower MCI scores are indicative of poorer aquatic ecology below the weir / intake however a diverse range of fish species, including migratory native fish, and good densities of trout are present. 	M	
Biophysical - Margins		
<ul style="list-style-type: none"> The river margins appear to be generally physically intact with few structures (except the swing bridge footings at Meeting of the waters and some aggregate extraction) 	M-L	
<ul style="list-style-type: none"> Some of the riverbanks and margins have dense woody vegetation- mixed exotic and indigenous, the remainder have little or no riparian vegetation where pastoral farming and other extraction and landfill activities extend close to the river edge. Upper half of true left and meeting of waters contains mixed native / exotic forest, and immediate margins on both banks having a substantial component of native vegetation. However, exotic vegetation still dominates, especially pine forest and pasture. 	M-L	
Experiential		
<ul style="list-style-type: none"> The more developed land use and other activities adjacent to the river reduce the experience of naturalness and wildness 	L	
<ul style="list-style-type: none"> Experiential attributes such as sound of water, smells, still occur and can be appreciated albeit with less water volumes. 		
<ul style="list-style-type: none"> Transient experiences of high floods and quickly changing water levels express the natural and unmodified river character. 		

4.2.4 River Reach 4: Waiwhakaiho River - Meeting of The Waters to the Sea - (Refer to Figure 9 in Appendix 2)

The 12km reach extends from the Mangorei powerhouse tailrace to the sea. It is flanked by a combination of scenic reserve, farmland, public parkland / reserves, and residential and industrial areas within New Plymouth. The river is generally cut down with high banks and old river terraces above. In places the river channel extends the full width of the bed and in other areas the channels weave across the rocky bed, through rapids and pools. The water diverted for the Scheme returns to the river via the powerhouse and tailrace at the Meeting of the Waters Scenic Reserve. A number of walkways and reserves along the river's west bank provide multiple access points to the river which is popular for recreational use.

This reach of the Waiwhakaiho River has a **Moderate-Low** level of natural character due to the variable flow from the power station, the number of structures and highly modified river margins in the downstream urbanised area, and reduced quality of the experiential values.

Waiwhakaiho River - Meeting of the Waters to the sea

Existing Natural Character Description

Rating

M-L

Biophysical - Active Bed

- While the diverted water is returned to the river, the flow regime is modified with large daily swings in the discharge from the hydro Scheme, with fluctuations a significant feature of the lower river. M
- The riverbed morphology is largely unmodified by structures in the upper part of the reach but is more modified closer to the coast and through the industrial area by bridges, stormwater outflows and bank reinforcement. The supply and movement of rocks and gravels downstream are reduced and modified by the weir and other structures within the river. M-L
- Similar higher periphyton biomass and generally lower MCI scores to the residual flow section of the river are indicative of poorer aquatic ecology with a reduced number and size of fish species present at the Rimu Street monitoring site. M

Biophysical - Margins

- The river margins are physically intact in the upper parts of the reach but more modified downstream through the industrial area. L
- Most of the riverbanks and margins have some degree of dense woody vegetation- mixed exotic and indigenous. Where the steep riverbanks allow grazed pasture occasionally extends down to the river's edge.
- The margins are broadly similar to reaches above, with a substantial native component on steep banks but often pasture, or rough pasture with mixed exotic shrubland / trees to the water's edge. Where native plants are present, species composition is broadly similar to upper reaches with some quite well-developed steep terrace edges dominated by native species. However, these patches of native vegetation / habitat are relatively small and set within much more extensive developed farmland and built-up urban / industrial areas that have low to very low ecological value. The mouth and Lake Rotomana support (as part of a wider habitat network) a diversity of typical freshwater and coastal / marine water birds, and in itself is high value, but this does not increase the overall value of this reach. L

Experiential

- From within the river corridor where the densely vegetated riverbanks enclose the river corridor it largely blocks any experience of the developed / modified land uses beyond; however, in other places the urban land use activities come right down to the river. M-L
- The wild and remotes qualities are much reduced where the river passes through the industrial area and under the SH1 road and rail bridges.
- Transient experiences of high floods and quickly changing water levels express the natural and unmodified river character, and tidal influences characterise the estuary and lowest parts of the river.

4.2.5 Lake Mangamahoe - (Refer to Figure 8 in Appendix 2)

Lake Mangamahoe was constructed to provide water storage to the New Plymouth water supply and subsequently for the Scheme. It is contained at the downstream end by a dam on the Mangamahoe Stream and a saddle dam part way along the western edge of the lake. Water diverted from the Waiwhakaiho River is

the main supply for the lake with secondary input from the Mangamahoe Stream and Kent Road tributary. The lake depth varies, with the southern arm being shallower, with a silt base evident. Lake levels change hourly and daily with a typical annual operating range of approximately 750mm between the Mangamahoe Dam spillway crest (RL149.80) and the minimum operating level of RL149.05m.

While the lake is completely artificial (being man-made for water storage purposes) it has naturalised over the decades and, as outlined in the Terrestrial Ecology Report¹⁸ has probably resulted in a net positive effect on terrestrial ecological values, with the lakeside vegetation providing habitat for various terrestrial fauna and water birds. The lake is also a popular recreational area with high landscape and amenity values. In terms of natural character, although the lake's formation is artificial it still has intrinsic qualities of a lake. The lake's natural character has been assessed with reference to it being manmade but acknowledging it has been in existence for many decades and contains a range of natural character values associated with the water body and lake margins.

The lake has an overall **Moderate** level of natural character due to a combination of the modified flow and water level regime, water body and margin form; structures within the lake and margins; mix of native and exotic vegetation; and valued experiential qualities associated with a natural lake.

Lake Mangamahoe		
Existing Natural Character Description	Rating	M-L
Biophysical - Active Bed		
<ul style="list-style-type: none"> The flow regime of the lake is highly modified, with inward and outward flows being controlled to maintain the required storage volumes. 	VL	
<ul style="list-style-type: none"> The lakebed and shores of the lake are defined by the natural stream valley landform which underlies it, with the addition of silt. The dams which contains the lake, and the water intake and hydro outlet structures have modified the lakebed. 	M-L	
<ul style="list-style-type: none"> The lake supports a native fish community and trout fishery with water quality broadly similar to the Waiwhakaiho River upstream of the take. 	M	
Biophysical - Margins		
<ul style="list-style-type: none"> The lake margins are physically intact and due to the managed nature of the lake levels the margins are not as affected by effects of flooding or summer dry spells. The lake margins on the east bank are densely vegetated to the shoreline with a mix of indigenous and exotic vegetation. The western margins are managed as 'parkland' with a narrow fringe of vegetation along the shoreline and mown grass beyond. 	M-L	
<ul style="list-style-type: none"> The lake provides good habitat for a diversity of water birds, including numerous introduced and native waterfowl, as well as birds of forest / forest-edge / scrub (e.g. tui, bellbird, fantail, silvereye and some at-risk or threatened species (NZ dabchick, grey duck) and in 1935 was gazetted as wildlife sanctuary and is currently a wildlife refuge under the Wildlife Act 1953. Vegetation of the lake and surrounds is also likely to support a diversity of native invertebrates and lizards. 	M-H	
Experiential		
<ul style="list-style-type: none"> Experiential qualities of the lake are moderate due to the apparent naturalness of the water body and surrounding vegetated slopes. 	M	
<ul style="list-style-type: none"> The wild and remote qualities are somewhat reduced by the presence of sealed roads, vehicles, structures, and signage. 		

¹⁸ Mangorei HEPS Terrestrial Ecology Assessment of Effects November 2020

4.2.6 River Reach 5: Mangamahoe Stream (below the lake)- (Refer to Figure 8 in Appendix 2)

The downstream 1km long remnant of Mangamahoe Stream extends from the main dam and spillway to the Waiwhakaiho River. There is no required residual flow into the stream from the lake, although there is a small volume of leakage and spillway discharges and inflows from other small sub-catchments and when the spillway overtops.

The stream has a rocky bed and flows through exotic forest, with regenerating native and exotic shrub on the eastern margin and pastoral farmland to the west. A disused concrete dam, owned by NPDC, remains in the stream bed and retains a small permanent pool behind it.

This lower reach of Mangamahoe Stream is highly modified, and the stream has a **Low** level of natural character.

