

KANIERE VALLEY
HYDRO ELECTRIC POWER SCHEME – KANIERE HEPS AND MCKAYS HEPS
ASSESSMENT OF ENVIRONMENTAL EFFECTS

EXECUTIVE SUMMARY

This Assessment of Environmental Effects ('**AEE**') is submitted in support of TrustPower Limited's ('**TPL**') proposal to continue to operate and maintain (with some process optimisation) the existing Hydro Electric Power Scheme ('**HEPS**' or '**scheme**') at Kaniere Forks and McKays Creek. Re-consenting is necessary as the current authorisations for both the Kaniere Forks Power Scheme ('**Kaniere HEPS**') and the McKays Creek Power Scheme ('**McKays HEPS**') expire on 26 May 2011.

In addition to the re-consenting of the existing scheme (including the process optimisations), TPL also proposes to construct enhancements to both the Kaniere and McKays HEPS. The enhancements are proposed on the basis that the additional generation will provide for the more efficient utilisation of infrastructure and investment of the existing HEPS, and increase security of supply for the West Coast (particularly Hokitika). In summary, the proposed enhancements contain the following elements:

McKays HEPS enhancements

- Numerous maintenance and functional improvements to existing infrastructure.
- Increase water take from Kaniere River to McKays race (at the McKays Weir) from 5m³/s to 8m³/s.
- Replace the Coal Creek Flume with a new two (or three) pipe bridge.
- Increase McKays race capacity through deepening, widening and/or increasing the height of the existing race.
- Construct an above ground water race to the south of the existing McKays tunnel ('**McKays deviation**') or alternatively refurbish and enlarge the McKays tunnel to provide for a capacity of 9m³/s.

- Construct a new headpond immediately upstream of the McKays Creek Power Station.
- Increase the existing McKays Creek Power Station capacity from 6m³/s to a peak of 9m³/s (including the continued 1m³/s take from Blue Bottle Creek).
- Increase discharge to the Kaniere River from McKays Creek Power Station from 6m³/s to 9m³/s.

Kaniere HEPS enhancements

- Increase water take from Lake Kaniere to the Kaniere race from 1m³/s to a maximum of 8m³/s.
- Upgrade existing race from Lake Kaniere to Ward Road to take 8m³/s flow, largely through the construction of a new race. The majority of the new race will follow an alignment that utilises the existing transmission line route. The new race will also include two storage areas.
- Construct a new power station at Ward Road.
- Discharge 8m³/s to the Kaniere River from the new Kaniere Forks Power Station.
- Decommission the existing Kaniere HEPS from Ward Road.

The proposal as applied for, being continued operation of the optimised existing scheme and construction and subsequent operation of two enhancements, is referred to as the '**enhanced scheme**'.

The process of developing the enhanced scheme has been an iterative one, involving input and assessment from a number of parties and experts. TPL is confident this evaluation has produced a result that best maximises the project benefits (including more efficient utilisation of embedded energy infrastructure within the Region, and increased

security of supply from a renewable energy source), while minimising environmental effects.

The project's benefits and potential effects have been thoroughly evaluated within Section 5 of this AEE. Where the design results in notable areas of potential impact (particularly as a result of the proposed new Kaniere race and altered flow regime for the Kaniere River), and no feasible alternative design is able to ameliorate those effects, appropriate mitigation measures have been developed in consultation with stakeholders and interest groups. These measures have been accepted by TPL and will be reflected in the proposed conditions of consent for the enhanced scheme that will be provided in due course.

In light of the above, TPL considers the enhanced scheme as proposed by these applications will promote the sustainable management of natural and physical resources, as required in accordance with section 5 of the Resource Management Act 1991 (**'RMA'** or **'Act'**).

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1 INTRODUCTION

TPL proposes to continue to operate and maintain, and further enhance, its existing Kaniere and McKays HEPS utilising takes from Lake Kaniere, the Kaniere River and Blue Bottle Creek. To provide for the proposed enhancements, these applications seek authorisations to divert and discharge water, and construct infrastructure, as necessary for increasing the capacity of the Kaniere HEPS from 1m³/s to 8m³/s, and the McKays HEPS from 6m³/s to 9m³/s. To further maximise generation potential, water from the Kaniere HEPS will now also be discharged back to the Kaniere River above the intake weir for the McKays HEPS, something that does not occur at present.

The enhanced scheme is intended to provide additional and more efficient energy generation, to assist the West Coast Region in meeting growing demand due to industrial and commercial development in the area. The enhanced scheme is thus considered to be of regional significance, with a number of regional benefits.

Figure 1 indicates the general location of the enhanced scheme, and its overall configuration.

1.1 The Applicant

TPL is a predominantly New Zealand owned company with its head office in Tauranga. TPL was created as part of the deregulation of the electricity supply industry following the enactment of the Energy Companies Act 1992. Before that, the

company grew from the Tauranga Electric Board, which was established in 1924.

Until 1999, TPL had generation, transmission and retail interests, with a regional focus in the Bay of Plenty. Following the 1999 electricity industry reforms, TPL sold its local transmission business and grew its generation and retail operations. TPL is now New Zealand's fifth largest electricity generator (in terms of megawatt ('MW') capacity, and gigawatt hour ('GWh') output), and the fourth largest electricity retailer serving some 260,000 customers throughout New Zealand. The company owns and operates 36 small to medium size hydro electricity power stations, a moderate sized wind farm on the Tararua Ranges in the Manawatu, and has a further wind farm in South Australia.

The Energy Companies Act 1992 requires that the principal objective of every energy company is to operate as a successful business.

1.1.1 TPL's Environmental Policies

In recognition of the environment's significance to TPL's continued operation (all of TPL's electricity is generated from renewable sources), company-wide policies were developed and ratified by the Board of Directors in January 2000 as identified below.

"Policies:

TrustPower will operate so as to comply with all legal and statutory environmental obligations. In operating, maintaining and enhancing assets, TrustPower will:

- *Avoid or minimise all adverse environmental effects which its operations may cause;*
- *Liaise and work with the community and all potentially affected stakeholders in the identification, mitigation and/or monitoring of any potential environmental effects;*
- *Use and operate the natural and physical resources under its control in an efficient and environmentally appropriate and responsible manner;*
- *Recycle and re-use material where practically and economically feasible; and*
- *Ensure that all generation staff and contractors acting on its behalf are aware of:*
 - (i) the surrounding environment and the potential environmental effects which operations could induce, and*
 - (ii) the contingencies and procedures to be followed in the event of an adverse environmental effect being induced.”*

The environmental policies focus on practical steps for minimising the impacts of the company’s activities on the environment. This is achieved through close management of TPL’s facilities and by implementing systems and practices that enable all levels of staff to readily identify and address the potential for adverse environmental effects.

1.1.2 TPL’s Generation Portfolio

TPL’s involvement in hydro electric generation traces back to 1968 when its predecessor was the joint owner (with the Tauranga City Council) of the Kaimai Hydro Electric Power

Scheme. The facilities and resources of the 36 hydro electric power stations and one wind farm that TPL now manages span substantial areas of land and local authority boundaries. A number of these, such as the scheme, are located within environmentally sensitive areas.

TPL’s generation assets are typically small to moderate in scale and output. The schemes vary from 0.43MW of installed capacity at the existing Kaniere HEPS, to 100MW of installed capacity at the Waipori Scheme.

1.2 The Existing Scheme

TPL currently operates the Kaniere and McKays HEPS within the Kaniere River Valley, pursuant to 10 resource consents as outlined in **Schedule 1** to this AEE. Water is taken for the schemes from Lake Kaniere, the Kaniere River and Blue Bottle Creek, and conveyed via a series of races. As the intake for the McKays HEPS is currently located upstream of the discharge from the Kaniere HEPS, the schemes do not currently have any complementary water use.

The Kaniere HEPS is located approximately 16km southeast of Hokitika. Fed from Lake Kaniere via some 9km of races, and discharging into the Kaniere River, the existing twin generator Kaniere Forks Power Station was commissioned in 1909 with 60 hertz (**‘Hz’**) output generated from 76m of head. At the expense of some output capacity, it was converted to 50Hz in 1931 to allow synchronisation with the nearby McKays Creek Power Station. With a rated capacity of 430 kilowatt (**‘kW’**), the Kaniere HEPS has an average output of 3.75GWh.

The McKays HEPS is supplied via a weir and race from the Kaniere River, and weir from Blue Bottle Creek. Commissioned in 1931 to supply local gold mining operations, it has a head of 33m, with a rated capacity of 1,100kW and an average output of 8GWh.

The existing scheme has a combined generation capacity of 1.53MW, with a average annual output of 11.75GWh (which equates to supply for approximately 1500 homes, based on an average annual household energy use of 8,000MWh).

1.3 The Proposed Enhanced Scheme

The enhanced scheme broadly consists of increasing the Kaniere HEPS take and discharge from 1m³/s to 8m³/s, and McKays HEPS take and discharge from 6m³/s to 9m³/s, to provide a combined generation capacity of 4.5MW. The enhanced scheme will accordingly provide a further 20GWh of energy per annum in addition to that from the existing scheme, giving a combined output of 31.8GWh per year. Based on the average annual household use outlined above, the Kaniere and McKays HEPS enhancements will provide supply for approximately 2500 homes, in addition to the 1500 already served by the scheme. The key aspects of the enhanced scheme are described in the Civil Engineering reports prepared by TPL and attached as **Appendix A** to this AEE. They are also summarised in Section 3 and **Schedule 2** to this AEE.

In summary, the enhanced scheme consists of the existing scheme modified to include some optimisation (as described in

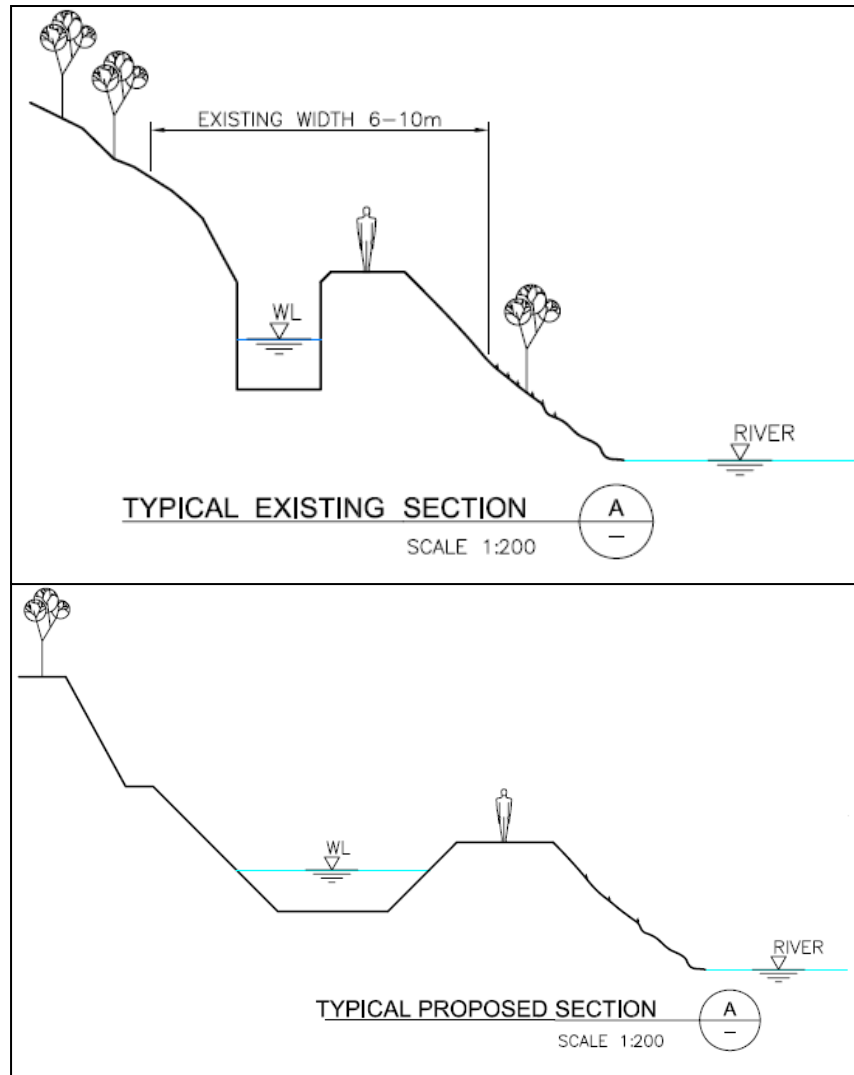
more detail in Section 3 below), together with the Kaniere and McKays HEPS enhancements.

The key elements of the **Kaniere HEPS enhancement** are:

- Increasing the water take from Lake Kaniere to the Kaniere race from 1m³/s to a maximum of 8m³/s;
- Upgrading the existing race from Lake Kaniere to Ward Road to take an 8m³/s flow, largely through the construction of a new race, the typical cross-section for which is shown in **Figure 2**. The majority of the new race will follow an alignment that utilises the existing transmission line route. The new race will also include two storage areas;
- Construction of a new power station at Ward Road;
- Discharging 8m³/s to the Kaniere River from the new Kaniere Forks Power Station, upstream of the intake for the McKays HEPS; and
- Decommissioning the existing Kaniere HEPS from Ward Road, part of which will be dewatered and modified to become a recreational and interpretation area.

Figures 3 and **4** illustrate the principal features of the enhanced Kaniere HEPS and McKays HEPS enhancements respectively, including the location of stream crossings, flumes and tunnels.

Figure 2: Kaniere race cross section



The key elements of the **McKays HEPS enhancement** are:

- Increasing the water take from Kaniere River to McKays race (at the McKays Weir) from $5\text{m}^3/\text{s}$ to $8\text{m}^3/\text{s}$;
- Replacing the Coal Creek Flume with a new two (or three) pipe bridge;
- Increasing the McKays race capacity, largely through deepening, heightening or widening existing race, and the provision of limited headpond storage;
- Constructing the McKays deviation to the south of the existing McKays tunnel, or alternatively refurbishing and enlarging the McKays tunnel to provide for a capacity of $9\text{m}^3/\text{s}$;
- Constructing a new headpond immediately upstream of the McKays Creek Power Station with a maximum capacity of $7,600\text{m}^3$;
- Increasing the existing McKays Creek Power Station capacity from $6\text{m}^3/\text{s}$ to a peak of $9\text{m}^3/\text{s}$ (which includes the existing $1\text{m}^3/\text{s}$ take from Blue Bottle Creek); and
- Increasing the discharge to the Kaniere River from McKays Creek Power Station from $6\text{m}^3/\text{s}$ to $9\text{m}^3/\text{s}$.

1.3.1 Resource consents required for the enhanced scheme

The enhanced scheme requires resource consents from the West Coast Regional Council ('**WCRC**') and Westland District Council ('**WDC**') in accordance with the following plans:

- Operative Westland District Plan (2002) ('**WDP**');
- Operative West Coast Regional Air Quality Plan (2002) ('**RAQP**');
- West Coast Regional Plan for Discharges to Land (2002) ('**RPDL**');

- Transitional West Coast Regional Water Management Plan (2007) ('**TRWMP**');
- Transitional West Coast Regional Land and Riverbed Management Plan (2009) ('**TRLRMP**'); and
- Proposed West Coast Regional Land and Water Plan (2010) ('**PRLWP**').

A compliance assessment of the resource consent requirements for the enhanced scheme against the relevant rules of the various regional and district planning documents is provided in **Schedule 3** to this AEE. In summary, and using an overall "bundling" approach as is appropriate for this project, the construction, operation and maintenance of the enhanced scheme requires consent as:

- a discretionary activity from WCRC; and
- a non-complying activity (particularly with respect to vegetation clearance within conservation land) from WDC.