Mangamahoe Stream (below the Lake)	
Existing Natural Character Description	Rating
Biophysical - Active Bed	
<ul style="list-style-type: none"> The flow regime of the stream is highly modified from its natural state with little or no regular flows. The physical bed of the stream is largely unmodified with the exception of an obsolete dam. Because the stream does not flow the dynamic process of sediment movement does not occur. 	VL
<ul style="list-style-type: none"> Samples of aquatic communities in lower reaches indicative of poor health (MCI). Evidence of native fish in lower reaches but fish passage restricted by the presence of NPDC dam. Limited water quality data with evidence of periphyton biomass cover dominated by mat algae. 	M-L
Biophysical - Margins	
<ul style="list-style-type: none"> The stream margins are physically intact but have been modified by the old dam structure. The riparian vegetation grows to the edge of the riverbed but with little water the typical riparian communities are not present. Vegetation in the margins is dominated by exotic weeds species and forestry. 	L
<ul style="list-style-type: none"> The extensive forest along the stream and in wider landscape is likely to support a reasonable diversity of forest birds. 	L-M
Experiential	
<ul style="list-style-type: none"> Experiential qualities of the stream as a waterbody are low due to the absence of flowing water. However, the remote character of the stream corridor is retained. 	L

4.3 Summary of Natural Character Values

River Reach and Name	Natural Character Ratings
River Reach 1 - Waiwhakaiho River SH3 to Weir / Intake	Moderate-High
River Reach 2 - Waiwhakaiho River at Weir / Intake	Moderate-Low
River Reach 3 - Waiwhakaiho River Weir / Intake to the Waters	Moderate-Low
River Reach 4 – Waiwhakaiho River – Meeting of the Waters to the Sea	Moderate-Low
Lake Mangamahoe – Lake and Margins	Moderate-Low
River Reach 5 - Mangamahoe Stream (below the lake)	Low

4.4 Effects on Natural Character

The primary impact of the Scheme is the reduced flow in the Waiwhakaiho River. The reduced flow in the river is largely limited to the 6km residual flow reach (i.e. from the intake structure to the tailrace), as the release of at least 950 L/s during the day from the station, combined with other sub-catchment flows, results in higher mean flows in the river downstream of the Scheme. In addition, the variable residual flow requirement ensures that the Scheme can make good use of winter flows, while providing a higher residual flow in the summer.

The changes to the flow regime, morphology, vegetation and habitat of the river and lake have further reduced the natural character values from the earlier modification due to settlement and associated vegetation clearance, water abstraction, farming and urbanisation. With the continued operation of the Scheme, as outlined in Section 2.1, the modification to the natural character attributes of the Waiwhakaiho River and margins will remain broadly as it has been in the past apart from natural variations due largely to climatic conditions. In this regard, the natural character values for each river reach and Lake Mangamahoe will remain broadly as described in Sections 5.3 above.

Given the existing values and the ongoing operation of the Scheme the effects on the exiting natural character values will vary within each river reach and Lake Mangamahoe. Within:

- the Waiwhakaiho River - above the weir and intake, the river is not affected by the Scheme and the ongoing effects are considered to be **Neutral** for River Reach 1.
- River Reach 2 - the ongoing effects are associated with the weir, fish passage and intake structures, and changes to the water flows, and this will continue to have **Moderate** adverse natural character effects.
- River Reach 3 - the primary ongoing effect is the reduced flow rate in the river, and this will continue to generate **Moderate-Low** adverse effects on the natural character values.
- River Reach 4 - while the flow rates are restored, the fluctuation associated with the water release from the power station will continue to generate **Low** adverse effects.
- Lake Mangamahoe – although man-made, with structures and a managed water regime, it has ecological and experiential values that overall result in **Low** beneficial ongoing natural character effects.
- River Reach 5 - where there is no residual flow, the Scheme would continue to generate **Moderate** adverse effects.

4.5 Summary of Natural Character Effects

River Reach and Name	Natural Character Effects
River Reach 1 - Waiwhakaiho River SH3 to Weir / Intake	Neutral
River Reach 2 - Waiwhakaiho River at Weir / Intake	Moderate Adverse
River Reach 3 - Waiwhakaiho River Weir / Intake to the Waters	Moderate-Low Adverse
River Reach 4 – Waiwhakaiho River – Meeting of the Waters to the Sea	Low Adverse
Lake Mangamahoe – Lake and Margins	Low Beneficial
River Reach 5 - Mangamahoe Stream (below the lake)	Moderate Adverse

5.0 Landscape Effects Assessment

Landscape character is derived from the distinct and recognisable pattern of elements that occur consistently in a landscape. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. Landscape effects therefore result from changes in the physical components within an area, which in turn can alter the overall character and potentially the wider landscape. Such effects are typically the result of landform or vegetation modification or the introduction of new structures, facilities or activities necessary to facilitate a project. It should be noted that landscape effects can occur without being seen by a viewing audience.

When assessing the significance of landscape change, it is important to consider the values associated with or derived from a landscape (e.g. its biophysical, sensory and associative values), the susceptibility of these to change, and the magnitude of the change proposed. Landscape effects deal with the effects of change, development and use of the landscape as a resource, rather than the effects on views and visual amenity for people.

5.1 Existing Landscape Character and Values

The Waiwhakaiho River is a steep-graded fast flowing river with a rocky bed and is prone to fast-rising floodwaters. Below the Mangorei power station the river flows and levels are affected by the Scheme on a daily basis. A condition of consent requires that a continuous generation flow release back into the Waiwhakaiho River (of at least 950L/s) be maintained between 8 am and 6 pm each day. This provides recreational / amenity opportunities while maintaining water and habitat quality in general.

As outlined above, the Scheme is set within undulating and rolling rural land that descends to the coast and through the residential / urban outskirts of New Plymouth. The land cover in the rural area is predominately covered in pasture but also consists of a mix of indigenous scrub and bush, and exotic forest along parts of the riverbank. The hilly terrain surrounding the lake supports a diverse mix of exotic commercial plantation forest, ornamental exotic trees and regenerating native vegetation. The lake and its surrounds provide a valuable recreational asset to the district, including scenic walks, mountain biking, horse riding, sightseeing, fishing and picnic areas for visitors.

From the Trustpower weir and intake, the Waiwhakaiho River passes through rural, suburban and industrial areas to the sea. These lower reaches of the river are well used for recreational activities including swimming, fishing, and kayaking. The Waiwhakaiho River walkway, along the western bank, links the subdivision of Merrilands to the New Plymouth Coastal Walkway. An in-river kayaking course is located in the tailrace of the power station and is well used by kayak clubs. The Taranaki Outdoor Pursuits and Education Centre (“TOPEC”) camp is located between Hydro Road and the river near the Meeting of the Waters and utilises the

river and tail race for kayaking and rafting activities. Meeting of the Waters Scenic Reserve is located on either side of the river where the tail race enters the Waiwhakaiho River, and a swing bridge upstream allows access to the reserve across the River from the TOPEC camp.

5.2 Landscape Effects Assessment

As there are no substantial changes proposed to the Scheme's operating regime the effects currently associated with the abstraction, redirecting, storing and use of a proportion of the water within the Waiwhakaiho River will continue. These flow rates and river levels will continue to fluctuate in line with both the varying seasonal rainfall and hydro power demands, whilst at all times maintaining the minimum flow rates in the river and range of lake levels.

Based on this, the key ongoing landscape effects are as follows:

- **Waiwhakaiho Diversion**

The main physical modifications to the landscape associated with the diversion are the intake structure, weir and fish passage located within the river approximately 1.5km downstream of the SH3 bridge crossing. This area is characterised by production pine forest on the left bank and an open pastoral area located on a lower river terrace opposite. The river margins consist of a mix of native shrubs and weed species. While the instream structures are an obvious modification to the natural streambed, they have weathered to a natural grey stone colour similar to the surrounding rocks and boulders. While an obvious modification these instream elements and the intake structure set within the left bank are of a scale where they are not dominant within the immediate river landscape and do not impact on the character of the wider landscape. In this area given the scale of the structures and the context of the landscape the physical and landscape character effects are considered to be **Low** adverse.

- **Lake Mangamahoe**

Lake Mangamahoe, having first been constructed over 80 years ago has become well integrated into its landscape setting to the point where it has now high landscape, recreational and amenity values. The lake is set within a 235ha park, owned by Trustpower and leased to and administered by the NPDC and subject to its own Management Plan¹⁹. The management plan states that recreational areas are highly valued by communities within the district, contribute to the quality of life of residents, and enhance visitor experience. The management plan recognises the primary purpose of the land is for water catchment and forestry use and that these uses at times take precedence over recreational activities. Ongoing pine forest harvest and re-planting around the lake results in changes to the landscape character and can contribute to sediment in the lake. According to the Tonkin and Taylor Sediment Assessment, sediment entering Lake Mangamahoe has a variety of origins including through the Waiwhakaiho tunnel, Mangamahoe Stream and Kent Road tributary²⁰. The main recreational activities associated with the lake area are trout fishing, walking, cycling and horse riding, as well as more passive / leisure pursuits around the fringes of the lake. Details of the recreational use of the lake are outlined in the A detailed Recreation Assessment²¹ prepared by Mr Rob Greenaway.

The main ongoing physical landscape effects resulting from the HEPS relate to the outlet, dam and spillway structures at the northern end of the lake, the managed variability in the lake level, the sedimentation and the periodic lowering of the lake for weed removal. The structures have become well integrated into the character of the lake surrounds and the visible changes to the lake levels are a recognised daily fluctuation to the edge of the lake much like a small tidal variation. While the visible appearance of suspended sediment would affect the clarity of the water in the lake this can be caused through a range of land uses (e.g. pastoral farming and forestry), soil erosion and episodic events such as landslides.

¹⁹ New Plymouth District Lake Mangamahoe Management Plan December 2011

²⁰ Mangorei HEPS Consent Renewal: Lake Mangamahoe Sediment Assessment - by Tonkin and Taylor Ltd, November 2020 – Executive Summary

²¹ Mangorei Hydroelectric Power Scheme Reconsenting: Recreation Assessment November 2020

Given the scale and age of the structural elements around the lake edge, the regular small fluctuation in water level and clarity, and the fact the lake is manmade for water storage purposes, it is considered the Scheme does not create an adverse effect on the landscape resource or character of lake water body, margin or surrounding area, particularly when these are considered in relation to the ongoing catchment land-use and periodic forestry operations. Overall, it is considered that the physical and landscape character of Lake Mangamahoe is beneficial to a **Moderate** level.