1.4 Consent term and lapsing period

1.4.1 Consent term

As outlined in the application documents, TPL seeks that all consents be granted for the maximum possible term. In accordance with section 123 RMA, these are:

- Land use consent (section 9 RMA): Unlimited
- Land use consent (section 13 RMA) : 35 years
- Water permit (section 14 RMA): 35 years
- Discharge permit (section 15 RMA): 35 years.

1.4.2 Lapsing period

Under section 125 RMA, a resource consent lapses 5 years after the date of its commencement, unless it has been given effect to before the end of this period, or the consent expressly provides for a longer lapsing period. Construction of the enhanced scheme is anticipated to take between 18-34 months. However, given the nature of the proposal and the need to maintain flexibility over construction commencement, TPL requests that a lapsing period of 10 years applies to all resource consents.

1.5 Additional Approvals

As a considerable extent of the enhanced scheme is contained within the Department of Conservation ('**DoC**') estate, a new concession will be required (and is currently being sought).

The works will also require archaeological authorities from the New Zealand Historic Places Trust ('**HPT**') pursuant to the provisions of the Historic Places Act 1993 ('**HPA**').

1.6 Structure of AEE

In accordance with the Fourth Schedule to the RMA, this AEE is intended to provide all the information necessary for consideration of TPL's applications to construct, operate and maintain the enhanced scheme. It accordingly addresses matters associated with both regional and district issues, to allow a comprehensive assessment of the proposal. It is also supported by a suite of detailed technical reports, which have formed the basis of the assessment outlined here.

This AEE contains the following sections:

Section 2: Existing Environment

This section sets out the existing context for the project including the surrounding land-uses, landscape and geological setting, hydrology, ecological values, historical and cultural context, and recreational background.

Section 3: Description of the enhanced scheme

This section discusses the drivers for development of the enhanced scheme, and its key elements.

Section 4: Consultation

This section outlines the consultation that has been undertaken with affected parties, key stakeholders and the community during development of the enhanced scheme.

Section 5: Assessment of Environmental Effects

This section details the actual or potential effects associated with the enhanced scheme and how it is proposed that these be avoided, remedied or mitigated.

Section 6: Statutory Framework

This section sets out the relevant provisions of the RMA, planning documents and other matters pertinent to the consideration of these applications.

Section 7: Summary and Conclusions

This section provides conclusions as to the various matters addressed in this AEE, and the enhanced scheme's ability to

promote the sustainable management purpose of the Act as required by section 5.

Section 8: Proposed Conditions

This section notes that a full suite of proposed conditions considered necessary to ensure the effects of the enhanced scheme will be adequately avoided, remedied or mitigated will be provided by TPL in due course.

Figure 1: Location Plan

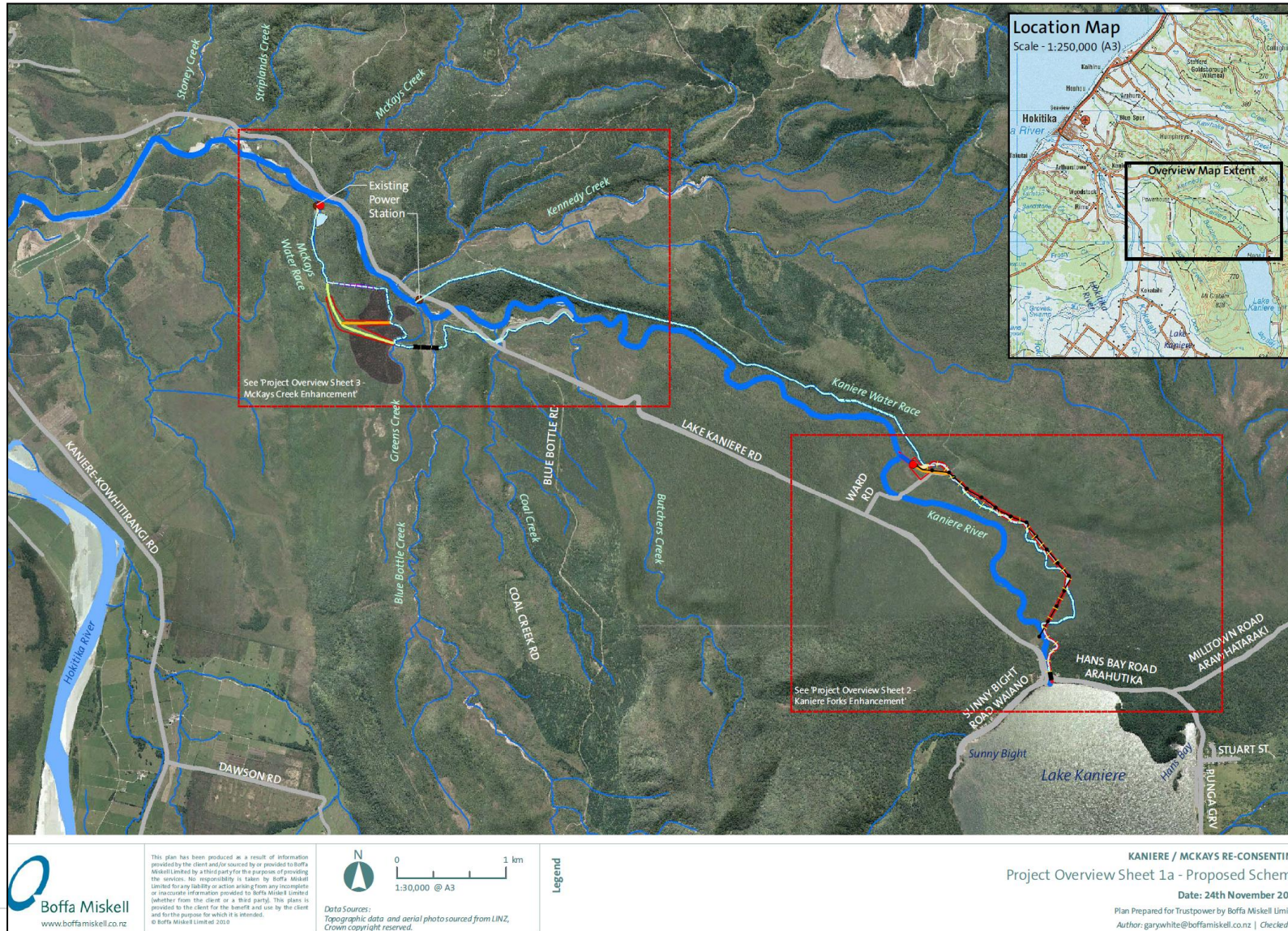


Figure 3: Principal features of the Scheme: Kanierie HEPS Enhancement

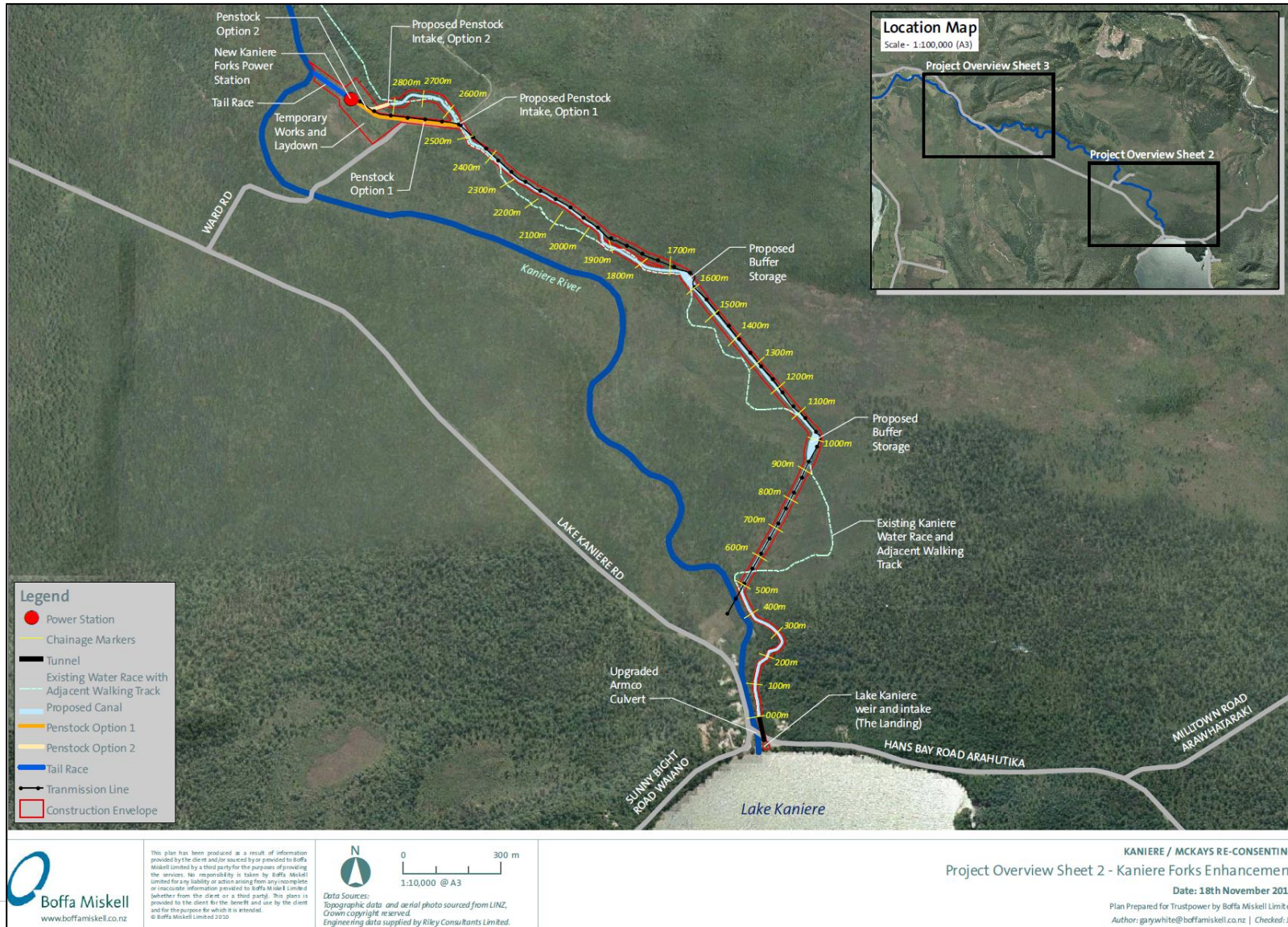
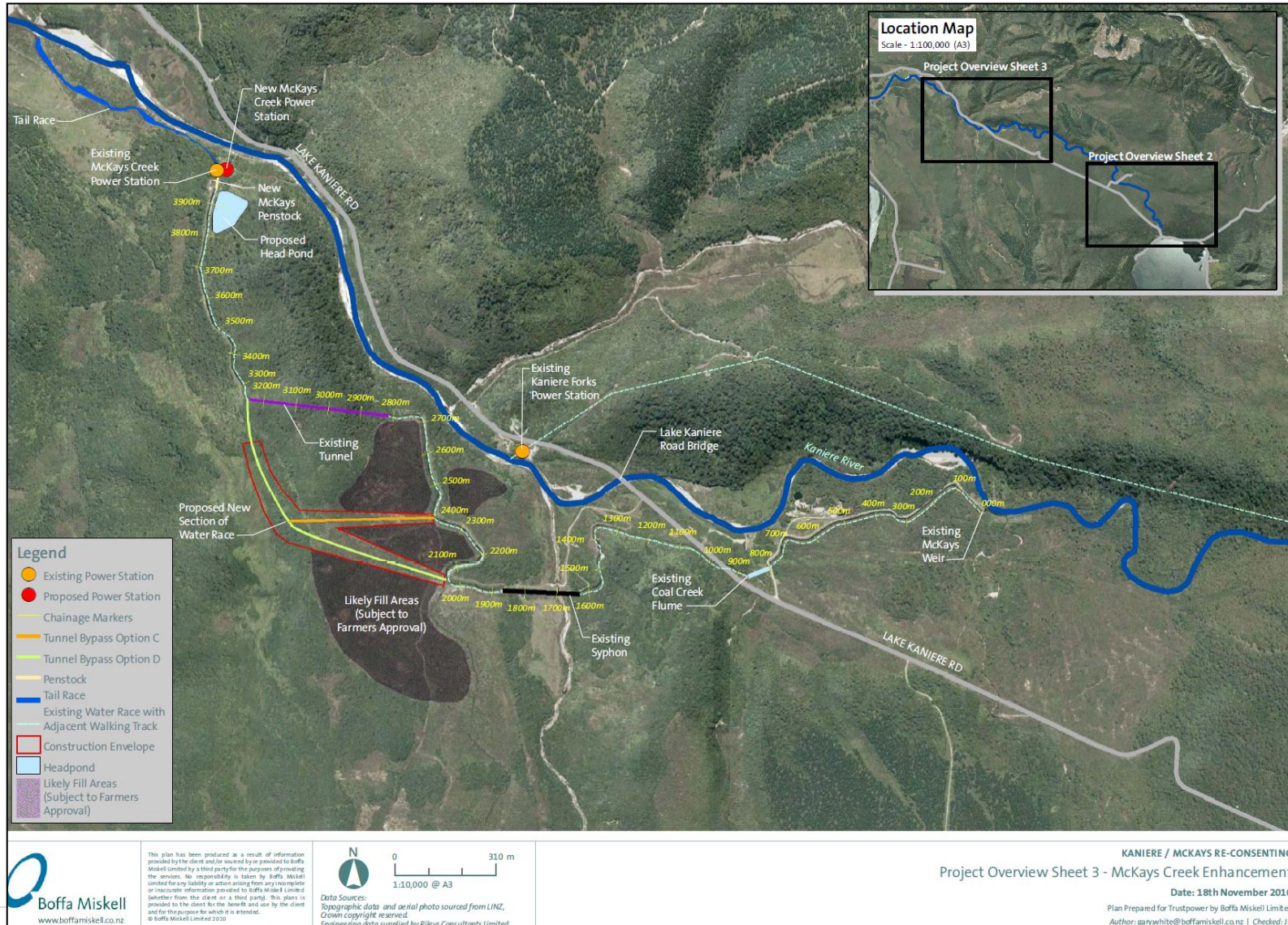


Figure 4: Principal features of the Scheme: McKays HEPS Enhancement



2 THE EXISTING ENVIRONMENT

The following section details the location and existing environment within which the enhanced scheme is to be located. A summary of the notable features of the existing environment is provided in **Schedule 4** to this AEE.

2.1 General Location and Context

Figure 1 identifies the topographical setting with an overlay of the enhanced scheme.

2.2 Land Status

The enhanced scheme is largely located within public conservation land administered by DoC. The initial section of the Kaniere HEPS is located within the Lake Kaniere Scenic Reserve, but also passes through a narrow portion of private land. Beyond this, the Kaniere HEPS race follows the boundary between the Lake Kaniere Scenic Reserve and the Kaniere Forest Conservation Area, before fully entering the latter further along the race.

Where the Kaniere HEPS fully enters the Kaniere Forest Conservation Area, it deviates occasionally into the Lake Kaniere Scenic Reserve. The proposed new Kaniere Forks Power Station and penstocks are almost entirely within the Lake Kaniere Scenic Reserve.

The majority of the McKays race is within the Kaniere Farm Conservation Area, although it crosses two DoC administered marginal strips at the intake and discharge points, and

approximately 1km of private land before the race enters the 430m McKays tunnel. The proposed new McKays head pond, penstocks and power station are all located on private land owned by TPL.

2.3 Demographic Context

Both Hokitika and the West Coast Region had a steady growth in population between the 2001 and 2006 census years.

The total population of the West Coast Region is 31,326, which increased by 1,026 people, or 3.4%, between 2001 and 2006. According to the 2006 census the usual resident population of the Hokitika urban area was 3,078, a decrease of 12 people since 2001.

462 people usually live in the settlement of Kaniere and its immediate surrounds, within 171 occupied dwellings. This is an increase of 72 people, or 18.5%, since 2001. The township has a general store and garage, and primary school (years 1 – 6).