- **Power Station and Surrounds**

The power station, penstocks and tailrace which are located south of the Waiwhakaiho River adjacent to Hydro Road have become an established part of the landscape character of the river terrace and northern extent of the foothills within the river catchment. The area is characterised by areas of indigenous bush, particularly around the river margins and TOPC land and the mix of mature exotic trees located further from the river edge. The tailrace extends approximately 250m from the power station in a channel under the Hydro Road bridge to the Waiwhakaiho river. Below the bridge the tailrace is used as a course for kayaking by TOPEC. Two above ground penstock pipes extend for approximately 300m from the tunnel outlet (RL150m) to the powerhouse (RL100m), a fall of approximately 50m at a slope angle of 1V to 6H. While these linear infrastructure elements modify the hill slope above the power station, they do not alter the rural character of the area to any more than a limited extent as they form part this modified landscape with a number of other buildings, roads, fences and vegetation evident. The power station is now well integrated into its immediate surrounds resulting in no more than **Low** adverse effects on the physical elements or landscape character.

5.3 Landscape Effects Summary

In summary, the implementation of the Scheme has resulted in modification to the physical landscape and wider character within the foothills of the mid Waiwhakaiho River catchment. These changes are characterised by the 37ha Lake Mangamahoe and associated parkland as well as in-stream and lake structures, tunnels, above ground pipes, a water race and buildings. The elements and the ongoing effects generated by their scale and form are overall considered to be **Neutral**, with any adverse effects of the in-stream, power station and lake structures compensated for by the landscape quality and character of the lake and its wide public use and enjoyment.

6.0 Visual Amenity Assessment

Amenity values are defined in the RMA as:

...those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes²².

Visual amenity describes the pleasantness and aesthetic coherence of a place and comprises the visual and aesthetic aspects of amenity. The experiential and perceptual components of the landscape and natural character assessment contribute to the overall amenity values of an area.

Matters to be considered in relation to visual amenity are:

- **In river** - flow level, wetted surface / dry channel, substrate / rock material, water clarity, water colour, water movement, light reflection.
- **River / lake margins** - vegetation, levels of human modification, (e.g. structures, buildings, litter), seasonal colour, nature of exposed river / lake margin (e.g. substrate of margin, algal proliferations).

²² Resource Management Act Section 7c

- **Visibility and viewing audience** - the nature and size of the viewing audience, with some reaches / areas more accessible and visible than others; their sensitivity e.g. recreational / residential audiences have a greater level of sensitivity than passing traffic or workers.

Operational changes that could affect the visual amenity are:

- Noticeable drop in river / lake water level and / or a change in the regular pattern of level fluctuations
- Changes to the clarity of the water in the lake or river (which may include sedimentation, periphyton or an increase in the extent of a muddy shoreline); and
- Changes to the character of the lake and riverbanks through flooding, erosion or debris.

6.1 Visual Catchment and Viewing Audience

The Waiwhakaiho River is typically deeply incised with steep banks which are generally heavily vegetated with shrubs and trees. This profile makes it difficult to see the riverbed and channel unless the viewer is located immediately adjacent to the bank, such as at road / reserve access points, or at a bridge crossing. Views of the river are possible from the public walkways and reserves along parts of the river between the Meeting of the Waters Scenic Reserve and the coast and at some bridge crossings. Access along the river from Araheke walkway provides close up views of the river and at the tailrace discharge point in the Meeting of the Waters Scenic Reserve. Some reaches of the river are open with grass and low vegetation on the margins which make for easy views of the river from surrounding roads and farmland.

Lake Mangamahoe is a popular public recreation area, maintained by NPDC. It is valued for its scenic qualities, with walking, mountain biking, equestrian tracks, a shore-based fishery and picnic areas, and consequently has a relatively large local viewing audience. The lake margins are densely vegetated in many places with a mix of native and exotic vegetation, which in some locations restrict open views of the lake thereby reducing the visibility of the changing lake levels.

As noted by the Recreation Assessment²³, the Waiwhakaiho River is also a popular fishery, given its proximity to New Plymouth and angling guides recommend trout fishing upstream of the weir and downstream of the Meeting of the Waters. Other activities on the river include kayaking and rafting, with kayaking possible from the National Park to the sea given suitable river flows; and the tailrace used by the New Plymouth Kayak Club. Rafting is offered by TOPEC at the Meeting of the waters along with other recreational pursuits such as swimming, and orienteering. The two walking tracks within the Department of Conservation's Meeting of the Waters Scenic Reserve provide access to both sides of the river. Public access is also available from the Lake Mangamahoe park to Hydro Road, south of the power station and down to the Scenic Reserve walkways.

In the lower reaches of the river there are public access tracks along parts of the river's edge with the Waiwhakaiho Pathway extending from Skeet Place to Raiomiti Street. At the river mouth there are also walking tracks and access for seasonal whitebait fishing.

6.2 Effects on Visual Amenity

The introduction of the Scheme on the Waiwhakaiho River and the associated creation of Lake Mangamahoe which occurred approximately 80 years ago has created an environment with a range of amenity values, particularly around the lake and at the Meeting of the Waters Scenic Reserve where the public can enjoy a range of active and passive recreational pursuits. These natural and man-made landscapes have a range of qualities associated with water and vegetation that enhance the visual amenity of the surrounds and the experience of the general public. As the operating regime of the Scheme is to be maintained in its current state there will be no further changes to the landscape qualities and character of the river and lake and these attributes will be able to continue to be enjoyed. On balance it is considered the Scheme has enhanced the visual amenity of the area surrounding Lake Mangamahoe through making this area more accessible and available for leisure pursuits. This has resulted in beneficial visual effects for the viewing audience and visual

²³ Mangorei Hydroelectric Power Scheme Reconsenting: Recreation Assessment November 2020

amenity of the area, and it is considered that the ongoing operation of the Scheme will overall result in **Moderate-High** beneficial effects on visual amenity values.

7.0 Effects in Relation to Statutory Provisions

The relevant landscape, natural character and visual amenity provisions as outlined in Section 3 above are summarised and commented on below in relation to the proposed consent of the Scheme.

- **The protection of natural character and natural features and landscapes of regional significance associated with Taranaki's rivers, lakes and their margins.**

Comment:

- The Waiwhakaiho River has been identified as a river of regional significance, notwithstanding the presence of the Scheme, with a range of adverse effects associated with its development and ongoing operation. In terms of natural character and landscape effects the modification to these values were largely generated when the Scheme was constructed. The ongoing use, under the same conditions of consent and operating parameters will maintain the natural character values of the river, lake and margins surrounding the Scheme.
- **The recognition and appropriate management of natural areas that are of value for water quality and quantity, natural character, amenity, geological and geomorphological, botanical, wildlife and fishery values; and biodiversity and the functioning of ecosystems.**

Comment:

The ongoing management of the Scheme in accordance with the conditions of consent will maintain the same level of effects on the values identified and provide benefits for the community in terms of power generation, landscape quality and visual amenity.

- **The avoidance, remediation or mitigation of adverse effects of inappropriate use and development, on amenity values, the promotion of positive effects, and the balancing of positive effects against adverse effects.**

Comment:

The creation of scenic, aesthetic, and recreational opportunities for the community adjacent to the river (Meeting of The Waters Scenic Reserve) and the Lake Mangamahoe parkland mitigates the adverse visual amenity effects resulting from the use of the Scheme.

- **The maintenance and enhancement of public access to and along rivers and lakes.**

Comment:

Public access is to be maintained around Lake Mangamahoe and to and along the Waiwhakaiho River.

The landscape, natural character and visual amenity effects associated with the continued operation of the Scheme are not contrary to the policy expectations and directions set out in the relevant provisions.

John Goodwin

Registered Landscape Architect

Boffa Miskell

November 2020

Appendix 1: Natural Character, Landscape and Visual Effects Assessment Methodology

11 February 2019

Introduction

The Boffa Miskell Ltd landscape and visual effects assessment (LVA) process provides a framework for assessing and identifying the nature and level of likely effects that may result from a proposed development. Such effects can occur in relation to changes to physical elements, the existing character of the landscape and the experience of it. In addition, the landscape assessment method may include an iterative design development processes, which includes stakeholder involvement. The outcome of any assessment approach should seek to avoid, remedy or mitigate adverse effects (see **Figure 1**). A separate assessment is required to assess changes in natural character in coastal areas and other waterbodies.

This outline of the landscape and visual effects assessment methodology has been undertaken with reference to the **Quality Planning Landscape Guidance Note**²⁴ and its signposts to examples of best practice, which include the **UK guidelines for landscape and visual impact assessment**²⁵ and the **New Zealand Landscape Institute Guidelines for Landscape Assessment**²⁶.

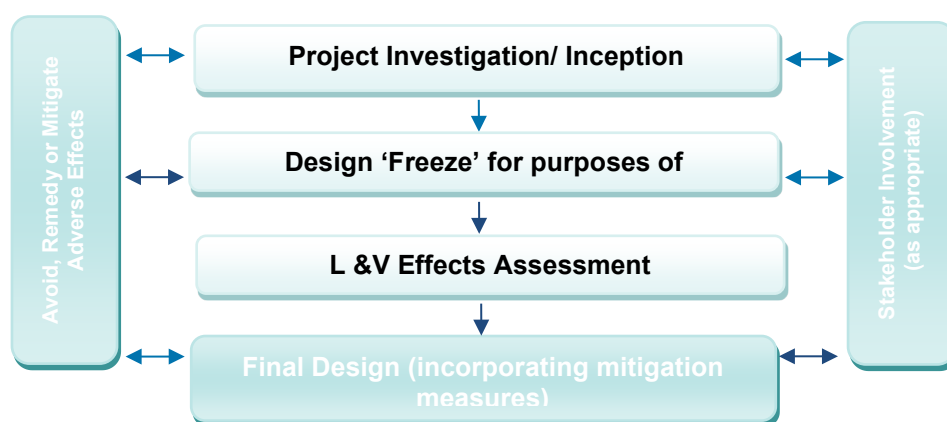


Figure 1: Design feedback loop

When undertaking a LVA, it is important that a **structured and consistent approach** is used to ensure that **findings are clear and objective**. Judgement should be based on skills and experience and be supported by explicit evidence and reasoned argument.

While natural character, landscape and visual effects assessments are closely related, they form separate procedures. Natural character effects consider the change in degree of modification relating to the coastal environment. The assessment of the potential effect on the landscape forms the first step in this process and is carried out as an effect on landscape elements, features and on landscape character. The assessment of visual effects considers

²⁴ <http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape>

²⁵ Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)

²⁶ Best Practice Note Landscape Assessment and Sustainable Management 10.1, NZILA

how changes to the physical landscape affect the viewing audience. The types of effects can be summarised as follows:

Natural Character effects: *Change in the level or degree of naturalness along a waterbody.*

Landscape effects: *Change in the physical landscape, which may affect its characteristics or*

Visual effects: *Change to views which may affect the visual amenity experienced by people.*

The policy context, existing landscape resource and locations from which a development or change is visible, all inform the 'baseline' for landscape and visual effects assessments. To assess effects, the landscape must first be **described**, including an understanding of the **key landscape characteristics and qualities**. This process, known as landscape characterisation, is the basic tool for understanding landscape character and may involve subdividing the landscape into character areas or types. The condition of the landscape (i.e. the state of an individual area of landscape or landscape feature) should also be described together with, a judgement made on the value or importance of the potentially affected landscape.

Natural Character Effects

In terms of the RMA, natural character specifically relates to coastal and freshwater environments. The RMA provides no definition of natural character. Section 6(a)) considers natural character as a matter of national importance:

...the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.

Natural character comprises the natural elements, patterns and processes of the waterbodies and their margins, and how they are perceived and experienced. This assessment interprets natural character as being the degree of naturalness of waterbodies and their margins' consistent with the following definition²⁷:

The degree or level of natural character within an environment depends on:

- 1. The extent to which the natural elements, patterns and processes occur*
- 2. The nature and extent of modification to the ecosystems and landscape / seascape.*

The degree of natural character is highest where there is least modification

The effect of different types of modification upon natural character varies with context and may be perceived differently by different parts of the community.

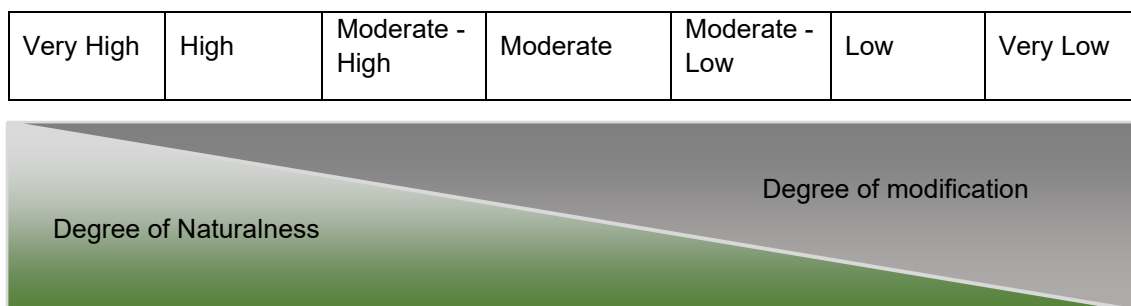
The process to assess natural character involves an understanding of the many systems and attributes that contribute to a waterbody including biophysical and experiential factors. This can be supported through the input of technical disciplines such as river hydrology and morphology, aquatic and terrestrial ecology, and landscape architecture.

²⁷ Department of Conservation (2011) Natural Character and the NZCPS: National Workshop – Summary and Discussion Outcomes

The wider landscape character context of the catchment adjacent to the lake / river may also be relevant in interpreting natural character, (e.g. natural characteristics and qualities may gain significance because of their location within a national park or downtown waterfront).

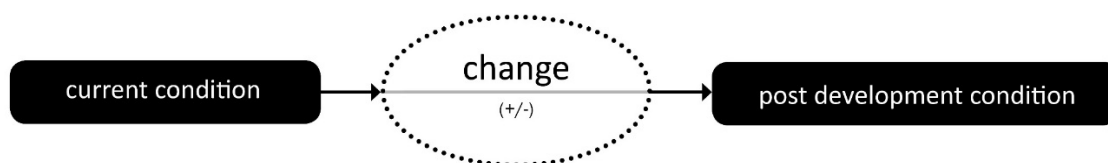
Defining the level of natural character

The level of natural character is assessed in relation to a seven-point scale. The diagram below illustrates the relationship between the degree of naturalness and degree of modification. A high level of natural character means the waterbody is less modified and vice versa.



Effects on Natural Character

An assessment of the effects on natural character of an activity involves consideration of the proposed changes to the current condition compared to the existing. This can be negative or positive.



The natural character effects assessment involves the following steps;

- assessing the existing level of natural character;
- assessing the level of natural character anticipated (post construction); and
- considering the significance of the change

Landscape Effects

Assessing landscape effects requires an understanding of the landscape resource and the magnitude of change which results from a proposed activity to determine the overall level of landscape effects.

Landscape Resource

Assessing the sensitivity of the landscape resource considers the key characteristics and qualities. This involves an understanding of both the ability of an area of landscape to absorb change and the value of the landscape.

Ability of an area to absorb change

This will vary upon the following factors:

- Physical elements such as topography / hydrology / soils / vegetation;
- Existing land use;
- The pattern and scale of the landscape;
- Visual enclosure / openness of views and distribution of the viewing audience;
- The zoning of the land and its associated anticipated level of development;
- The scope for mitigation, appropriate to the existing landscape.

The ability of an area of landscape to absorb change takes account of both the attributes of the receiving environment and the characteristics of the proposed development. It considers the ability of a specific type of change occurring without generating adverse effects and / or achievement of landscape planning policies and strategies.

The Value of the Landscape

Landscape value derives from the importance that people and communities, including tangata whenua, attach to particular landscapes and landscape attributes. This may include the classification of Outstanding Natural Feature or Landscape (ONFL) (RMA s.6(b)) based on important biophysical, sensory / aesthetic and associative landscape attributes, which have potential to be affected by a proposed development. A landscape can have value even if it is not recognised as being an ONFL.

Magnitude of Landscape Change

The magnitude of landscape change judges the amount of change that is likely to occur to areas of landscape, landscape features, or key landscape attributes. In undertaking this assessment, it is important that the size or scale of the change is considered within the geographical extent of the area influenced and the duration of change, including whether the change is reversible. In some situations, the loss / change or enhancement to existing landscape elements such as vegetation or earthworks should also be quantified.

When assessing the level of landscape effects, it is important to be clear about what factors have been considered when making professional judgements. This can include consideration of any benefits which result from a proposed development. **Table 1** below helps to explain this process. The tabulating of effects is only intended to inform overall judgements.

Contributing Factors		Higher	Lower
Landscape (sensitivity)	Ability to absorb change	The landscape context has limited existing landscape detractors which make it highly vulnerable to the type of change resulting from the proposed development.	The landscape context has many detractors and can easily accommodate the proposed development without undue consequences to landscape character.
	The value of the landscape	The landscape includes important biophysical, sensory and shared and recognised attributes. The landscape requires protection as a matter of national importance (ONF/L).	The landscape lacks any important biophysical, sensory or shared and recognised attributes. The landscape is of low or local importance.
Magnitude of Change	Size or scale	Total loss or addition of key features or elements. Major changes in the key characteristics of the landscape, including significant aesthetic or perceptual elements.	The majority of key features or elements are retained. Key characteristics of the landscape remain intact with limited aesthetic or perceptual change apparent.
	Geographical extent	Wider landscape scale.	Site scale, immediate setting.
	Duration and reversibility	Permanent. Long term (over 10 years).	Reversible. Short Term (0-5 years).

Table 1: Determining the level of landscape effects

Visual Effects

To assess the visual effects of a proposed development on a landscape, a visual baseline must first be defined. The visual 'baseline' forms a technical exercise which identifies the area where the development may be visible, the potential viewing audience, and the key representative public viewpoints from which visual effects are assessed.