The Hokitika Valley, which contains the statistical meshblock for Lake Kaniere, has a total resident population of 516 people, which is an increase of 24 people, or 4.9%, since the 2001 Census. The area contains many holiday homes and baches.

The remaining areas, statistically defined as 'Hokitika Rural' had a total population of 828 people as of the 2006 census.

2.4 Lake Kaniere and the Kaniere River

Lake Kaniere is approximately 8km long and 2km wide, with depths of up to 195m. Under the existing scheme, the level of Lake Kaniere has fluctuated between -0.13m RL and 1.71m RL, with a mean level over 2002 – 2009 of 0.89m (median 0.94m) (TPL records 2002 – 2009). Lake Kaniere level data identifies that the lake spills the weir crest (just over 1.00m RL) approximately 40% of the time.

Lake Kaniere is used to supply the Hokitika residential and commercial domestic water supply. Accordingly, no water can be diverted from Lake Kaniere for power generation when lake levels recede to a staff gauge of -0.2m RL (which equates to 100mm above the minimum operating level for the local water supply).

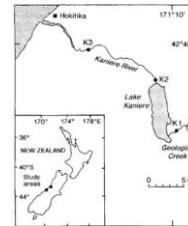
Spill from Lake Kaniere is managed by three control gates, and via spill from the lake outlet weir. The outlet weir comprises a 26.5m concrete section, and an 11.0m section with stop logs. The diversion of water from Lake Kaniere is controlled to ensure that a minimum flow of 200l/s passes through the control structure and down the Kaniere River at all times (in accordance with TPL's current water/discharge permits).

The Kaniere River flows from Lake Kaniere to its confluence with the Hokitika River, 5km from the coast of the Tasman Sea. The total length of the Kaniere River from the intake at Lake Kaniere to the McKays HEPS tailrace discharge is 9km, with a total catchment (including the McKays Creek tributary catchment) of approximately 111km² and a mean flow of 10.8m³/s.

Specific catchment hydrology and flow statistics are provided in Section 2.7 below. A study of West Coast Lake outlets was undertaken by Harding (1992), key results from which are shown in **Figure 5**.

Figure 5 Mean physical water parameters measured at two sites in the Kaniere River monthly from December 1988 to January 1990 (Adapted Harding 1992).

| Parameter | Kaniere River (K2) At Lake Kaniere outlet. | Kaniere River (K3) 13km downstream of Lake Kaniere outlet. |
|------------------------------|--------------------------------------------|------------------------------------------------------------|
| <i>Mean velocity (m/s)</i> | 0.58 | 0.50 |
| <i>Mean depth (m)</i> | 0.3 | 0.5 |
| <i>Mean width (m)</i> | 7 | 18 |
| <i>Mean temperature (°C)</i> | 15.2 | 14.9 |



2.5 The Kaniere Valley

The name Kaniere is linked to the pounamu (greenstone) history of the area. Mt Tūhua overlooks Lake Kaniere on one side, and the Arahura River to the east is a major pounamu source. Kaniere refers to the act of sawing pounamu. Kani means “saw” and “ere” refers to the action of sawing.

Lake Kaniere is surrounded by the Lake Kaniere Scenic Reserve. Various components of the scheme are located within the Kaniere Forest Conservation Area (DoC estate) on the north side of Kaniere River, and within the Lake Kaniere Scenic Reserve on the south side of the River.

Apart from the Kaniere race, the main elements of the existing scheme are neither immediately accessible nor visible to the general public. Public access is available at the northern end of the lake at ‘The Landing’ where the weir and intake to the Kaniere race adjoin Hans Bay Road. Access is also available along the Kaniere race walkway, with the river visible from Ward Road Bridge. Some 50% of the land occupied by the Kaniere HEPS is managed by DoC as the Lake Kaniere Scenic Reserve, with the remainder being crown land administered by Land Information New Zealand (‘LINZ’).

There are a moderate number of residential properties, being mainly holiday homes, surrounding Lake Kaniere, principally on the eastern side of the Lake with access off Stuart Street and Punga Grove some 1.5km from the Lake Kaniere intake. There are also a number of households located on the eastern side of Lake Kaniere with direct access to Sunny Bight Road. The settlement of

Kaniere is located to the north of the confluence of the Kaniere and Hokitika Rivers.

Further north of Lake Kaniere the land has been cleared for farming and forestry with considerable disturbance due to roading and the construction of a large siphon across Green Creek Valley.

To the north and south of the McKays HEPS are existing pine plantations. In other parts of the area south of the Kaniere River the land has been used for logging silver pine and is now regenerating.

2.5.1 *Recreational activities in the Kaniere Valley*

Lake Kaniere and the Kaniere River are located within close proximity to Hokitika. The Lake is highly regarded regionally because of its natural scenic qualities and immediacy to a number of informal recreational opportunities. The Kaniere River has some limited recreational values, particularly those parts associated with the Kaniere race that are valued for their scenic and heritage values.

Lake Kaniere is frequently used for recreational boating with boat ramps and associated parking at Hans Bay Road, Sunny Bight Road and Tūhua Creek. The Lake Kaniere Yacht and Power Boat Club undertakes a number of its activities from the Lake, including regular regattas. A high proportion of recreational fishing is also undertaken by boat due to access limitations. The Lake has a reputation amongst its users as providing a sense of isolation and picturesque scenery.

The Lake and River has some profile with regard to angling. Whilst important locally, Lake Kaniere itself is not a highly recommended fishing venue. In-river angling along the Kaniere River is not considered a significant recreational resource given the lack of access and relatively modest fish numbers in most sections of the River.

The area is highly valued in terms of recreational walking and hiking and provides opportunities for a range of hikes for varying abilities, including the Kahikatea Forest Walk (10mins) from the Sunny Bight picnic area, to the Lake Kaniere Walkway (4 hours one way) and Mount Tūhua Track (7 hours).

The Lake Kaniere walkway is a 1 hour return trip as far as Ward Road, or 3 – 4 hours to Kennedy Creek near the existing Kaniere Forks Power Station. The walkway follows the historic Kaniere race, which runs along the edge of the Lake Kaniere Scenic Reserve. The track travels through intact forest and forest that is regenerating after logging and burning in the 1920s. The historic race, which contains control gates, timber flumes and tunnels, has been operating since 1875 supplying water first for gold sluicing and later for generating electricity.

Recreational mountain biking is undertaken on a number of tracks within the area, including the Lake Kaniere Walkway and the Mahinapua Walkway. These tracks have been promoted by DoC and the Westland Mountain Biking Club.

Whilst recreational kayaking occurs on Lake Kaniere, it is not a frequent feature of the Kaniere River given the low gradient and flow, and connectivity issues along the length of the River. It is, however, used on an informal basis during flood events.

2.6 Kaniere Valley Geological Setting

The area is generally characterised by recent alluvial valleys separated by moraine hills and plateau underlain by late Cenozoic muddy sandstone and mudstone in the north, a few scattered outcrops of early Paleozoic Greenland Group greywacke and argillites, Tūhua granite and Oligocene limestone. Most of the soils in the area have very low natural fertility and those alluvial and sand soils that are more fertile have been developed for farming.

2.7 Catchment Hydrology

The existing hydrological environment of the Kaniere Valley and its catchment is detailed in the Hydrological Study prepared by TPL and attached as **Appendix B** to this AEE. In summary, key points regarding the catchment hydrology are as follows.

2.7.1 *Flow Statistics/Characteristics*

The flow characteristics of the Kaniere River are based on the extended flow record for the period July 2005 to June 2008, as summarised in **Figure 6** below.

Figure 6: Summary Statistics for Kaniere River Location for the period 2002 - 2008

| Location | Catchment Area (Km ²) | Mean (and Median) Flow (m ³ /s) |
|----------------------------------------------------|-----------------------------------|--------------------------------------------|
| Kaniere River at Lake Kaniere | 52.3 | 6.1 (5.5) |
| Kaniere River downstream | 65.9 | 2.9 (1.2) |
| McKay weir | | |
| Kaniere River downstream of Kaniere HEPS discharge | 87.6 | 5.1 (2.8) |
| Kaniere River downstream of McKays HEPS discharge | 111.0 | 10.8 (7.5) |

2.7.2 Flood Hydrology/Rainfall

One of Lake Kaniere’s main functions is to absorb or buffer flood inflows from its upper catchments.

A number of very strong rainfall gradients exist within the Kaniere River catchment. Orographic enhancement leads to greater rainfall totals (and intensities) in upper catchment areas and a general increase in the rainfall gradient from northwest to southeast. Accordingly, the area has high annual rainfall (2500mm to 4000mm).

Seasonally, rainfall is fairly consistent throughout the calendar year, with higher rainfall being recorded in late autumn/early winter, and the highest monthly totals occurring during the spring melt in October and November. This combination can result in high lake levels and strong lake outflows during spring and summer.

The lake is normally drawn down over the winter months, which coincide with lower inflow, levels, and increased flow release to

meet generation demand. The maximum recorded lake level is 1.77m in January 2002, with the second highest of 1.66m recorded in November 2008. The lowest level of -0.13m RL was measured in late April 2003.

2.8 Aquatic Ecology

The existing aquatic values of Lake Kaniere and the Kaniere River catchment, including the tributaries being Kennedy Creek, Blue Bottle Creek and Butchers Creek, are detailed in the Assessment of Aquatic Ecology Effects prepared by Ryder Consulting Limited and attached as **Appendix C** to this AEE (**‘Ryder Report’**). Key aspects of the existing aquatic ecology of the Kaniere River and its tributaries are summarised below.

2.8.1 Kaniere River flow distribution and gradient

Due to the controlled nature of the Lake Kaniere outflows, the flow distribution into the Kaniere River is generally static, with 75% of the flows between 4 to 8m³/s. The consented minimum is 0.20m³/s with the minimum recorded flow of 0.92m³/s. The 2002 to 2009 mean flow is 6.2m³/s (the median is 5.6m³/s), and flows below 2m³/s occur less than 4% of the time.

In the reach of the Kaniere River directly downstream of Lake Kaniere (Sample site K1),¹ the river has a relatively shallow gradient with a long medium to fast riffle. This continues at sample sites further downstream (K2 – 2.5km downstream of Lake Kaniere, K3 – 200m upstream of the McKays weir, K4 – 50m upstream of the Kaniere HEPS discharge) with a substrate

¹ Refer to Figure 3.1 in the Ryder Report (Appendix C) for locations of all sampling sites.

dominated by cobbles with gravels, and increasing numbers of large boulders respective to the survey site downstream. The river widens to a medium velocity riffle run at sample sites further downstream (K5 – 1km upstream of the McKays HEPS discharge and K6 - 1km downstream of the McKays discharge) with a substrate dominated by cobbles with gravels and large boulders, some of which are exposed.

2.8.2 *Kaniere River instream character and riparian vegetation*

The Kaniere River can be generally separated into two character areas, an upper reach representing the narrower, steeper gradient section of the river from the lake outlet to upstream of McKays weir, and a lower reach representing the wider and less steep section downstream of the McKays weir.

As can be expected, water velocities are higher and increase more quickly with increasing flow in the narrower upper reaches, relative to the lower reaches, reflecting the difference in channel gradient between these reaches. Channel and wetted perimeter widths are also narrower in the upper reaches.

In general, riparian vegetation in the upper section downstream of Lake Kaniere and adjoining the Kaniere race is dominated by podocarp-hardwood forest (mainly rimu with kamahi, southern rata and toro) around Lake Kaniere, with increases in kahikatea and manuka shrubland adjoining the race. From approximately 900m upstream of Ward Road the manuka shrubland is replaced by rimu/kamahi forest. The lower section of the Kaniere River and the McKays race is a mosaic of cleared land and exotic pasture and gorse at the McKays weir, with increases in regenerating

secondary kamahi forest between Lake Kaniere Road and Blue Bottle Creek.

2.8.3 *Kaniere River water quality*

The Kaniere River generally has good water quality. Dissolved oxygen and pH levels are both within WCRC Guidelines. Water temperatures at all survey sites exceeded 20°C when measured (3/4 February 2010). The WCRC does not have specific guidelines for water temperature; however it considers that water temperatures above 20°C are high and may restrict sensitive aquatic species such as trout.

2.8.4 *Kaniere River aquatic flora and fauna*

Periphyton

Periphyton is present at all survey sites in the Kaniere River. Long filamentous green algae are present at all sites.

Macroinvertebrates

A total of 40 macroinvertebrate taxa were identified from the six sampling sites in the Kaniere River. The macroinvertebrate community included taxa typical of moderate lowland rivers, indicating good water quality and habitat. QMCI scores were generally 'fair' to 'good' quality invertebrate habitat; however, at one sampling site (K6) the QMCI score was 'poor'.

Within the limits of taxonomic resolution that were used for identification, two invertebrate species were identified as Threatened: the freshwater mussel (kakahi) and freshwater crayfish (koura).

Fish

Surveys identified an obvious difference between the upper and lower reaches in terms of fish communities. The upper reaches (K1 – K3) upstream of the McKays Weir only identified two species, being longfin and shortfin eel. Similar numbers of shortfin and longfin eel were recorded downstream of the weir (K4 – K6) as were a further four native fish species and one introduced species, being bluegill and redfin bullies, common bully, torrentfish and a single brown trout respectively.

2.8.5 Aquatic ecology of the Kaniere River Tributaries

Several of the larger tributaries of the Kaniere River were surveyed for fish. These include Kennedy Creek, Blue Bottle Creek, and Butchers Creek.

Kennedy Creek

Kennedy Creek enters the Kaniere River approximately 200m downstream of the Kaniere HEPS discharge. The channel has a relatively steep gradient, with a substrate of large cobbles and boulders. There are patches of long green filamentous algae throughout the channel.

Six native fish species have been recorded, including bluegill, redfin and common bully, koaro, and shortfin and longfin eel.

Blue Bottle Creek

Blue Bottle creek enters the Kaniere River downstream of the McKays weir, some 75m upstream of the Kaniere HEPS discharge. Water is taken from the Creek at an intake in the mid to lower reaches and conveyed to the McKays race. The habitat generally

consists of long slow velocity runs separated by shorter lengths of medium velocity shallow riffles. Occasionally the Creek is punctuated by steep drop down chutes, which have a deeper pool type habitat below them. Lower levels are clean of algae, which tends to be present in patches further upstream, and a substrate dominated by cobbles and boulders.

Fish species found include bluegill, redfin and common bully, koaro, and longfin eel. Brown trout were recorded at the survey site closest to the confluence with the Kaniere River.

Butchers Creek

Butchers Creek enters the Kaniere River approximately 70m upstream of McKays weir. Two sites were surveyed, with the downstream site being narrow short run with some short areas of riffle and deeper pool habitat, and the upstream site being mainly comprised of a long pool some 70cm in depth. Both consisted of a cobble and boulder substrate. Fish species found included redfin bully, koaro, shortjaw kokopu and longfin eel.

2.8.6 Conservation Value

Seventeen fish species have been recorded in the Kaniere River catchment, thirteen of which were native and four introduced. Brown trout are common in both the lower Kaniere River and Lake Kaniere; however, angler use of the Kaniere River is low. Four fish species found in the river are classified as Threatened, including the giant kokopu and longfin eel ranked as being in 'Gradual Decline', and shortjaw kokopu and lamprey ranked as 'Sparse'.

Examination of the heads of 14 common bullies collected from the lower reaches of the three tributaries surveyed confirmed that latrosensory pores were not present, and hence that all individuals were lake reared (i.e. non-diadromous).

Examination of chemical signatures from six giant kokopu collected from tributaries also confirmed a land locked population. This could be a natural occurrence, or a direct response to restricted passage due to the presence of McKays weir and the lake outlet control gates.

2.9 Terrestrial Ecology

The existing terrestrial ecology values of the Kaniere Valley are detailed in the Terrestrial Ecology and Avifauna Assessment prepared by Boffa Miskell Limited and attached as **Appendix D** to this AEE (**'Boffa Miskell Report'**). The key existing terrestrial ecology characteristics of the application site are summarised below.