The Sensitivity of the viewing audience

The sensitivity of the viewing audience is assessed in terms of assessing the likely response of the viewing audience to change and understanding the value attached to views.

Likely response of the viewing audience to change

Appraising the likely response of the viewing audience to change is determined by assessing the occupation or activity of people experiencing the view at particular locations and the extent to which their interest or activity may be focussed on views of the surrounding landscape. This relies on a landscape architect's judgement in respect of visual amenity and the reaction of people who may be affected by a proposal. This should also recognise that people more susceptible to change generally include: residents at home, people engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views; visitors to heritage assets or other important visitor attractions; and communities where views contribute to the wider landscape setting.

Value attached to views

The value or importance attached to particular views may be determined with respect to its popularity or numbers of people affected or reference to planning instruments such as viewshafts or view corridors. Important viewpoints are also likely to appear in guidebooks or tourist maps and may include facilities provided for its enjoyment. There may also be references to this in literature or art, which also acknowledge a level of recognition and importance.

Magnitude of Visual Change

The assessment of visual effects also considers the potential magnitude of change which will result from views of a proposed development. This takes account of the size or scale of the effect, the geographical extent of views and the duration of visual change, which may distinguish between temporary (often associated with construction) and permanent effects where relevant. Preparation of any simulations of visual change to assist this process should be guided by best practice as identified by the NZILA²⁸.

When determining the overall level of visual effect, the nature of the viewing audience is considered together with the magnitude of change resulting from the proposed development.

Table 2 has been prepared to help guide this process:

²⁸ Best Practice Guide: Visual Simulations BPG 10.2, NZILA

Contributing Factors		Higher	Lower	Examples
The Viewing Audience (sensitivity)	Ability to absorb change	Views from dwellings and recreation areas where attention is typically focussed on the landscape.	Views from places of employment and other places where the focus is typically incidental to its landscape context. Views from transport corridors.	Dwellings, places of work, transport corridors, public tracks
	Value attached to views	Viewpoint is recognised by the community such as an important view shaft, identification on tourist maps or in art and literature. High visitor numbers.	Viewpoint is not typically recognised or valued by the community. Infrequent visitor numbers.	Acknowledged viewshafts, Lookouts
Magnitude of Change	Size or scale	Loss or addition of key features in the view. High degree of contrast with existing landscape elements (i.e. in terms of form scale, mass, line, height, colour and texture). Full view of the proposed development.	Most key features of views retained. Low degree of contrast with existing landscape elements (i.e. in terms of form scale, mass, line, height, colour and texture). Glimpse / no view of the proposed development.	- Higher contrast/ Lower contrast. - Open views, Partial views, Glimpse views (or filtered); No views (or obscured)
	Geographical extent	Front on views. Near distance views; Change visible across a wide area.	Oblique views. Long distance views. Small portion of change visible.	- Front or Oblique views. - Near distant, Middle distant and Long distant views
	Duration and reversibility	Permanent. Long term (over 15 years).	Transient / temporary. Short Term (0-5 years).	- Permanent (fixed), Transitory (moving)

Table 2: Determining the level of visual effects

Nature of Effects

In combination with assessing the level of effects, the landscape and visual effects assessment also considers the nature of effects in terms of whether this will be positive (beneficial) or negative (adverse) in the context within which it occurs. Neutral effects can also occur where landscape or visual change is benign.

It should also be noted that a change in a landscape does not, of itself, necessarily constitute an adverse landscape or visual effect. Landscape is dynamic and is constantly changing over time in both subtle and more dramatic transformational ways; these changes are both natural and human induced. What is important in managing landscape change is that adverse effects are avoided or sufficiently mitigated to ameliorate the effects of the change in land use. The aim is to provide a high amenity environment through appropriate design outcomes.

This assessment of the nature effects can be further guided by **Table 3** set out below:

Nature of effect	Use and Definition
Adverse (negative):	The activity would be out of scale with the landscape or at odds with the local pattern and landform which results in a reduction in landscape and / or visual amenity values
Neutral (benign):	The activity would be consistent with (or blend in with) the scale, landform and pattern of the landscape maintaining existing landscape and / or visual amenity values
Beneficial (positive):	The activity would enhance the landscape and / or visual amenity through removal or restoration of existing degraded landscape activities and / or addition of positive elements or features

Table 3: Determining the Nature of Effects

Determining the Overall Level of Effects

The landscape and visual effects assessment concludes with an overall assessment of the likely level of landscape and visual effects. This step also takes account of the nature of effects and the effectiveness of any proposed mitigation. The process can be illustrated in Figure 2:

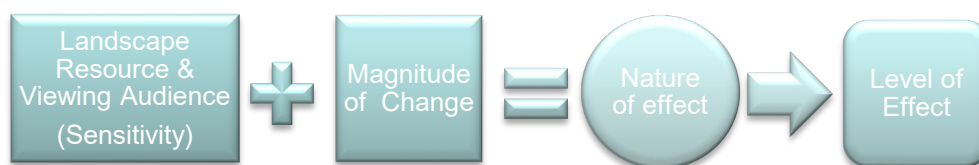


Figure 2: Assessment process

This step informs an overall judgement identifying what level of effects are likely to be generated as indicated in **Table 4** below. This table which can be used to guide the level of landscape and visual effects uses an adapted seven-point scale derived from NZILA's Best Practice Note.

Effect Rating	Use and Definition
Very High:	Total loss of key elements / features / characteristics, i.e. amounts to a complete change of landscape character in views.
High:	Major modification or loss of most key elements / features / characteristics, i.e. little of the pre-development landscape character remains and a major change in views. <u>Concise Oxford English Dictionary Definition</u> <i>High: adjective- Great in amount, value, size, or intensity.</i>
Moderate- High:	Modifications of several key elements / features / characteristics of the baseline, i.e. the pre-development landscape character remains evident but materially changed and prominent in views.
Moderate:	Partial loss of or modification to key elements / features / characteristics of the baseline, i.e. new elements may be prominent in views but not necessarily uncharacteristic within the receiving landscape. <u>Concise Oxford English Dictionary Definition</u> <i>Moderate: adjective- average in amount, intensity, quality or degree</i>
Moderate - Low:	Minor loss of or modification to one or more key elements / features / characteristics, i.e. new elements are not prominent within views or uncharacteristic within the receiving landscape.
Low:	Little material loss of or modification to key elements / features / characteristics. i.e. modification or change is not uncharacteristic or prominent within views and absorbed within the receiving landscape. <u>Concise Oxford English Dictionary Definition</u> <i>Low: adjective- 1. Below average in amount, extent, or intensity.</i>
Very Low:	Negligible loss of or modification to key elements/ features/ characteristics of the baseline, i.e. approximating a 'no change' situation and a negligible change in views.

Table 4: Determining the overall level of landscape and visual effects

Determination of “minor”

Decision makers determining whether a resource consent application should be notified must also assess whether the effect on a person is less than minor²⁹ or an adverse effect on the environment is no more than minor³⁰. Likewise, when assessing a non-complying activity,

²⁹ RMA, Section 95E

³⁰ RMA Section 95D

consent can only be granted if the s104D 'gateway test' is satisfied. This test requires the decision maker to be assured that the adverse effects of the activity on the environment will be 'minor' or not be contrary to the objectives and policies of the relevant planning documents.

These assessments will generally involve a broader consideration of the effects of the activity, beyond the landscape and visual effects. Through this broader consideration, guidance may be sought on whether the likely effects on the landscape or effects on a person are considered in relation to 'minor'. It must also be stressed that more than minor effects on individual elements or viewpoints does not necessarily equate to more than minor effects on the wider landscape. In relation to this assessment, moderate-low level effects would generally equate to 'minor'.

The third row highlights the word 'significant' which has particular reference to the NZCPS and Policy 13 and Policy 15 and where on the effects-spectrum 'a significant' effect would be placed.

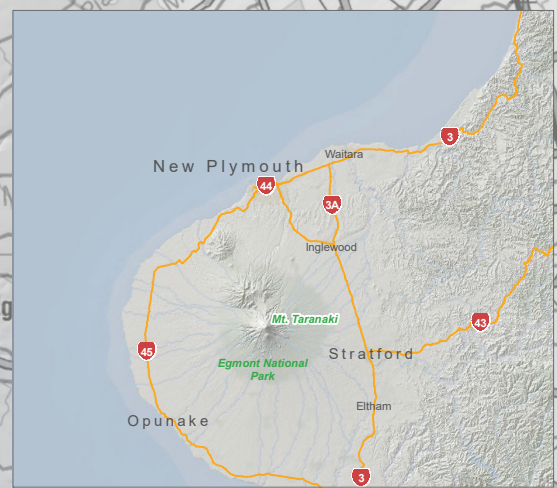
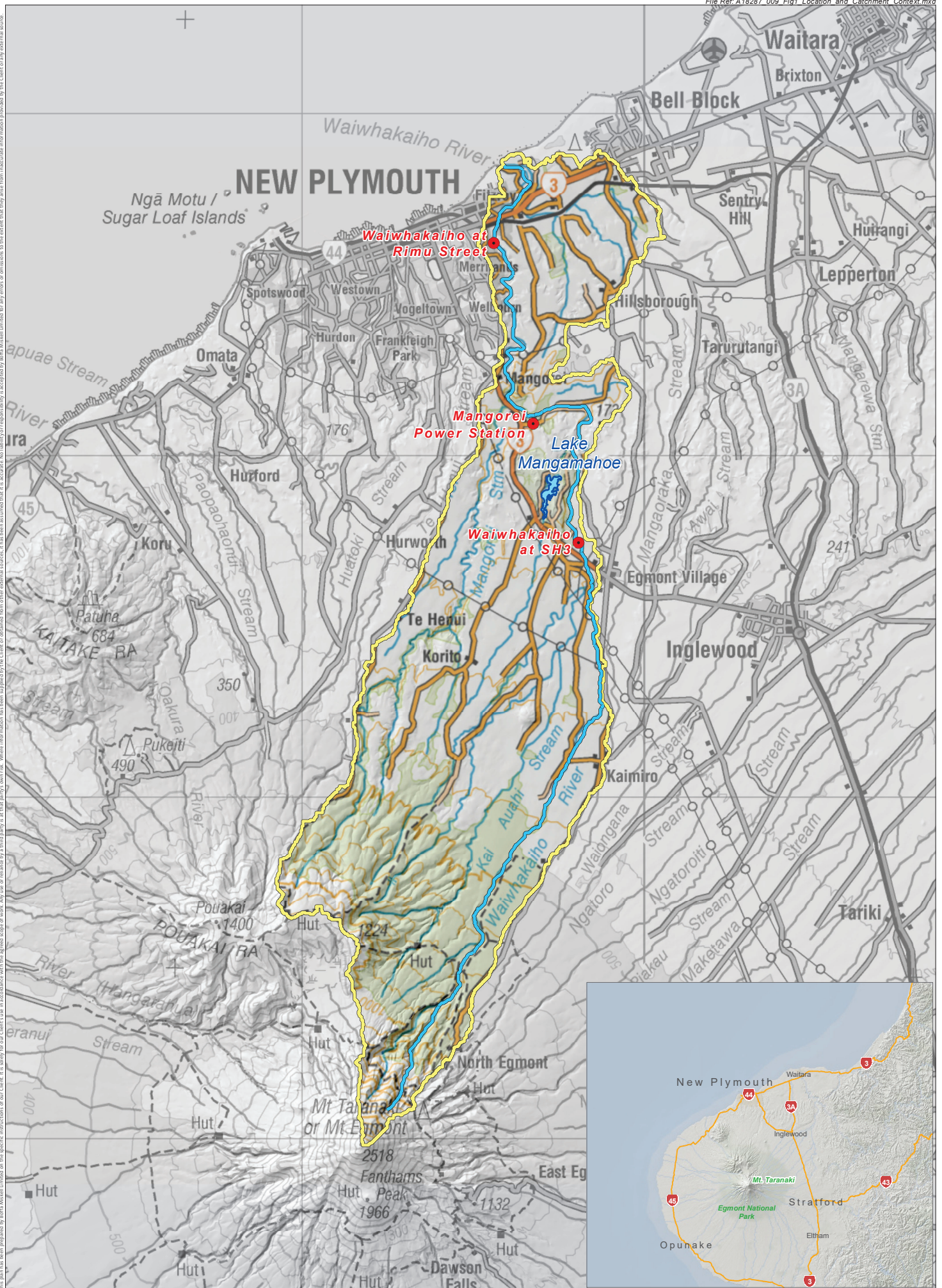
<u>Less than Minor</u>		<u>Minor</u>	<u>More than Minor</u>			
Very Low	Low	Moderate – Low	Moderate	Moderate-High	High	Very High
					Significant³¹	

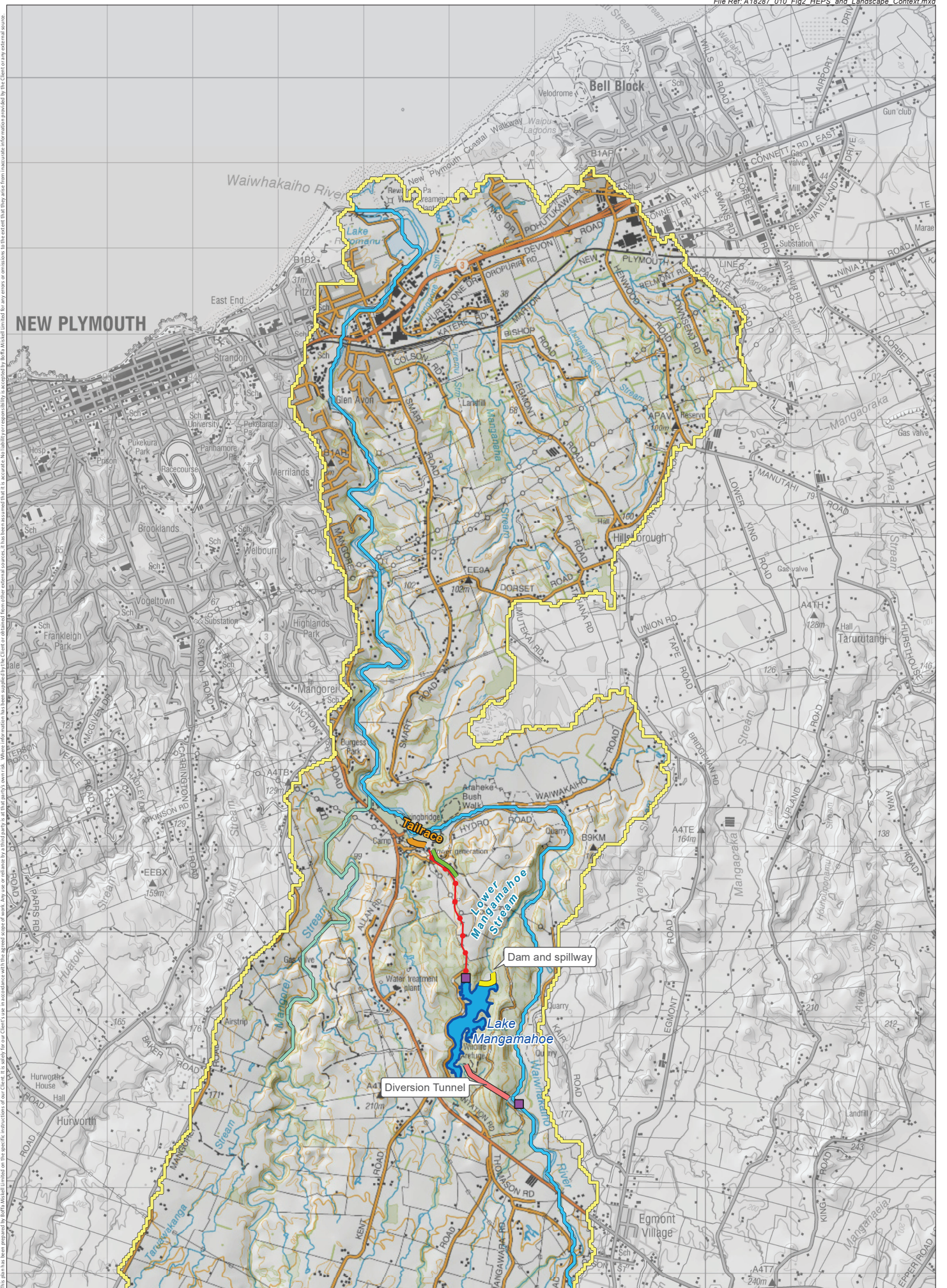
Table 5: Determining minor effects for notification determination and non-complying activities

³¹ To be used only about Policy 13(1)(b) and Policy 15(b) of the New Zealand Coastal Policy Statement (NZCPS), where the test is 'to avoid significant adverse effects'.