2.9.1 General Context

Kaniere Valley is highly varied in terms of its terrestrial ecology. This is due to the varied use and modification of the Kaniere River Valley by humans in the past, in contrast to the scale and extent of conservation estate that extends over much of the Kaniere HEPS. The existing scheme is situated within the Whataroa Ecological Region and the Hokitika Ecological District (**'ED'**).

It appears that historically Lake Kaniere provided access for Ngāi Tahu/Maori between the Hokitika and Arahura Rivers and between the East and West Coasts via Browning Pass/Noti

Raureka. It is unlikely that Maori presence in the area led to major changes in land use or vegetation patterns.

2.9.2 Birds and Animals

Lake Kaniere itself does not support a diverse bird population, although it does form part of the wider habitat network. Species with recognised New Zealand threat classifications recorded at Lake Kaniere include grey duck (Nationally Critical), black shag (Nationally Uncommon) and South Island Fernbird (Declining).

The ecological value of terrestrial habitats in the vicinity of the Kaniere and McKays HEPS for birds is high. Long tailed cuckoo (Naturally Uncommon) and western weka (declining) were recorded during field inspections, and kea (Naturally Uncommon) and South Island fernbird (Declining) have been historically recorded. Robin were also found near Lake Kaniere.

Other birds that may occur within the site, but that were not observed, include New Zealand Falcon (Nationally vulnerable), yellow crowned parakeet, South Island kaka (Nationally Endangered) as well as fernbird, marsh crake and spotless crake.

The primary rimu/kamaha forests adjacent to the exiting Kaniere HEPS provide good habitat for bats, with long tailed bats (Nationally Endangered) being recorded from the Lake Kaniere area as recently as 2009 in the vicinity of Geologists Creek at the southern end of the Lake. Survey results indicate a roost here with a large number of individuals.

Lizards and invertebrate taxa were not specifically surveyed as they are very difficult to detect and no acutely threatened species are known to occur in the vicinity of the study area. Four species of lizard (two gecko and two skink species) have been recorded within the wider ED. The habitat types adjacent to the Kaniere and McKays HEPS provide suitable habitat for West Coast Green Gecko (Sparse), Forest Gecko (Not threatened), and Common Skink (Not threatened). Speckled Skink (Gradual Decline) may be present but this is less likely. Rare or threatened invertebrate species are unlikely in the habitats adjacent to the scheme given that they are generally widespread and well represented.

Although not observed, many mammals are likely to occur within the subject site including red deer, hares, rabbits, possums, rats, mice, mustelids (weasels, stoats and ferrets), hedgehogs and feral cats.

2.9.3 Ecological Significance in terms of section 6(c) RMA

Based on relevant criteria as outlined in the Boffa Miskell Report, the following vegetation communities are considered to be significant for the purposes of section 6(c) RMA:

- Adjacent to the Kaniere HEPS:
 - Primary (rimu) – (miro)/kamahi – quintinia forest;
 - Manuka scrub;
 - Secondary (rimu)/mountain toatoa – quintinia – southern rata forest;
 - (Silver pine)/manuka scrub;
 - Weeping matipo scrub; and
 - The vegetation communities within the vicinity of Ward Road.

- Adjacent to the McKays HEPS:
 - Secondary kamahi – quintinia forest within the Kaniere Farm Conservation Area; and
 - The primary (rimu) – (miro)/kamahi – quintinia forest within the Kaniere Farm Conservation Area and the Kaniere Forks Scenic Reserve.

2.10 Landscape, Visual and Natural Character

An overview of the existing landscape and natural character environment relevant to the enhanced scheme is outlined in the Visual and Landscape Assessment prepared by Mary Buckland and attached as **Appendix E** to this AEE (**'Buckland Report'**). The key visual and landscape characteristics of the application site are summarised below.

Although the Kaniere River is the major element and feature in the Kaniere Valley, it is not particularly visible other than from the Lake Kaniere intake at 'The Landing', Kaniere Road bridge and glimpses from the Kaniere race. The river is also sporadically visible from Ward Bridge, the side road off Lake Kaniere Road to McKays weir, bridge crossing of Kaniere River south of the Kaniere HEPS, and the ford above the McKays HEPS.

Whilst the WDP seeks to protect and manage the diverse and distinctive landscapes within the Westland District, neither Lake Kaniere or the Kaniere River are identified in the non-exhaustive list of 'examples' of such landscapes identified (*WDP, Section 3.10*). The Operative West Coast Regional Policy Statement (2000) (**'RPS'**) does not identify specific outstanding natural features and landscapes.

In the absence of any full local or region wide landscape assessment, it would be inappropriate to attempt to determine the significance of a single landscape or feature in the context of the present applications for the purposes of section 6(b) RMA.

Overall the Lake Kaniere landscape and part of the south bank of the Kaniere River as located within the Lake Kaniere Scenic Reserve are considered to have high landscape and natural character values.

The more northerly parts of the scheme and Kaniere River that run through the modified Lake Kaniere Forest are of lower quality and have lower natural character value.

2.11 Traffic

The road to Kaniere is classed as Collector Road in the WDP (*WDP, Appendix C*). All other roads within the vicinity of the scheme, including Lake Kaniere Road, are identified as 'Other' Roads.

There are currently no consented or known proposals for developments that will significantly alter traffic patterns within the area. The most significant change to general traffic patterns will be related to a general increase in tourist traffic via Lake Kaniere Road to Lake Kaniere, and traffic generated from incremental residential development at Lake Kaniere. It is considered that this growth can be easily accommodated within the local roading network, without affecting the high levels of service currently provided.

2.12 Noise

In the absence of road traffic and recreational motorised boating there are no major noise sources and the Kaniere Valley is relatively quiet.

2.13 Air Quality

Given the orientation of the Kaniere Valley, the existing forested land cover, and small population, the ambient air quality is expected to be high.

2.14 Cultural, Historical and Archaeological Context

The historical/cultural context of the Kaniere Valley is outlined in the Heritage Assessment prepared by Clough and Associates Limited attached as **Appendix F** to this AEE ('**Clough Report**'). The key historic and archaeological values relevant to the application site are summarised below.

2.14.1 Historic Records

The main archaeological resources within and around Kaniere relate primarily to nineteenth century gold mining and industry.

The archaeological remains of gold workings are recorded on either side of Blue Bottle Creek recorded as J33/63, consisting of an almost continuous sluice face up to 10m high with associated tail races, stacked stone walls and bridges and tail fans. A further recorded site, J33/64, is located on two low terraces on the western side of Blue Bottle Creek, and consists of sluice faces, tail

races, stacked tailings and tailing fans. The existing Kaniere race is also recorded as J33/67.

There are no recorded sites of Maori origin within or in the vicinity of the Kaniere and McKays HEPS.

The power houses of McKays Creek and Kaniere Forks are also considered to be of heritage value as they date from 1931 and 1908 respectively.

However, none of the above sites are specifically identified or scheduled in the WDP or the HPT register.

2.14.2 Culturally significant areas

The entire length of the Kaniere River Valley and Lake Kaniere was used by iwi before contact with Europeans. The Lake and River were an important transport route, and also provided a source of food.

A Cultural Impact Assessment was not considered necessary by iwi and any recommendations provided through consultation have been considered by TPL.

3 Detailed Description of the Scheme

The enhanced scheme largely builds on the existing infrastructure and structures within the Kaniere Valley, thereby increasing generation capacity by using many of the existing physical resources already in place to generate electricity. Before explaining the design process and proposed works in more detail, however, it is necessary to expand on the key drivers behind TPL's decision to proceed with the present applications, and in particular the Kaniere and McKays HEPS enhancements to increase the scheme's generation capacity.

3.1 Drivers for Development

The latest Ministry for Economic Development ('MED') Energy Outlook document contains a "Base Case" expectation of considerably reduced growth in electricity demand, to average only 1.3% per annum over the period 2005 to 2030.²

The assumed rate of growth in electricity demand is less than the forecast estimated GDP growth for the same period, and hence assumes a high level of energy efficiency improvements and uptake. Regardless, even the MED's conservative Base Case scenario predicts a need to establish 3,166MW of additional electricity generation capacity in New Zealand between 2005 and 2030.

² Source: *New Zealand Energy Outlook to 2030*. Ministry of Economic Development; 2006. The same forecast is used in the New Zealand Energy Strategy.

The 2007 New Zealand Energy Strategy ('NZES') revises this forecast upwards even further, to requiring 3,900MW of additional generation capacity by 2030.

It is also noted that the majority of this increase will need to involve renewable resources, in order to meet the NZES's target of having 90% renewable electricity generation by 2025.

The draft NZES released in July this year retains the aspirational 90% target from renewable sources by 2025. It also incorporates and reiterates the need to increase the security of electricity supply, by methods such as having embedded generation, and locating generation close to load sources, where possible.

Electricity consumption on the West Coast of the South Island is currently (2009) at 317GWh per annum. This represents a significant increase in demand over the last five years, primarily as a result of new mining developments, and the continued expansion of the Westland Dairy Factory.

Electricity is currently supplied to the West Coast through the existing scheme, together with a number of small scale local hydro schemes at:

- Kumara (6.5MW);
- Dilmans (3.5MW);
- Duffers (0.5MW);
- Wahapo(3MW);
- Fox Glacier (0.2MW); and
- Arnold (3MW).

Total installed capacity thus amounts to approximately 18MW. Consents for two further developments, being the Mokihinui and the Arnold Enhancement schemes, are currently before the Environment Court.

As a result, the West Coast is a net importer of electricity supply, with only some 50% of energy requirements currently generated on the Coast.

As noted above, the enhanced scheme will increase the scheme's overall generation capacity from 1.53MW to 4.5MW and provide a total output of 31.8GWh per year (an increase of 20GWh). It will also improve security of supply for the region.

3.2 Design Process

The design process has been a thorough and iterative one, involving a number of experts and key stakeholders with relevant technical and local knowledge. In this regard, an important component of the design process was the active involvement of a number of groups and stakeholders including: tangata whenua (Te Runanga o Ngati Wae Wae and Te Runanga o Ngāi Tahu), DoC, Fish and Game, HPT, WCRC and WDC.

As a consequence of the design philosophy and approach employed by TPL, the enhanced scheme is considered technically and economically feasible, as well as being environmentally acceptable.

3.3 Optimisation of existing scheme

TPL proposes to implement a number of infrastructural changes to the existing scheme to optimise its performance, independent of constructing the Kaniere and/or McKays enhancements. These include:

- Installing 20mm fish screens to reduce fish entrainment at the Kaniere intake, the McKays weir and Blue Bottle Creek intake.
- Monitoring for and removing certain 'pinch points' for fish passage within the Kaniere River and at Blue Bottle Creek if necessary.
- Providing fish passages at the Lake Kaniere and McKays weirs.
- Installing fish screens/return channels to impede fish entry into the McKays and Kaniere HEPS tailraces.
- Undertaking a range of maintenance activities including track and race vegetation control, clearance of wind throw, repairing slips on the track or race, and necessary dredging of accretion of material along the right bank of the Kaniere River at the Lake intake structure.

3.4 The McKays HEPS enhancements

As outlined in **Schedule 2**, the key works for the McKays HEPS enhancements (separated into minor/maintenance and moderate works) are as follows:

- Minor/maintenance works:
 - Increasing the height of the existing weir by 5cm for all but one bay (33m of the 36m weir).

- Installing a v-notch weir below the lower bay so that environmental flows are better controlled and measured.
- Maintenance works and repairs of the existing race to remove debris and vegetation, smooth the sides of the race, and remove high spots. The race may be locally deepened up to 0.5m to accommodate the increased flows, with excavated material placed on the access road embankment beside the canal.
- Any excavated fill will be utilised to increase low spots on the race, by a maximum of 0.5m on the accessway side of the race to accommodate anticipated flows.
- Repairing the concrete wall opposite the Greens Creek intake where it has been undermined.
- Removing debris and restrictions downstream of the Kaniere Road culvert (80m downstream of Coal Creek), to ensure there is adequate freeboard to accommodate an increased 8m³/s flow.
- Undertaking track and race vegetation control.
- Clearing wind throw.
- Repairing slips on the track or race.

- Moderate Works
 - Replacing the old inefficient and poorly functioning Coal Creek Flume with two or three new 1300mm pipes.
 - An option of constructing an above ground race with a capacity of 9m³/s to the south of the existing tunnel as an alternative to refurbishing and enlarging the McKays tunnel. The 550,000m³ of material excavated from the formation of this section of race is to be deposited at

two areas of private land on the western side of Blue Bottle Creek, both above and below the McKays Creek HEPS pipeline (refer **Figure 4**).

- Widening of up to 2m on the cut side of the race and increasing the height of the road embankment between the exit of the McKays tunnel and the proposed augmented headpond.
- Constructing new, 70m above ground penstocks, to be commissioned between the new headpond and power station, and decommissioning the existing underground penstock when it reaches the end of its design life.
- Constructing a headpond with a maximum capacity of 7,600m³.
- Either:
 - o Increasing the existing McKays Creek Power Station capacity from 6m³/s to a peak of 9m³/s (which includes the existing 1m³/s take from Blue Bottle Creek); or
 - o Constructing a new power station similar or smaller to the existing McKays station, adjacent to the existing powerhouse.
- Increasing the existing discharge from the McKays Power Station from 6m³/s to 9m³/s. The 750m length of the tailrace will be unaltered.

3.5 The Kaniere HEPS enhancements

As outlined in **Schedule 2**, the key works for the Kaniere HEPS enhancements are as follows:

- Modifying the existing intake and replacement of the three existing gates (by two new gates of the same size) to enable an increased abstraction of 8m³/s to the new Kaniere race.
- Installing an environmental flow bypass to ensure river flow is maintained.
- Installing a new tunnel and culvert with a capacity of 8m³/s from the intake under Kaniere road to the start of the Kaniere race.
- Replacing the existing 1m³/s Kaniere race with a new 8m³/s race following essentially the same alignment.
- Constructing and commissioning a new penstock, power station and tailrace immediately downstream of Ward Road.
- Decommissioning and dewatering of the existing Kaniere HEPS from Ward Road.

3.6 Construction Works and Programme

3.6.1 The McKays HEPS enhancements

It is anticipated that the Kaniere HEPS will continue to operate during the 9-12 month period for construction of the McKays HEPS enhancements.

Works as a consequence of modifying the McKays weir and associated race will involve an initial dewatering of the races to allow for minor works to widen and/or deepen the race and increase the height of the weir. Dewatering of the race is currently undertaken on a regular basis to enable routine maintenance.

Various sized creeks are crossed by the race, and in each case a structure is necessary to provide flow passage. The choice of structure depends on the relative levels of creek and race, and the size and importance of the creek. The largest creek bypassed is Coal Creek, by way of the Coal Creek flume. The existing flume will be replaced by two or three 1300mm diameter pipes. A spill facility will be retained at Coal Creek. The Blue Bottle Creek diversion weir will be repaired.

Material excavated to widen and/or deepen the race will be sorted. Suitable inorganic material will then be placed on the access road (fill side of the race). The McKays HEPS access road will be resurfaced.

The new headpond will be formed by engineered cut to fill earthworks, with no additional spoil requiring disposal from this component of the construction activities.

Overland penstock installation will require the clearance of vegetation and erosion protection works to minimise run-off prior to works commencing. The slope from the headpond to the powerhouse is at 35° and the penstock will be provided with anchor blocks and supports. Once decommissioned, the existing underground penstock will remain in-situ.

Construction of the new station will begin with erosion control works and stripping the area of vegetation, topsoil and other organic material, followed by bulk excavation to foundation levels. Foundations and walls will be constructed prior to installation of the inlet to the turbine and generating plant. A

gantry crane will be installed as early as possible to provide adequate lifting capability. The penstock intake and penstock will be constructed in parallel, where possible, with the power station. As the powerhouse structure, penstock and penstock intake near completion, the turbine and generator will be installed in the power station, together with ancillary equipment. Spoil from these works will be used for fill in shaping the land surrounding the power station where practicable.

Dewatering of the construction site, including the power station may be needed at times. The discharge of water will be via sediment control ponds, before discharge to water bodies.

Excavation works associated with the alternative McKays deviation and placement of 550,000 on private farmland will involve only localised haul movements. Prompt revegetation of the spoil areas will be subject to the requirements of the Weed Management Plan.

3.6.2 *The Kaniere HEPS enhancements*

Construction of the Kaniere HEPS is expected to take approximately 18 months, and will begin with the construction control works (earthwork, erosion and sediment control).

Once the sediment control works are in place, the existing Kaniere race will be dewatered, with the footprint of the new race formed from cut to fill. Long term stockpiled areas will be grassed, and short term stockpiles watered for dust suppression and sediment control purposes.

Modifications to the Kaniere intake and formation of the gate structures will require temporary river diversions and coffer damming or sheet piling. Concrete foundations and structural elements will be constructed and gates placed when complete.

Construction of the new station will be the same as for the McKays HEPS. Spoil from these works will largely be used to shape the land surrounding the power station, and fill the existing Kaniere HEPS race. Some additional 80,000m³ of spoil will either be deposited locally or within the private land identified above for the McKays deviation.

Dewatering of the construction site, including the power station will be needed at times. The discharge of water will be via sediment control ponds, before discharge to water bodies.

The buffer storage areas will be created by fully formed encircling embankments.

3.7 Ongoing maintenance activities

This section outlines the general ongoing maintenance activities that will occur once the enhanced scheme is fully completed.

3.7.1 Weed/Algae Control

Herbicides will be employed, as they are now, to address invasive weed growth around the infrastructure for the enhanced scheme, including within the races. Both the herbicide and its methods of application will accord to best industry practice.

Weed growth will be proactively controlled in the races on a regular basis.

TPL will also investigate a weed monitoring and control protocol in consultation with DoC.

3.7.2 Maintenance of the access track and race

Maintenance of the races will include bank reinstatement, maintenance of freeboard levels, and removal of accumulated sediment deposits as needed.

Regular inspections and remedial action will be undertaken to ensure a well graveled and maintained access track for recreational use.

3.7.3 Civil Structures Maintenance

Routine monthly inspections of the scheme will be undertaken to ensure the maintenance of the numerous culverts, flumes, tunnels and other infrastructure.

3.8 Electricity Transmission

The output of the proposed enhanced scheme will be embedded into the local 33kV or 11kV distribution network of the local line business Westpower. Electricity will continue to be exported via the Kaniere HEPS to the existing 11kV electric power line adjacent to the current Kaniere race.

4 CONSULTATION

4.1 Approach

TPL adopted a consultation strategy with respect to the enhanced scheme, the purpose of which was to:

- Advise stakeholders of the proposal;
- Provide opportunity for constructive comment on scheme design and mitigation of effects; and
- Provide a level of information that would enable informed decision making on the processing of any necessary consent applications.

TPL recognised that for consultation to be successful, it would need to:

- Provide information in a co-ordinated and timely manner to key stakeholders;
- Provide easily identified and accessible communication tools/networks for stakeholders to respond efficiently to the information they receive e.g. identified personnel, phone numbers, records of individual discussions, written responses, response sheets etc; and
- Be proactive in seeking response to information sent – to give timeframes and follow-up.

4.2 Stakeholder Groups

Prior to the commencement of technical investigations, TPL invited the following key stakeholder groups to a series of individual meetings:

- Fish and Game.
- DoC.
- WCRC.
- WDC.
- Te Runanga o Ngāi Tahu.
- Te Runanga o Ngati Wae Wae.
- HPT.
- Westland Milk Products.
- Energy Efficiency and Conservation Authority.
- Members of the Lake Kaniere Property Owners Association.

Following commencement of the technical investigations, TPL also provided information regarding the enhanced scheme to, and offered to meet with, Westland Milk Products and the Energy Efficiency and Conservation Authority. However, neither of these groups considered a meeting to be necessary.

The purpose of these meetings was to outline the intent and purpose of the enhanced scheme, and seek stakeholder input into the briefs and scope of work being undertaken by technical advisors.

TPL met with each of these groups both prior to the commencement, and following the completion, of the draft technical report writing. Comments received from during stakeholder consultation have been considered by TPL, and incorporated into the enhanced scheme design and proposed mitigation as practicable. A number of changes were made to the enhanced scheme, and proposed mitigation, as a result.

It is not intended that discussion with the key stakeholder groups will cease once applications are lodged in November 2010. TPL is committed to continuing open dialogue and discussions with all parties.

4.2.1 Key Stakeholder Matters

In summary, the key matters raised by stakeholder groups during consultation included:

- The level of residual water flow in the Kaniere River and the impact of this revised flow regime on the values of the river, particularly for recreation and fish habitat.
- The extent and impact of vegetation clearance.
- Options for compensation for indigenous vegetation lost/removed.
- The extent of earthworks and need for sediment control.

The main matters raised by specific stakeholder groups are outlined in the following sections.

4.2.2 Department of Conservation

TPL has liaised with DoC as both a stakeholder and in its role as landowner, and commenced discussions regarding preparation of the necessary concession application. Specific topics discussed have included impacts in relation to recreation, archaeology, fish passage and terrestrial habitat.

4.2.3 Iwi

TPL representatives met with Paul Horgan of Te Runanga o Ngāi Tahu on 22 February and 16 July 2010, and Ben Hutana of Te Runanga o Ngati Wae Wae on 23 February and 14 July 2010.

A key matter raised by the iwi groups is protecting the mauri of Lake Kaniere and the Kaniere River. Other issues raised include: impacts on eels and native fish, as well as potential need for trap and transfer programmes; and the extent of works to items of archaeological significance to iwi.

4.2.4 Fish and Game

TPL representatives met with Fish and Game staff on 12 November 2009 and 22 September 2010. Fish and Game staff acknowledged that the Kaniere River is not a significant fishery in its own right; however, they identified the potential adverse effects of low residual flows on the river's aquatic ecology as being of interest.

4.2.5 WCRC and WDC

TPL representatives met with staff from WCRC and WDC in November 2009 and 2010. Council Officers have raised a number of relevant consenting issues, including practical decisions as to the ability to retain the existing Kaniere race and residual water flows.

4.2.6 HPT

Following discussions with HPT, it is understood that whilst the enhanced scheme will result in significant effects on the heritage fabric of the existing Kaniere race (before mitigation), there are opportunities for addressing and mitigating these effects.

Further to advice from HPT, TPL has commissioned the Heritage Assessment attached as **Appendix F** and will be seeking

archaeological authorities from HPT for the works as required by the HPA.

4.2.7 General Public

TPL has also acknowledged the need to keep both the general public and local residents informed regarding development of the enhanced scheme. A meeting was held with members of the Lake Kaniere Property Owners Association on 22 February 2010 where the proposal was explained, and it was outlined that there would be little effect on Lake Kaniere levels, apart from a potential alteration in the way the lake rises and falls from a “stepped” to a more “wavelike” process.

5 ASSESSMENT OF ENVIRONMENTAL EFFECTS

Potential effects of the enhanced scheme have been assessed against the environment as it actually exists now, including the existing Kaniere and McKays HEPS. Put simply, it would not make sense to assess the effects of the enhanced scheme against the Kaniere environment prior to the establishment of the existing physical infrastructure from some 100 years ago, disregarding the changes this has introduced (including the current residual flow in the Kaniere River of 0.2m³/s), some of which are irreversible.

The following sub-sections accordingly assess the effects of the enhanced scheme on that basis, and having regard to the existing environment as described in Section 2 of this AEE above.

Summary tables of the individual expert assessments are provided in **Schedule 5** to this AEE

5.1 Assessment of Effects

5.1.1 Positive Effects

The enhanced scheme will introduce a number of positive effects, as follows:

- An enhanced area for recreational use, including dual purpose walking and mountain bike track improvements and surface treatment.
- The installation of 20mm mesh fish screens at the Lake Kaniere, McKays Creek and Blue Bottle Creek intakes to prevent entrainment of migrating eels.

- Improved upstream fish passage opportunities at the lake outlet and McKays weir, and an increased residual flow regime.
- The investigation and implementation of a weed monitoring and control protocol in consultation with DoC.
- The continued and more efficient use of the existing physical infrastructure for the existing Kaniere and McKays HEPS, including races, culverts, flumes and tunnels. This will result in an additional 2.97MW of generation capacity from renewable sources, and the eventual commensurate displacement of higher cost thermal electricity generation, consistent with current government policies.
- Increased availability of affordable energy, with greater security of supply, for the Westland District, and Hokitika in particular, as a result of reduced transmission charges and transmission line losses.
- Economic benefits for the Westland District in terms of construction revenue and increased employment opportunities.

5.1.2 Effects on water availability

Under the enhanced scheme, water levels and flows in Lake Kaniere and the Kaniere River will be lower for a greater period of time than is presently the case. However, the currently consented minimum level for Lake Kaniere will not be reduced, and minimum residual flows in the sections of the Kaniere River affected by the enhanced scheme will be increased from the current 0.2m³/s to at least 0.3m³/s downstream of the Lake Kaniere outlet.

Water requirements for Hokitika's domestic and commercial supply will be unaffected under the enhanced scheme. It is also understood that no industrial or agricultural enterprises have take or discharge consents for the affected sections of the Kaniere River that will be affected as a consequence of a higher frequency of lower flows.

5.1.3 Effects on Aquatic Ecology

The following improvements will be undertaken as part of optimisation works for the enhanced scheme, independently of the McKays and Kaniere HEPS enhancements:

- The provision of 20mm wide mesh fish screens at the Kaniere, McKays Creek and Blue Bottle Creek intakes, as well as the formation of native fish passes. The McKays fish screen will be downstream of the intake at McKays and incorporate a return channel to the River, as combined with a two way fish pass; and
- Monitoring the residual flow at a number of channel modifications, specifically at the Blue Bottle weir, to ensure the removal of potential pinch points at low flows.

In terms of the enhanced scheme, the potential for adverse aquatic ecology effects are related to:

- Increased diversion of the Kaniere River, and consequential increased frequencies of lower residual flows in the Kaniere River, increased temperatures and nuisance algae;
- Fish passage within the Kaniere River and its tributaries, including canal screening; and
- Construction effects.

Increased diversion, temperature and nuisance algae

The Ryder Report considers the impacts on habitat availability and quality as a result of the revised flow regime for the Kaniere River under the enhanced scheme. As noted above, while the minimum residual flows will actually be increased under the enhanced scheme, flow levels will be lower than present for greater periods of time. This can have both positive and negative impacts on habitat availability and quality, depending on the species being considered.

While sustained periods of reduced flow can cause increased water temperatures and reduced water quality, this is not expected to occur in the present case as water temperatures in the river are largely driven by those at the Lake outlet.

Fish Passage

The Ryder Report advises that the maintenance of safe fish passage up and down the Kaniere River system should be the key management objective with regard to aquatic ecology. In this regard, the main in-stream passage barriers are the McKays weir and Lake Kaniere outlet. The enhanced scheme will also result in a reduction in Lake Kaniere overspill by 34% relative to the existing environment, which will reduce opportunities for fish passage.

Construction Effects

Construction works include the modification of the Kaniere and McKays races, through dewatering and excavation, and the construction of the new Kaniere Forks Power Station. The potential effects of these works on aquatic communities within

the races and in the Kaniere River include direct disturbance and indirect effects such as increased sedimentation and other contaminants, and the introduction of aquatic weeds or algae.

Mitigation

TPL originally proposed to retain the current 0.2m³/s minimum residual flow level. However, on the basis of its expert's advice, in order to appropriately manage potential adverse effects on aquatic ecology, TPL has now adopted a proposed minimum flow regime which includes maintaining 0.4m³/s at Ward Road, and 0.5m³/s downstream of the new Kaniere Forks Power Station. Together with the other mitigation measures outlined below, this regime is expected to result in no more than minor effects on the aquatic ecology of the Kaniere River relative to the existing situation.

In addition to the revised residual flow regime the Ryder Report also recommends that:

- TPL undertake in river temperature monitoring with flow releases, and consider additional flow releases where mean water temperatures significantly exceed Lake temperatures.
- Flushing flows be utilised where necessary to manage nuisance filamentous algae.
- Measures such as the installation of fish screens at intakes and fish passes, and the removal of pinch points, as well controlled releases to aid downstream migration of adult eels.
- Adverse effects on aquatic communities within and downstream of construction areas be managed through the development and implementation of an appropriate

Environmental Management Plan ('EMP'), incorporating measures for the control of construction activities, earthworks and sediment.

5.1.4 Effects on Terrestrial Ecology

McKays HEPS enhancement

a. Construction effects

In terms of the McKays HEPS enhancement, the extent of construction works is largely confined to the existing scheme envelope. In conjunction with the adoption of recommended construction management techniques, this will ensure that any adverse effects are minimised to acceptable levels.

The only potential construction area outside the existing scheme envelope is the McKays deviation. The works associated with this proposed upgrade are largely confined to areas of habitat that have already been previously modified. The proposed construction envelope requires the removal of 3.7ha of vegetation, including the permanent removal of 25m of canopy (2.3ha). This equates to a permanent loss of approximately 1.1ha of kamahi/quintinia forest, and some 0.1ha of soft tree fern – rough tree-fermland, with the balance being lower ecological value gorse scrub.

While there will be discernable effects on the habitats of terrestrial birds and fauna in the immediate area during the construction in particular of the McKays deviation, these are anticipated to be less than minor.

b. Ongoing effects

The McKays HEPS enhancement will not require any change to the minimum operating range of Lake Kaniere, although the amount of time the lake levels approach the minimum range will increase from the present situation. Simulations predict the mean and median lake levels will reduce by 0.54 and 0.69m respectively for the McKays HEPS enhancement.

Changes in the lake levels are unlikely to adversely affect terrestrial communities by exposing more available habitat along the lakeshore. There may, however, be changes to the vegetation composition and distribution of riparian wetlands, with the extent of change dependent on a number of variables including hydrology, size, and distance from the lake and community composition. In terms of the two largest wetlands, effects on the Big Bay Wetland are expected to be negligible given its hydrology is largely driven by stream inflows. For the Slip Bay wetland, there is a predicted long term lakeward shift of all vegetation communities. Connectivity issues are not expected to be an issue given that with the exception of the Hans Bay wetland there is no permanent open water in any of the wetlands.

Decreased flows in the Kaniere River between McKays weir and the McKays Power Station can be expected of up to 5m³/s, and there will be lower flows for longer periods of time than at present. There are no wetlands in these reaches of river that will be impacted by a higher frequency of lower flows. While there will be a reduction in the average size of the wetted channel, this may even be beneficial for some bird species as greater areas will be exposed for roosting habitat, water velocities will be reduced,

and more pools will be created thereby increasing food accessibility.

Kaniere HEPS enhancement

a. Construction effects

Without mitigation, more than minor effects are anticipated with the removal of significant vegetation communities along the entire length of the race construction envelope with the total removal being conservatively in the order of 10.1ha. These vegetation communities include rimu/kamahī – quintinia forest (1.7ha), and more modified vegetation communities such as rimu/mountain taotao (1 ha), and manuka scrub (0.2ha). The ability to realign the Kaniere race under the existing transmission lines has resulted in some 5.2ha of the removed vegetation being highly modified regenerating manuka/ tanglefern. As a result, the Kaniere HEPS enhancement will result in the permanent loss of approximately 4.9ha of ecologically valuable vegetation communities and faunal habitat.

b. Ongoing effects

The Kaniere HEPS enhancement is unlikely to have more than minor adverse effects on bird habitats or the bird communities of Lake Kaniere, or the Kaniere River. However, effects associated with the formation and commissioning of the new increased capacity Kaniere race will have minor long term effects relating to the loss of feeding, roosting and nesting habitat, habitat fragmentation and modification and potential corridor effects.