Appendix 2: Figures to Accompany Assessment

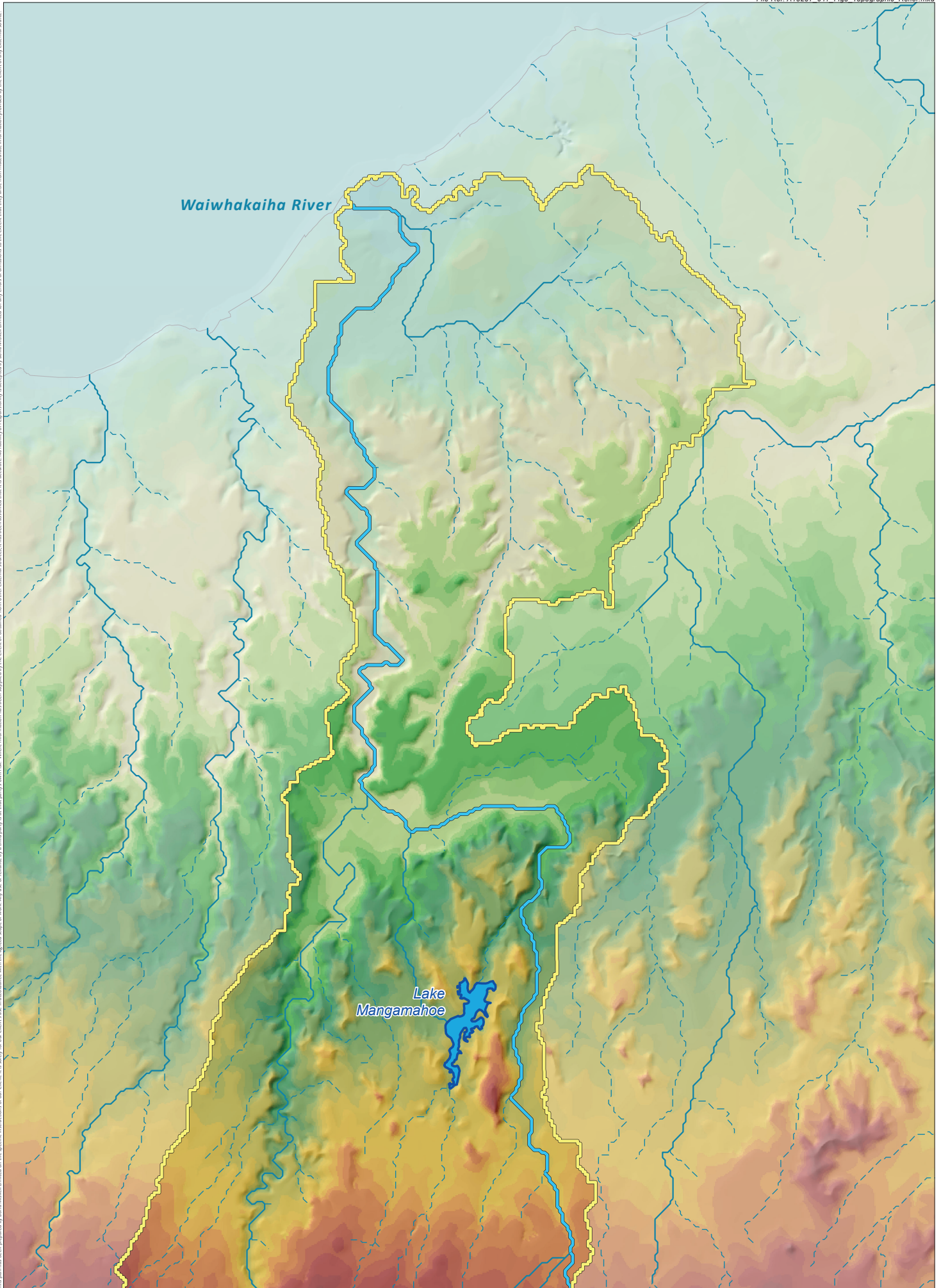
- Figure 1: Location and Catchment Context
- Figure 2: HEPS and Landscape Context
- Figure 3: Topographic Relief
- Figure 4: Land Cover
- Figure 5: River Reaches: Key Plan
- Figure 6: River Reach 1
- Figure 7: River Reach 2
- Figure 8: River Reach 3 and 5 / Lake Mangamahoe
- Figure 9: River Reach 4





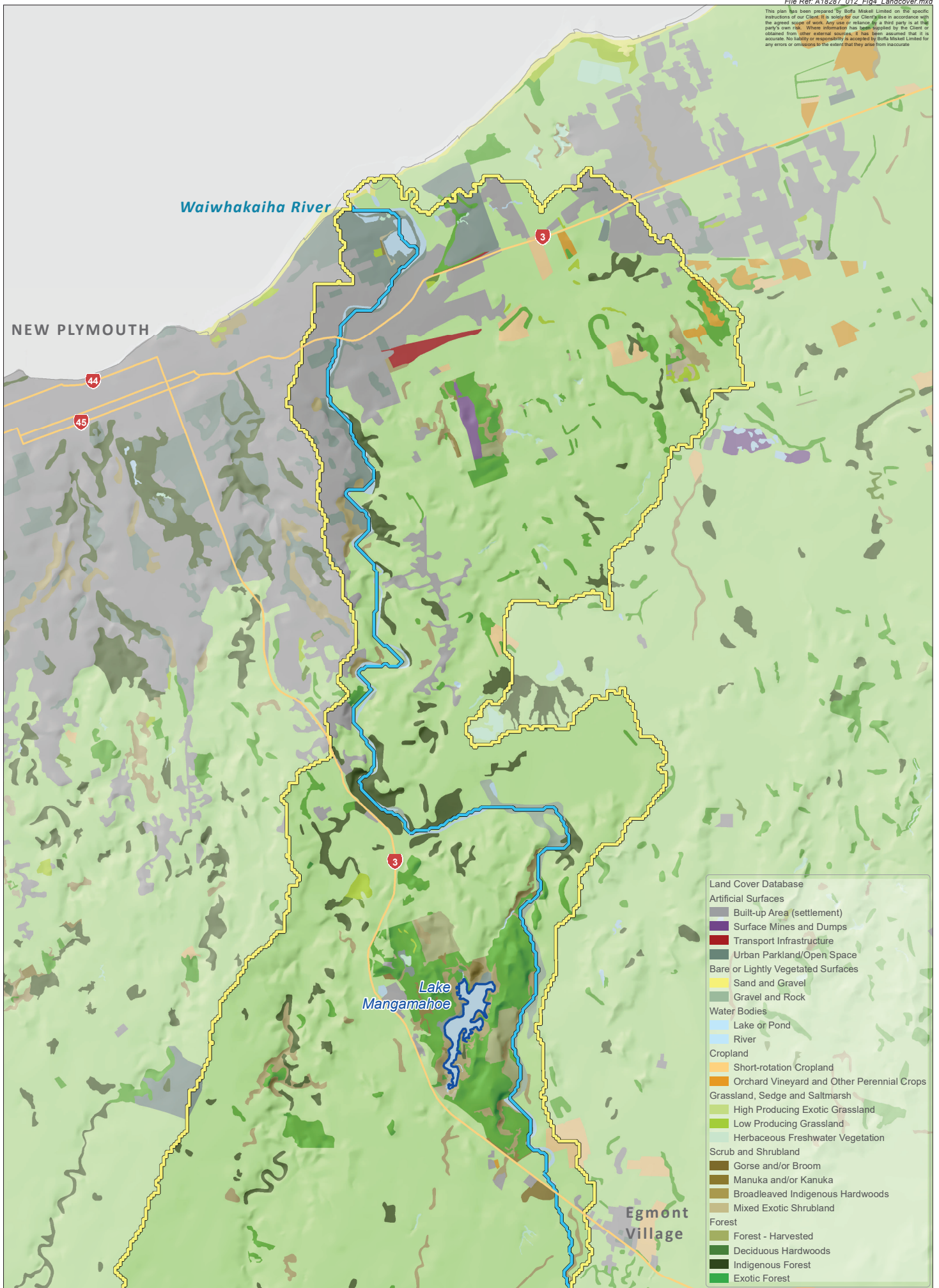
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Figure 2



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Figure 3



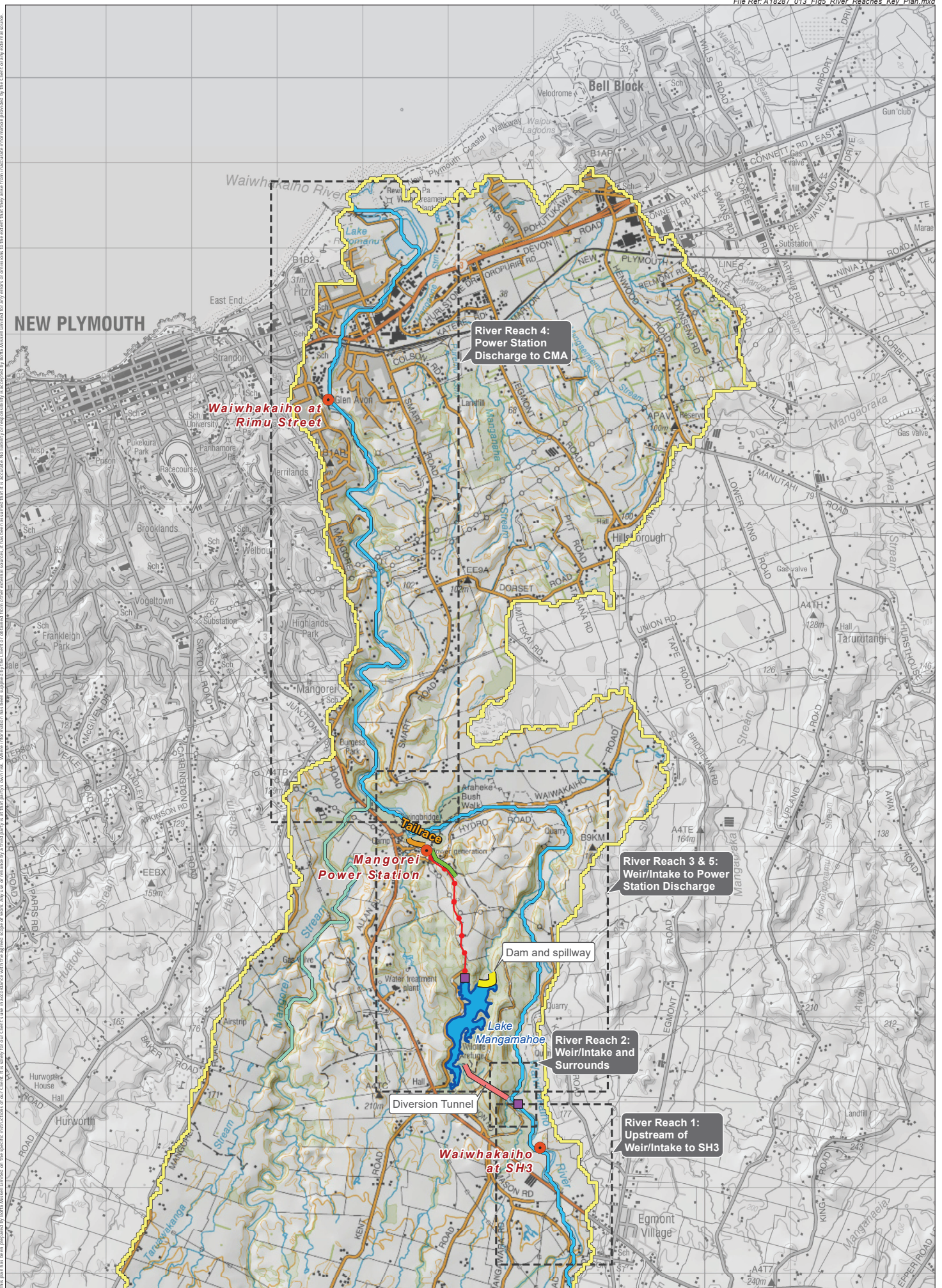


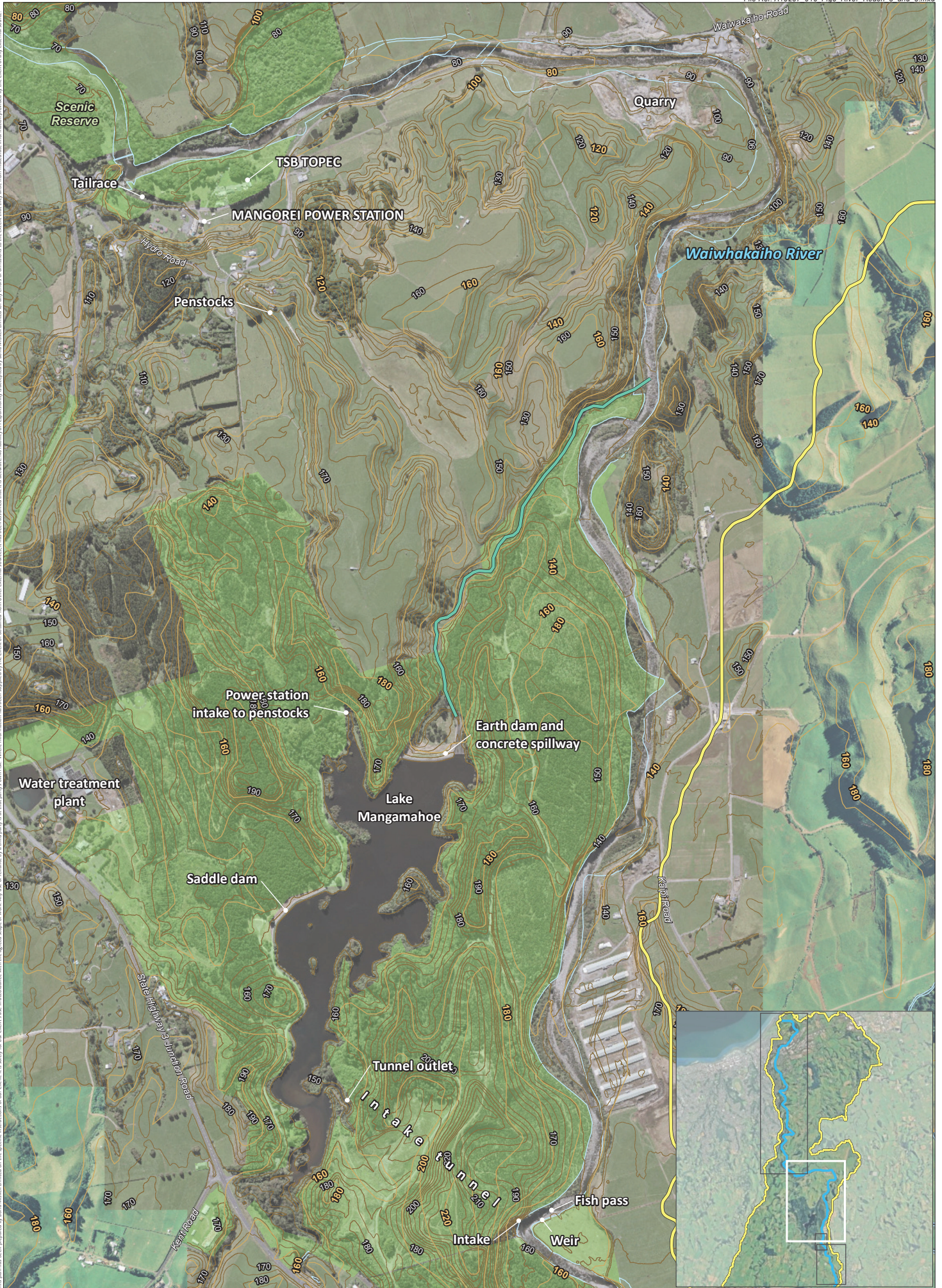
Figure 5



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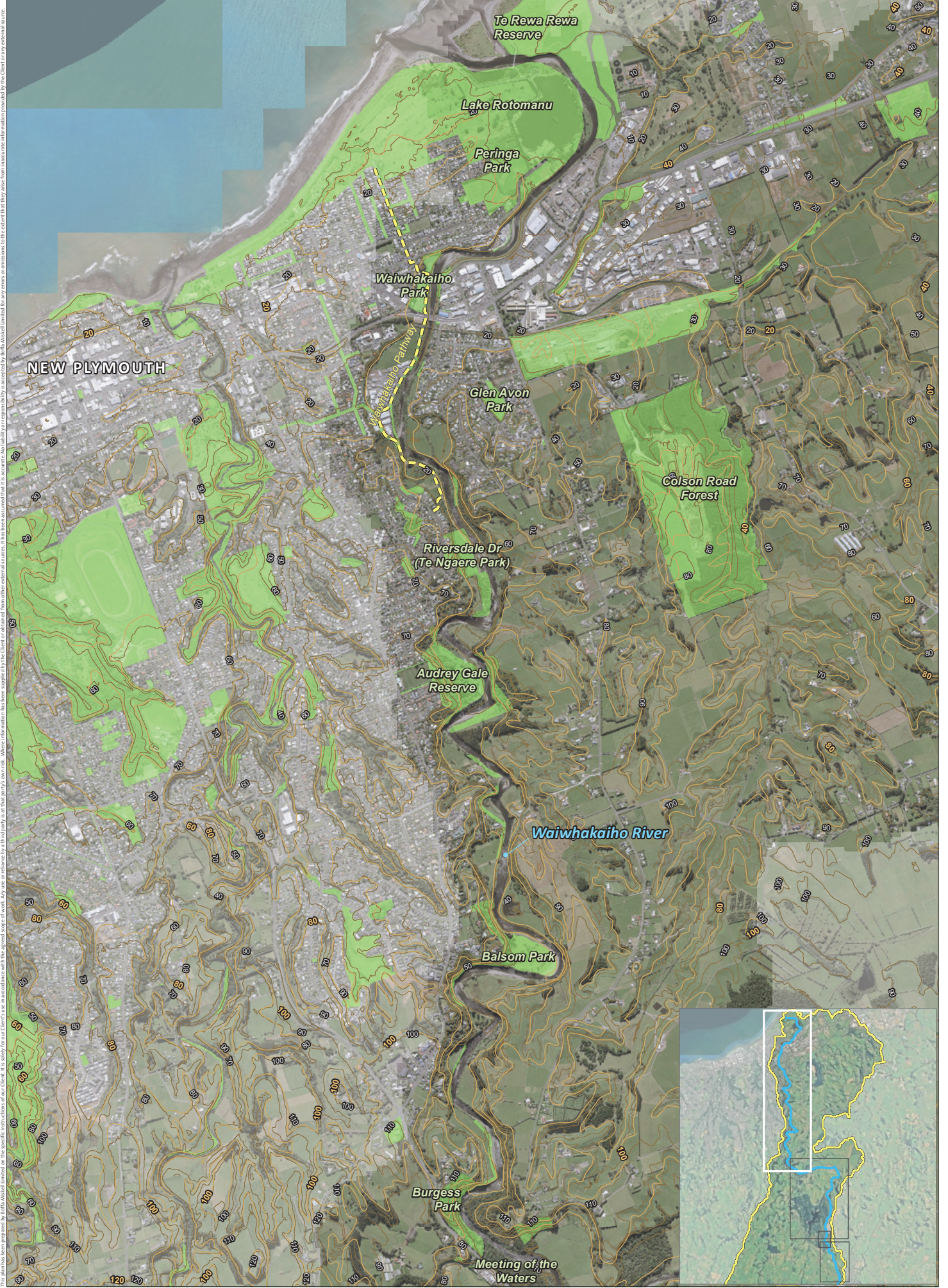


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Figure 8



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