The potential effects on riparian vegetation and wetlands of Lake Kaniere are as identified above for the McKays HEPS

enhancement, although it is noted that simulated changes in lake levels are smaller than those identified for that enhancement (a reduction in mean and median lake levels of 0.43m and 0.54m respectively).

The Kaniere HEPS enhancement is not considered to significantly increase existing corridor effects. However, the proposed envelope will bisect important habitat for terrestrial birds between the Lake outlet and Ward Road. This will result in the net loss of feeding, roosting and breeding habitat for a number of indigenous forest and bird species, including 'Threatened' and 'At Risk' species. However, these losses need to be put in context with the fragmentation of habitat provided by the existing scheme, and also the wider available habitat in the area. A significant area of the Hokitika ED (51,129 ha, 46.7%) is protected as public conservation land, and the majority of this is forest habitat. As such, habitat loss associated with the construction envelope is unlikely to have a more than minor adverse impact on local bird populations.

Mitigation

As already noted, construction management will include the preparation of an EMP to manage the range of potential construction related effects associated with proposed works, including sediment run-off, noise and dust, weed control and monitoring, fire, and accidental discharge of contaminants. Whilst some loss of indigenous trees and plants within the construction envelope will be unavoidable, the extent of these losses can be minimised by containing construction works in the smallest corridor possible. No Threatened or Rare plant species

are likely to be impacted on within the construction corridor. Noise, dust and vibration effects are likely to be short lived and the appropriate management of these matters, together with fire risk avoidance, through the EMP will ensure that such effects are adequately mitigated.

It is also considered prudent that an ecologist is involved on site during the detailed design stage of determining the construction corridor and race augmentation works so as to minimise possible fauna disturbance. The ecologist would also be able to advise where practicable as to the staging of sections of construction works so as to avoid disturbing nesting birds and bat nesting, particularly those areas of primary rimu/kamahī forest during the spring/early summer.

An environmental offset of ecologically valuable vegetation is being explored with DoC. Mitigation planting will also be undertaken on the residual construction envelope to supplement natural regeneration and reduce the adverse effects of increase edge habitat. Environmental conditions in the area will result in rapid regeneration.

A wider 'mitigation package' including implementation of a predator and weed control programme is also being considered to mitigate the loss of the higher order ecological habitat. The removal of the hydrangeas at the existing McKays Power Station is also considered necessary.

Overall, and taking into account the environmental offset and mitigation package being developed with DoC, together with

other relevant mitigation, the adverse effects on terrestrial ecology of the enhanced scheme are considered to be minor.

5.1.5 *Effects on Landscape and Natural Character*

In the 100 years since it was built, the existing Kaniere race has blended into the landscape and has high landscape values, though modified. The enhanced scheme proposes a wider and deeper new race for a distance of about 3.5kms to the new Kaniere Forks Power Station. This will affect the present landscape character of the immediate area, and it will take a number of years to reintegrate with the landscape. This proposal will have material adverse effects on the natural character and landscape values. The balance of the existing Kaniere race will ultimately be decommissioned and de-watered.

The stretch of Kaniere River between Lake Kaniere and the McKays weir passes through a landscape of high quality and high natural character. The proposed reduction in water flow as a consequence of the enhanced scheme, with a higher frequency of minimum flows along the stretch of river between Lake Kaniere and Ward Road, will have adverse visual and landscape effects. It reduces the width and volume of water in the river, exposing rocks on either side of the rocky substrate. White water is also less evident.

The new Kaniere Forks Power Station will have impacts on landform, landscape character, and natural character and will be visible from Ward Road.

Mitigation

The current public access to the existing Kaniere HEPS race, and also the race weir, as well as the addition of further and enhanced public amenities is an integral part of the enhanced scheme. TPL has confirmed that it will ensure that these recreational attributes will be further enhanced as follows:

- Works undertaken in association with the intake and the Lake Kaniere culvert will be extended to include the creation of an enhanced landscape and picnic setting in this area known as 'The Landing'.
- Localised maintenance works will result in a well maintained surface for public walking and cycling access.
- Works associated with the McKays HEPS enhancement may include a more attractive and accessible landscape and recreational setting and the provision of increased public access.
- The new Kaniere race will provide for alternative recreational tracks. The forest will be regenerated where possible to reduce the extent of amenity effects over time. Those parts of the existing Kaniere race which are to be decommissioned will have their walking and cycling opportunities maintained.
- Rehabilitation works for the enhanced scheme will be undertaken in accordance with a Landscape Rehabilitation Plan ('LRP').
- The new Kaniere Forks Power Station and penstocks will be painted in recessive colours, and its effects further mitigated in the medium to long term through the LRP.

The existing Kaniere Forks Power Station is to be decommissioned in due course subsequent to construction of the

Kaniere HEPS enhancement. Elements of the existing (decommissioned) Kaniere Forks Power Station will be retained as an integral part of an enhanced visitor recreational and interpretation experience. The existing Kaniere penstocks will be removed and this area re-vegetated pursuant to the LRP.

Consequently, taking into account the limited public views of many sections of the enhanced scheme and the mitigation proposed, the landscape and visual effects of the enhanced scheme are considered to be no more than minor.

5.1.6 Effects on Archaeology

As outlined in the Clough Report (**Appendix F**), all recorded historical/archaeological sites relate to past mining and early electricity generation.

The archaeological impacts of the enhanced scheme are considered by Clough and Associates to be significant before mitigation, primarily as a consequence of the destruction of sections of the Kaniere race, and the retirement of that section of race from Ward Road to Kennedy Road without consequent repair and maintenance.

It is noted that the retirement and resultant degradation of the Kaniere race would be a natural consequence of either the scheme not being re-consented, or TPL no longer implementing its consents (given that these are permissive, not mandatory). Further, as the race is wholly within DoC's ownership, there is no obligation on TPL to either maintain the race structure or maintain flows into the race. The race is not scheduled in the HPT

Register, but qualifies as an archaeological site and Historic Place pursuant to section 2 HPA, as it is associated with pre-1900 human activity. The only mandatory obligation in statute is the duty under the HPA not to destroy or damage the race without appropriate authority, but retirement is not considered to be in breach of this duty. Furthermore, there is no requirement within the WDP for TPL to maintain the race or flows into it.

There are no recorded sites of Maori origin within or in the vicinity of the Kaniere or McKays HEPS enhancements. While it is considered unlikely that significant archaeological remains associated with Maori occupation and activity will be found in this area, it cannot be ruled out.

Mitigation

TPL will apply for appropriate archaeological authorities as required by the HPA. TPL will also consult with HPT to develop an Archaeological Management Plan ('AMP') for implementation during construction works to manage the investigation and recording of archaeological sites, monitoring of earthworks, and protocols relating to the discovery of unrecorded archaeological sites and artefacts, and koiwi.

The AMP will include provision for an 'Accidental Discovery Protocol' to deal with the unexpected discovery of artefacts. Key aspects of the protocol will be that in the event that artefacts are unexpectedly discovered, all work will cease within 50m of the discovery area. The WDC, tangata whenua and HPT will be immediately notified. The New Zealand Police will also be

informed if human remains are found. The appropriate protocol will then be observed.

In conjunction with the accidental discovery protocol outlined above, an archaeologist and tangata whenua representative will be present during the initial topsoil stripping exercise.

With respect to the proposed decommissioning of the existing Kaniere HEPS from Ward Road, the proposed mitigation package includes the following:

- Where practicable, sections of the race between Lake Kaniere and Ward Road should be preserved in working order;
- Public access to be retained to the preserved section of the Kaniere race and interpretation panels installed to provide information on the race use and history;
- In conjunction with DoC, possible future remedial work and maintenance to be undertaken on the retired sections of the Kaniere race and race man's track between Ward Road and Kennedy Creek;
- The new race is to avoid the remains of the Ward Road race man's hut, and information panels will be installed regarding this structure, its use and history; and
- Appropriate recording of destroyed archaeological features.

In conjunction with the range of mitigation measures outlined above, it is considered that the adverse archaeological effects of the enhanced scheme are no more than minor.

5.1.7 Effects on Recreation

Recreational opportunities have the potential to be affected by lower lake levels, reduced water quality in that part of the Kaniere River affected by the diversion, changes to visual amenity, erosion, and reduction in fish condition and quantity, waterfowl habitat and food availability. There are also potential impacts on walking and cycling associated with the Kaniere race.

Specific recreational effects are considered with respect to:

- Mountain biking and walking;
- Fishing and angling; and
- Boat users/kayakers

Mountain biking and walking

The Lake Kaniere Walkway is located on DoC estate, and largely follows the 9km open Kaniere race from Lake Kaniere to Kennedy Creek. On 11 December 2008, DoC announced that the Lake Kaniere Walkway was opened as a formal mountain biking track. The Lake Kaniere Walkway track is generally considered for an intermediate skill level of users and is also identified as a regionally important mountain bike track.³

The Kaniere Walkway is heavily utilised by walkers and mountain bikers, and the existing nature and character of the walkway will change (up to Ward Road) considerably as a result of the Kaniere HEPS enhancement. There will also be adverse effects as a consequence of public access closures during construction activities.

Recreational walkers/picnickers at Lake Kaniere may also be able to discern an increase in the extent of bank exposure as a consequence of an increased frequency of drawdown for the enhanced scheme. However, whilst such effects are noticeable in terms of natural character, they will not reduce the extent or nature of the recreational experience of the walkway, or be lower than the currently consented lake level. Construction activities at the Kaniere race intake are limited to some three months duration, and will be subject to the LRP. Recreational impacts with respect to Lake Kaniere are therefore considered to be no more than minor.

Fishing and angling

Given access difficulties, especially with the extent of bush covering on the western shoreline, Lake Kaniere is generally fished by boat. Whilst important locally, Lake Kaniere itself is not a highly recommended fishing venue. In-river angling along the Kaniere River is also not considered a significant recreational resource given a lack of access and the extent of fish numbers in most sections of the river.

Reductions in in-stream median flows as a consequence of the enhanced scheme may cause connectivity issues, potentially reducing species numbers. However, it is considered that such effects will be adequately mitigated through the measures already outlined above, such that any impacts of the enhanced scheme on fishing and angling will be less than minor.

³ Kennett Brothers. Classic New Zealand Mountain Bike Rides 2005, page 72.

Boat users and kayakers

The recreational effects on boat users within Lake Kaniere are likely to be negligible, given that minimum lake levels will remain as currently consented. The only change would be a potential alteration to the way in which the lake raises and falls from a stepped process to a more waved process, and that lake levels will be lower for longer periods of time. The high water quality standard for contact recreation will not be diminished as a result of the enhanced scheme.

The Kaniere River is not a renowned whitewater kayaking river within the district. The current flow regime results in existing connectivity limitations, and in conjunction with a small gradient, means there are limited recreational kayaking opportunities. Whilst the river is sometimes used for kayaking during higher flows, usually when the lake spills (which occurs mostly between October through January), such opportunities are atypical, and will not be greatly diminished as a consequence of the enhanced scheme.

Mitigation

In order to mitigate potential effects on walking and mountain biking activities as a consequence of the enhanced scheme, TPL has confirmed that it will commit to the provision of further dual purpose walkway/mountain biking route along the majority of the new Kaniere race. TPL has also undertaken to ensure that the modified section of the Kaniere race to Ward Road will continue to be utilised for walking/mountain biking, except during the 12 month construction period. Surface treatment of the walkway

will also be improved to reduce degradation from mountain bike usage, and a cyclic programme for maintenance introduced.

Overall, impacts on the recreational resources associated with the enhanced scheme will be beneficial. Whilst there will be alteration to the nature and character of the recreational resource associated with the Kaniere race, disruption will be largely short lived, and walking and mountain biking tracks will be maintained.

5.1.8 Cultural Effects

TPL's consultation process with iwi and runanga that hold mana whenua over the Kaniere catchment is outlined in Section 4 of this AEE. It is clear from this consultation that tangata whenua have a close and enduring relationship with the Lake, River and its catchment. All seek that the river be maintained as a viable, healthy and integral part of the environment.

Also relevant with respect to the present applications is the Te Runanga O Ngāi Tahu Freshwater Policy. This iwi management plan emphasises the need for close consultation with Papatipu Runanga where abstraction or discharge activity and/or residual flows may be contrary to the objective of maintaining and protecting the mauri of freshwater.

In this regard, it is noted that various mitigation measures outlined above (including improving connectivity, installation of fish screens, and periodic flushing flows) are all aimed at maintaining freshwater quality and mahinga kai (including the eel fishery resource).

The Accidental Discovery Protocol will also ensure that the discovery of any unrecorded sites of significance tangata whenua is adequately and appropriately managed.

5.1.9 Noise and Dust

Construction noise and dust will be inevitable with the use of heavy machinery. However, the effects in this regard are considered to be negligible, given the sparsely populated nature of the Kaniere Valley and distance of the works from the closest residences. Noise and dust generation will also be managed through the EMP.

5.1.10 Traffic

Truck movements on public roads for the construction and commissioning of the enhanced scheme will largely be limited to the delivery of construction supplies, concrete and reinforcing steel. The number of vehicle movements will be well within the capacity of the existing transportation network.

The extent of cut to fill works will ensure that surplus spoil is utilised within the scheme envelope where possible, thereby minimising construction traffic for spoil transport, with the exception of the McKays tunnel deviation, which will involve localised transport of spoil within private roads.

6 STATUTORY FRAMEWORK

6.1 Introduction

This section summarises and discusses the relevant criteria from the Act, and the applicable planning documents, as they relate to the enhanced scheme.

6.2 The Resource Management Act 1991

6.2.1 Section 5

Section 5 sets out the purpose of the Act being to promote the sustainable management of natural and physical resources as defined in section 5(2) of the Act. In defining the “*natural and physical resources*”, section 5 states that resources must be used in a manner that enables people and communities to provide for their social, economic and cultural wellbeing, health and safety, while:

- (a) *sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- (b) *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- (c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Terms such as *natural and physical resources* and the *environment* are defined very broadly. Natural and physical resources include land, water, air, soil, minerals, energy, all forms of plants and animals, and all structures. The environment includes people and communities.

The enhanced scheme involves the sustainable use and management of physical resources of the Kaniere Valley, in particular the water from Lake Kaniere and the Kaniere River, as well as the existing scheme infrastructure. In particular, the enhanced scheme will enable increased generation from the continued utilisation of many of these existing resources. It will also allow water from the Kaniere HEPS to contribute to the McKays HEPS, something that does not occur at present.

The enhanced scheme will provide for the social and economic wellbeing of people and communities within the Westland District, by increasing generation capacity and security, resulting in more reliable and reasonably priced electricity. The provision of electricity is considered to be one of the vital services expected for people in New Zealand to be able to provide for their own wellbeing. While there may be some localised adverse effects, these will be more than outweighed by the mitigation measures to be adopted and overall project benefits that will accrue, both locally and regionally. These include enhanced economic benefits, which will further enhance the community's wellbeing.

Cultural wellbeing is also appropriately addressed and provided for with respect to the present proposal, in particular through continued discussions with, and input from, relevant iwi groups. The enhanced scheme will also not unduly affect the mauri of the relevant waterbodies, the most important cultural factor identified to date. The historic and archaeological features of the existing scheme will also be appropriately provided for through

either avoidance, or appropriate recording and preservation, as necessary.

The project will not have any foreseeable adverse effects on health and safety. All potential effects in this regard (such as increased sediment runoff entering waterways during construction, dust, noise or traffic effects) have been considered and mitigated to the extent practicable. A section of the existing Kaniere race that is to be decommissioned will also be backfilled to reduce the risk of injury should people fall in it.

The enhanced scheme will assist with sustaining the potential of natural and physical resources to meet the needs of future generations by enabling increased generation from a renewable resource. This is consistent with both current government policy, and New Zealand's international obligations with respect to the reduction of greenhouse gas emissions. In addition, no resources will be depleted as a result of the project so as to risk their availability for future generations.

The development will involve a number of adverse effects, particularly with respect to vegetation clearance and decommissioning of part of the existing Kaniere race. However, as demonstrated in the various expert reports attached to this AEE, these effects can be avoided, remedied or mitigated such that any concerns regarding the life supporting capacity of natural resources have been sufficiently addressed.

6.2.2 Sections 6, 7 and 8

Section 6 of the Act lists the matters deemed to be of national importance. Consent authorities must “*recognise and provide for*” the matters listed when exercising their powers under the Act. As relevant, the enhanced scheme must:

- (a) *preserve the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and protect them from inappropriate subdivision, use, and development:*
- (b) *protect outstanding natural features and landscapes from inappropriate subdivision, use, and development:*
- (c) *protect areas of significant indigenous vegetation and significant habitats of indigenous fauna:*
- (d) *maintain and enhance public access to and along the coastal marine area, lakes, and rivers:*
- (e) *recognise and provide for the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*
- (f) *protect historic heritage from inappropriate subdivision, use, and development:*

While not being matters of national importance like those within section 6, section 7 of the Act lists the ‘other matters’ to which a consent authority must have “*particular regard*” when considering the present applications. The ‘other matters’ of relevance to this application are:

- (a) *kaitiakitanga:*
- (aa) *the ethic of stewardship:*

- (b) *the efficient use and development of natural and physical resources:...*
- (c) *the maintenance and enhancement of amenity values:*
- (d) *intrinsic values of ecosystems:*
- (f) *maintenance and enhancement of the quality of the environment:...*
- (h) *the protection of the habitat of trout and salmon:*
- (i) *the effects of climate change:*
- (j) *the benefits to be derived from the use and development of renewable energy.*

Section 8 requires consent authorities to take into account the principles of the Treaty of Waitangi in considering consent applications.

In terms of sections 6(a) and (b), the Buckland Report in particular has recognised the high natural character and landscape value of the Kaniere Valley, including its wetlands, lakes and rivers. The enhanced scheme will have effects on some of these values, particularly with respect to the vegetation clearance and revised flow regime required for the Kaniere HEPS enhancement. However, appropriate mitigation is being provided with respect to these effects, including revegetation of the cleared areas where possible and an area of offset planting to be agreed with DoC. It is accordingly considered that these matters have been adequately provided for, and that the enhanced scheme will not represent an inappropriate use or development in the Kaniere Valley. While of high natural character and value, there are no outstanding landscapes or natural features affected by the enhanced scheme.

Matters relevant to section 6(c) are discussed in detail in the Boffa Miskell Report. This concludes that relevant vegetation communities and habitats have been adequately provided for by restricting construction works for the enhanced scheme to the existing scheme footprint, and following the existing transmission line route, where possible. To the extent that there are flora and fauna effects particularly as a result of vegetation clearance, these are to be adequately addressed through replanting and off-set mitigation.

The enhanced scheme will also ensure the continued maintenance and enhancement of public access to Lake Kaniere and along the Kaniere River, as relevant to section 6(d). In particular, TPL has committed to maintaining a dual purpose walkway/mountain biking route along the new Kaniere race. Public access will also be retained to the preserved section of the Kaniere race, to maintain the existing Kaniere race Walkway. Existing public access to Lake Kaniere will not be affected by the enhanced scheme.

Iwi issues are a theme of sections 6(e), 7(a) and (aa), and section 8. As noted in the context of the discussion regarding section 5 RMA above, cultural issues have been provided for through consultation with relevant iwi groups, and minimising effects on the mauri of the waterbodies used for the enhanced scheme. It is expected that these discussions will continue to occur throughout the application process, and during construction (if consent is granted).

The main impact of the enhanced scheme on historic heritage with respect to section 6(f) is the loss and decommissioning of parts of the existing Kaniere race. Appropriate mitigation has been proposed in this regard as already outlined above, including ensuring that sections of this race will be maintained in working order, and that other features will be preserved and utilised as educational features regarding the history of the Kaniere Valley.

It is considered that the project has appropriately addressed the efficient use and development of natural and physical resources, as required by section 7(b). In particular, the enhanced scheme will provide for increased generation from existing infrastructure. Overall, the proposal will also make use of a renewable energy resource without consuming or depleting it, and has been designed with a fundamental focus on the avoidance of effects where possible. Further, as the enhanced scheme will be embedded into the local electricity network, transmission losses will be minimised. The ability for water to pass through both the Kaniere and McKays HEPS is also considered a further efficient use of resources.

Sections 7(c), (d), (f) and (h) are all addressed in detail in the expert assessments attached to, and which form part of, this AEE. As outlined in Section 5 of this AEE, the enhanced scheme will result in some adverse environmental and amenity effects. However, these have been thoroughly assessed and an appropriate mitigation package developed to ensure any such effects are adequately addressed. As a result, it is considered that the enhanced scheme will not result in any unacceptable effects on amenity values, ecosystems, environmental quality or the

habitat of trout and salmon. In a broader sense, the proposal will also contribute to the maintenance and quality of the environment, by encouraging and facilitating renewable energy generation and the consequent displacement of greenhouse gas emissions.

Sections 7(i) and (j) of the Act refer to the effects on climate change and the benefits to be derived from the use and development of renewable energy. As already noted, the enhanced scheme will allow increased generation from renewable resources. As such, it will ultimately offset the discharge of carbon dioxide emissions from non-renewable sources, thereby assisting New Zealand to achieve its Kyoto Protocol obligations. Given this, the enhanced scheme is consistent with provisions of section 7(i) and (j).

6.2.3 Section 104

Section 104 of the Act lists those matters that consent authorities shall have regard to when assessing resource consent applications. The matters which must, **subject to Part 2**, be taken into regard are:

- *Any actual or potential effects on the environment (s104(1)(a));*
- *Any relevant provision from a national policy statement, regional policy statement or plan (s104(1)(b)); and*
- *Any other matter the Consent Authority considers relevant and reasonably necessary to determine the application (s104(1)(c)).*

Section 104(1)(a)

The actual or potential effects of the enhanced scheme on the environment are addressed in Section 5 of this AEE.

Section 104(1)(b)

An assessment of the enhanced scheme against the relevant planning documents (as required by section 104(1)(b)) is provided in Section 6.3 below.

Also with respect to section 104(1)(b), there are two national policy statements of relevance, being the Proposed National Policy Statement for Freshwater Management ('**PNPS-FM**'), and the Proposed National Policy Statement for Renewable Energy ('**PNPS-RE**'). Neither of these documents are operative, but are nevertheless considered here for completeness.

Proposed National Policy Statement for Freshwater Management

The PNPS-FM was publicly notified in 2008, with submissions closing in January 2009. The Board of Inquiry charged with hearing the submissions reported to the Minister for the Environment in January 2010. The PNPS-FM contains nine objectives relating to the management of freshwater systems. When read collectively, these broad objectives signal that freshwater in New Zealand should be improved and protected from degradation through careful management.

Of particular relevance to these applications is Objective 3, which promotes the progressive enhancement of the overall quality of freshwater resources. Objective 4 also seeks to ensure the life supporting capacity and ecological values of freshwater resources

are recognised and protected from inappropriate: (a) taking, use, damming or diversion; (b) land-use development; and (c) discharges of contaminants. For the reasons outlined above, it is considered that the enhanced scheme will not result in more than minor effects on water quality or aquatic ecology. It is therefore considered that the proposal is appropriate in the context of Objectives 3 and 4.

Objective 6 states that the demands of water are to be sustainably managed, while Objective 7 states that those allocated water must use it efficiently. Again as already outlined above, particularly with respect to section 7(b) RMA, the enhanced scheme is considered to represent a particularly sustainable and efficient use of water resources.

Proposed National Policy Statement for Renewable Energy

The PNPS-RE consists of one objective and five associated policies. Its focus is summarised in the objective, which states:

“To recognise the national significance of renewable electricity generation by promoting the development, upgrading, maintenance and operation of new and existing renewable electricity generation activities, such that 90 per cent of New Zealand’s electricity will be generated from renewable sources by 2025.”

In addition to the Objective, Policies 1 and 2 are particularly relevant to these applications. Policy 1 further expands on the objective by stating that the *“benefits of renewable electricity generation activities, at any scale, are of national significance”*.

This indicates that the benefits in terms of reduced greenhouse gas emissions that will accrue from the enhanced scheme are a relevant consideration, despite their relatively modest scale (both when compared to New Zealand’s overall levels of greenhouse gas emissions, and similar benefits that will arise from other, larger renewable energy developments).

Policy 2 requires that consent authorities consider measures to avoid, remedy or mitigate the adverse environmental effects of renewable electricity generation activities with some sense of practicality, and not unnecessarily fetter the operation of a scheme (and thereby its associated benefits). Section 5 of this AEE in particular outlines TPL’s proposals to adequately avoid, remedy or mitigate the effects of the enhanced scheme, to an appropriate level, and to the extent possible and practicable in the circumstances.

The PNPS-RE also reiterates the policies from the NZES promoting renewable energy generation outlined above, and as such, provides further support for the enhanced scheme.

Section 104(1)(c)

Other relevant matters including the NZES, and Te Runanga O Ngāi Tahu Freshwater Policy, are discussed elsewhere in this AEE as appropriate.

6.2.4 Section 104(2A)

Pursuant to section 104(2A), the consent authority must have regard to the value of TPL’s investment in the existing scheme, given that section 124 applies to these applications.

6.2.5 Section 104D

In accordance with section 104D, consent for a non-complying activity (such as that required for the enhanced scheme from the WDC⁴) can only be granted if at least one of the two tests is satisfied: either that the adverse effects of the activity on the environment will be minor, or the activity will not be contrary to the objectives and policies of the relevant plans.

For the reasons outlined below, it is considered that the enhanced scheme is not contrary to the relevant planning documents, pursuant to section 104D(1)(b). In respect of section 104D(1)(a), the enhanced scheme (once mitigated) will not generate effects that are more than minor in scale or degree.

6.2.6 Sections 105 and 107 – Restrictions on Discharge Permits

Sections 105 and 107 RMA specify circumstances in which a consent authority shall not grant a discharge permit. The operation and maintenance of the enhanced scheme will not result in any of the instances listed.

6.3 Planning Documents

The planning documents relevant to these applications are outlined in Section 1.3.1 above. In addition, consideration must also be given to the RPS.

⁴ It is considered that the WDC and WCRC consents need not be bundled and that the non-complying activity status therefore only applies to the WDC consents.

6.3.1 Weighting of various planning documents

Several of the relevant planning documents have been operative for some time, whilst others have only recently been notified. Therefore, for the purpose of weighting, a broad judgment must be made. It has been assumed that at this stage the operative plans carry significantly more weight than the recently notified PRLMP. However, for completeness, it has been assumed that the majority of the provisions of the PRLMP are likely to have immediate legal effect in accordance with section 86B RMA.

6.3.2 Objectives and Policies

The relevant policies and objectives from the applicable planning documents can be categorised into the following subject areas:

1. The effect of the enhanced scheme (particularly the construction aspects) on the water quality of the Kaniere River and its tributaries;
2. The impact of the abstraction of water from both Lake Kaniere and the Kaniere River on the ecological and fishery values of these water bodies;
3. The impact of the enhanced scheme in terms of the natural character, landscape and amenity values of Lake Kaniere, the Kaniere River and the Kaniere River Valley (particularly the vegetation clearance and flow regime);
4. The effects of the enhanced scheme on significant indigenous flora and fauna in the Kaniere River Valley (particularly the vegetation clearance aspects of 3 above);
5. The ability for the enhanced scheme to provide for the social and economic well-being of people and communities;
6. The cultural, archaeological and heritage effects as a consequence of the enhanced scheme (specifically as these

relate to implications on the Kaniere race and tangata whenua values);

7. The natural hazard impacts of the enhanced scheme;
8. Air quality issues associated with the enhanced scheme;
9. The impacts of the enhanced scheme on public access to the margins of Lake Kaniere and the Kaniere River; and
10. The land disturbance effects of the enhanced scheme.

Water Quality

Relevant Objectives and policies include:

- **RPS: Objectives 7.2** (Chapter 7 ‘Soils and Rivers’) and **8.2.1** (Chapter 8 ‘Water’) and associated **Policies 8.2.1** and **8.2.2**.
- **TRWMP: Objectives 5.3.1** (Natural and Human Use Values’) and **7.3.1** (Surface Water Quality’), and **Policies 5.4.1** and **5.4.1C**.
- **TRLRMP: Objectives 4.3.1** (‘Land Management’) and **5.3.1(g)** (‘Lake and Riverbed Management’) and **Policies 4.4.1(b), 4.4.3(a)** and **5.4.2(d)**.
- **PRLWP: Objectives 3.2.1** (‘Land Management’), **4.2.1(g)** (‘Lake and Riverbed Management’) and **8.2.1**, and **Policies 3.3.1(b), 3.3.3(a), 4.3.1** and **4.3.2(d)**.⁵
- **WDP Objectives 3.11.1** and **3.11.2** (‘Water Resources’), and **Policy 4.11(A)**.

Objective 8.2.1 of the RPS, and Objective 7.3.1 TRWMP and Policy 4.4.1(b) of the TRLRMP are considered to be of the most relevance to the enhanced scheme and are outlined below:

Objective 8.2.1 To maintain, and where water quality is degraded, enhance the quality of the region’s surface, ground and coastal water resources by:

- a) Recognising and providing for the relationship of Poutini Ngāi Tahu...;*
- b) Ensuring that land and water resources are used and managed so that their life supporting capacity, intrinsic, amenity, recreational and cultural values are maintained or enhanced*

Objective 7.3.1 To maintain or enhance the quality of West Coast’s water.

Policy 4.4.1 To manage the disturbance of land and vegetation in order to avoid remedy or mitigate any adverse effects on:

- (b) Water quality, including clarity, turbidity, and temperature changes, and instream values;*

The enhanced scheme has been designed so as to avoid or mitigate adverse effects with regard to ‘Water quality’ in terms of both construction, and operation. As detailed in Section 5 of this AEE, it is considered that the effects on water quality values from enhanced diversion and discharge of the Kaniere River will be no more than minor.

⁵ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Land and Riverbed Management Plan and the Regional Water Management Plan and therefore are not repeated below.

The water taken into the enhanced scheme and discharged back into the Kaniere River will be within acceptable physical and chemical limits, ensuring the water quality of the river downstream of the discharge is maintained.

The main activity resulting in the disturbance of land is the canal earthworks. Under the TRLRMP and PRLWP canals and races for electricity power generation are specifically excluded from the definition of 'Rivers' (relevance Policy 5.4.2(d)), although such a narrow application is not contained within either the RPS or TRWMP. However, there will also be minor works associated with the Kaniere, McKays and Blue Bottle Creek intakes, and the Kaniere and McKays tailraces. Earthworks in all areas, being race enlargement and creation, embankments and headponds will be carried out in accordance with sediment control plans to ensure the quality of water is maintained.

Sediment control measures that could be used include silt fences, silt settling ponds, the use of cut material where possible, and a LRP for embankment works.

Water Quantity

Relevant Objectives and policies include:

- **RPS: Objective 8.1.1** (Chapter 8 'Water') and associated **Policy 8.1.1**.
- **TRWMP: Objectives 5.3.1** (Natural and Human Use Values'), **6.3.1**, and **6.3.5** ('Surface Water Quantity'), and **Policies 5.4.1(1)(a)** and **(d)**, **6.4.3**, **6.4.5**, **6.5.1**, **6.5.2** and **6.5.3**.

- **PRLWP: Objectives 6.2.1** (Natural and Human Use Values'), **7.2.1**, **7.2.2** and **7.2.5** ('Surface Water Quantity'), and **Policies 6.3.1(1)(a)** and **(d)**, **7.3.3**, **7.3.5**, **7.3.8** and **7.3.10**.⁶
- **WDP Objectives 3.11.1** and **3.11.2** ('Water Resources').

Policy 8.1.1 of the RPS, Policies 5.4.1(1)(a) and (d), and 6.4.3 of the TRWMP are considered to be of the most relevance to the enhanced scheme and are outlined below:

Policy 8.1.1 When making decisions over water levels or river flows, or allocating water, the Regional Council will consider the following matters:

a) The natural availability of the water resource or natural range of levels and/or flows;

Policy 5.4.1 In the management of any activity involving water to give priority to avoiding, in preference to remedying or mitigating:

(1) Adverse effects on:

(a) The habitats of threatened species identified in Schedule 1A;

(d) The significant natural character of wetlands, and lakes and rivers and their margins;

Policy 6.4.3 To consider granting an application for a resource consent to take water from a river, subject to a

⁶ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Water Management Plan and therefore are not repeated below.

minimum flow lower than that specified in Policy 6.4.2, on a case-by-case basis, provided:

- a) Any adverse effects on instream values or natural character of the source water body or any other connected water body are avoided, remedied or mitigated;*
- b) Any adverse effects on lawfully existing takes of water are no more than minor;*
- c) The application if granted, together with the cumulative effect of other existing lawful takes, avoids, remedies or mitigates adverse effects on the life supporting capacity of any waterbody.*

The enhanced scheme has been designed to avoid adverse environmental effects with regard to the take and use of water. As detailed further below, it is considered that the effects on ecological, landscape and natural character, instream and amenity values from the continued or increased diversion and discharge of water back to the Kaniere River will be no more than minor.

From the outset, environmental investigations have been undertaken and used to design the enhanced scheme to have the least environmental impact. Measures such as an appropriate minimum flow regime have been developed to ensure that effects on the natural character and instream values of the relevant waterbodies will be adequately maintained. Return channels and fish screens will also be provided to reduce fish mortality and improve fish passage.

Policy 5.4.1(a) identifies the need to give a priority to avoidance, rather than remediation or mitigation, for habitats of threatened species, which, as identified in Schedule 1A for Lake Kaniere, includes the longfin eel as being in Gradual Decline. The enhanced scheme ensures that despite an increased frequency of low flow events, the river habitat and in-stream connectivity for longfin eel will be maintained.

Water quantities for the Hokitika domestic water supply will be maintained through adherence to the existing requirement to maintain the staff level gauge in Lake Kaniere of -0.2m RL, being 100mm above the minimum domestic supply operating level.

Natural Character/Amenity Values/Landscape Values

Relevant Objectives and policies include:

- **RPS: Objective 9.3** (Chapter 9 ‘habitats and Landscapes’) and associated **Policies 9.1** and **9.4**.
- **TRWMP: Objectives 5.3.2** (‘Natural and Human Use Values’) and **6.3.1** (‘Surface Water Quantity’), and **Policies 5.4.1(1)(d), 5.4.1C(b)** and **(e), 5.4.4, 5.4.5** and **6.4.3(a)**.
- **RAQP: Objective 7.3.1** (‘Dust’).
- **PRLWP: Objectives 6.2.2** (‘Natural and Human Use Values’) and **7.2.1** (‘Surface Water Quantity’),

- **WDP** and **Policies 6.3.1(1)(d), 6.3.3 (b) and (e), 6.3.6 and 7.3.3.**⁷ **Objectives 3.10.1, 3.10.2, and 3.10.3** ('Landscape'), and **Section 4.8 Policies A, B and C.**

Objective 9.3 and Policy 9.4 of the RPS, Policy 5.4.1(d) of the TRWMP, as well as Policy 4.8(B) within the WDP are considered to be of the most relevance to the enhanced scheme and are outlined below:

Objective 9.3 To preserve the natural features and landscapes of the West Coast from inappropriate subdivision, use and development.

Policy 9.4 Enable the continued development, use and maintenance of network utilities in or near habitats and landscapes.

Policy 5.4.1 In the management of any activity involving water to give priority to avoiding, in preference to remedying or mitigating:

(1) Adverse effects on:

(d) The significant natural character of wetlands, and lakes and rivers and their margins;

Policy 4.8(B) The contribution of indigenous vegetation to the landscape character of the district shall be recognised and its clearance controlled.

⁷ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Water Management Plan and therefore are not repeated below.

Lake Kaniere has recreational, amenity and natural character values to anglers, boat users, residents (both temporary and permanent), and walkers. There will be no effects on these recreational users of the Lake, as the enhanced scheme will have little discernable effects on lake levels, apart from slight increases in the extent of exposed lake edge.

The Kaniere Valley between Lake Kaniere and the McKays HEPS tailrace is a landscape area of high quality and high natural character. The enhanced scheme requires terrestrial vegetation removal for the new Kaniere race and possibly McKays deviation. This will have adverse effects on natural character and landscape. However, re-vegetation, offset planting and covenanting, and a comprehensive predator control plan will mitigate these impacts to a level that is considered acceptable.

The new elements of the McKays HEPS enhancement (power station enlargement, headpond and penstocks), and Kaniere HEPS enhancement (race, headpond, penstocks and power station), although man made, are visually contained and will not be readily apparent from public viewpoints. Any landscape and visual effects associated with the construction phase will be temporary.

Indigenous Flora and Fauna

Relevant Objectives and policies include:

- **RPS: Objective 9.1 and Policy 9.2** (Chapter 9 'habitats and Landscapes').

- **TRLRMP: Objectives 5.3.1(d) and (f), and Policies 4.4.1(e) and (i), 5.4.2(d),(e),(g) and (i)** (Chapter 5 Lake and River Bed Management).
- **PRLWP: Objectives 4.2.1(d) and (f), and Policies 3.3.1(e) and 4.3.2(d),(e),(g) and (i).**⁸
- **WDP: Objectives 3.7.1 and 3.7.3 and associated Policies 4.9 A, B and C.**

Objective 9.1 of the RPS, Policy 4.4.1 of the TRLRMP, and Objective 3.7.3 and Policy 4.9A of the WDP are considered to be of the most relevance to the enhanced scheme and are outlined below:

- Objective 9.1 To protect areas of significant indigenous vegetation and significant habitats of indigenous fauna*
- Policy 4.4.1(e) To manage the disturbance of land in order to avoid, remedy or mitigate any adverse effects on...*
(e) natural character and aquatic ecosystems;
(i) significant indigenous vegetation and significant habitats of indigenous fauna.
- Objective 3.7.3 To protect the integrity, functioning and health of indigenous ecosystems and maintain the current diversity of indigenous flora and fauna*
- Policy 4.9A Adverse effects on the integrity, functioning and health of natural habitats and ecosystems*

⁸ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Land and Riverbed Management Plan and therefore are not repeated below.

and indigenous species shall be avoided, or where avoidance is not practical, remedied or mitigated.

Ecological investigations have indicated that the originally proposed minimum residual flows of 0.2m³/s would be at the bottom end of the adequate flows for in-stream habitat. TPL has accordingly now adopted the proposed residual flow regime:

- Post Kaniere HEPS Enhancement
 - 0.3m³/s downstream of Lake Kaniere outlet
 - 0.4m³/s at Ward Road Bridge
 - 0.2m³/s downstream of McKays weir
- Post McKays Enhancement
 - 0.2m³/s downstream of Lake Kaniere outlet
 - 0.3m³/s at McKays weir
 - 0.5m³/s downstream of Kaniere Forks Station

The installation of fish screens at intakes, and fish passes, will ensure the safe passage of fish up and down the Kaniere River system. This will ensure the enhanced scheme meets a key management objective with regard to aquatic ecology.

Significant earthworks are required to construct the Kaniere and McKays HEPS enhancements, including within the bed of the Kaniere River, potentially resulting in direct disturbance and indirect effects. It is considered that any adverse effects on aquatic communities are able to be managed to an appropriate level through the EMP and adoption of relevant sediment control measures.

The construction of the Kaniere and McKays enhancements will require the clearance of 6ha of ecologically valuable vegetation communities and faunal habitat. It is proposed an ecologist will be involved on site during the detailed design stage in determining the construction corridor and race works, to ensure deviations are made around significant core vegetation communities where practicable.

In terms of mitigation of effects associated with the clearance of vegetation, a significant package of environmental offset is also being discussed with DoC. Further, comprehensive planting and rehabilitation will be developed and implemented as part of the LRP.

Social and Economic Wellbeing, Infrastructure and Energy

Relevant Objectives and policies include:

- **RPS: Objective 14 and Policy 14.1.**
- **TRWMP: Objectives 5.3.2 and 6.3.2, and Policy 5.4.1(1).**
- **PRLWP: Objectives 6.2.1 and 7.2.2, and Policy 6.3.2.⁹**
- **WDP: Objective 3.4.1 and Policy 4.6A.**

Objective 14.1 of the RPS, Policy 5.4.1(1) of the TRWMP, Policy 6.3.2 of the PRLWP, and Policy 4.6A of the WDP are considered to be of the most relevance to the enhanced scheme and are outlined below:

⁹ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Water Management Plan and therefore are not repeated below.

Policy 14.1 Recognise the importance of an adequate supply of energy resources for the needs of people and communities on the West Coast, provided that this is not inconsistent with other policies.

*Policy 5.4.1(1) In the management of any activity involving water to give priority to avoiding, in preference to remedying or mitigating:
(1) Adverse effects on:...
While taking into account the benefits to be derived from the use and development of renewable energy.*

Policy 6.3.2 To take into account the benefits from the use and development of renewable energy, including the social and economic benefits.

Policy 4.6A The efficient provision and development of all future services and infrastructure within the District shall be encouraged

A significant benefit of the enhanced scheme is that it will enable the West Coast community to become more self sufficient in power generation and will meet increasing commercial and domestic electricity demand.

The construction and operation of the enhanced scheme will accordingly enable present and future generations in the West Coast region to provide for their social and economic well-being. The enhanced scheme will also increase the level of security of electricity supply, and support the continued growth of communities and businesses within the Region. Any potential or actual environmental effects associated with the construction

and operation of the enhanced scheme will also be avoided, remedied or mitigated through a range of techniques detailed in Section 5 of this AEE.

The enhanced scheme will also allow more efficient generation from existing infrastructure and using a renewable resource, the significant benefits of which (as acknowledged and recognised in both the PRLWP and WDP) have already been outlined in this AEE.

Cultural and Heritage Values

Relevant Objectives and policies include:

- **RPS: Objectives 5.2(a) and 6, and Policies 5.1.1 and 5.2.1.**
- **TRWMP: Objective 5.3.3 and Policy 5.4.1(1)(h).**
- **TRLRMP: Policies 4.4.1(h) and 5.4.2(c).**
- **PRLWP: Objective 6.2.3, and Policies 6.3.1(1)(h), 3.3.1(h) and 4.3.2(c).¹⁰**
- **WDP: Objective 3.5.2 and Policy 4.5A.**

Objective 5.2(a) and Policy 5.2.1 of the RPS, Policy 5.4.1(c) of the TRWMP, and Objective 3.5.2 and Policy 4.5A of the WDP are considered to be of the most relevance to the enhanced scheme and are outlined below:

¹⁰ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Land and Riverbed Management Plan and Regional Water Management Plan and therefore are not repeated below.

Objective 5.2(a) Recognise and provide for the relationship of Poutini Ngāi Tahu, their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga within the West Coast

Policy 5.2.1 Provide for the protection of ancestral land, waahi tapu, water, sites and other taonga in consultation with Poutini Ngāi Tahu

Policy 5.4.1(1) In the management of any activity involving water to give priority to avoiding, in preference to remedying or mitigating:

(1) Adverse effects on:

- *Spiritual and cultural values and uses of significance to Poutini Ngāi Tahu identified in Schedule 1C;*
- *(h) significant historic heritage*

Objective 3.5.2 To recognise and provide for the relationship, culture and traditions of tangata whenua with their ancestral lands, water, waahi tapu and other taonga

Policy 4.5A Buildings, places and items of significant historic, cultural or scientific interest and their relationship with places in Westland District should be preserved and maintained

There are no recorded sites of Maori origin within or in the vicinity of the Kaniere or McKays HEPS enhancements. Whilst it is considered unlikely that significant archaeological remains associated with Maori occupation and activity will be found in this area, it cannot be ruled out. An appropriate Accidental Discovery Protocol will accordingly be adopted.

With respect to potential effects on the section of the existing Kaniere race that is to be retired, a number of mitigation measures are proposed, including the creation of visitor recreational and heritage interpretation experiences, preservation of sections of the existing race in working order where practicable and future remedial work.

As detailed in Section 4 of this AEE, TPL has consulted with iwi and runanga that hold mana whenua over the Kaniere catchment. It is clear from this consultation that tangata whenua have a close and enduring relationship with the lake, river and its catchment. All parties consulted have expressed a need for the river to be maintained as a viable, healthy and integral part of the environment. It is considered that the various mitigation measures outlined in Section 5, including improving connectivity, installation of fish screens and periodic flushing flows will maintain the freshwater quality and mahinga kai of the Kaniere River.

Natural Hazards

Relevant Objectives and policies include:

- **RPS: Objective 11, and Policy 11.2.**
- **TRWMP: Objective 5.3.4 and Policy 5.4.1(2).**
- **PRLWP: Objective 6.2.4 and Policy 6.3.1(2).**¹¹
- **WDP: Objective 3.13.1 and Policy 4.14A.**

¹¹ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Water Management Plan and therefore are not repeated below.

Objective 5.3.4 of the TRWMP, and Policy 4.14A of the WDP are considered to be of the most relevance to the enhanced scheme and are outlined below:

Objective 5.3.4 To avoid the exacerbation of any natural hazards or the creation of a hazard associated with the West Coast's water bodies

Policy 4.14A Development and subdivision for the purposes of accommodating and/or servicing people and communities should avoid areas of known natural hazard risk unless the risk of damage to property, infrastructure, community disruption and injury, and potential loss of life can be adequately mitigated

The enhanced scheme will not in itself result in the exacerbation of natural hazards. Land stability should not be affected by the proposed changes to the diversion of surface water.

Structures and works in the bed of the Kaniere River are required including modification of intake structures, replacement of flumes, the installation of environmental flow bypasses and riverbank protection structures. The structures will be sized and engineered to ensure that they do not exacerbate flooding, create scouring or slope instability.

Air Quality

Relevant Objectives and policies include:

- **RPS: Objective 13.2.**

- **RAQP: Objective 7.3.1 and Policies 7.4.1, 7.4.2 and 7.4.3.**

Objective 7.3.1, and associated Policies 7.4.1 and 7.4.2 of the RAQP are considered to be of the most relevance to the enhanced scheme and are outlined below:

Objective 7.3.1 The protection of human health, property, structures and ecosystems from the adverse effects of discharges of dust to air.

Policy 7.4.1 Adverse effects of the deposition of dust will be avoided, remedied or mitigated by ensuring that any discharge of dust does not occur at a volume, rate or in a manner that could cause significant restriction of visibility or the soiling of property.

Policy 7.4.2 Adverse effects of suspended dust will be avoided, remedied or mitigated by ensuring that any discharge of dust does not occur at a volume, rate or in a manner that could cause an offensive or objectionable effect, including the impairment of human health.

The main potential effect on air quality resulting from the enhanced scheme is dust during the construction activities. The construction activity itself is temporary. The main measure proposed for mitigating the generation of dust and its effects is its suppression by watering. The cut to fill works will ensure that surplus soil is utilised within the enhanced scheme envelope and consequently construction traffic for spoil transport will be

minimal. The dispersed nature of residential occupation in the Kaniere Valley and their distance to the construction envelope will ensure that any nuisance effects associated with dust will be avoided. The consideration of nesting habitat and the staging of works will ensure that any effects on avifauna and aquatic biota are minimised as much as is practicable.

Public Access

Relevant Objectives and policies include:

- **TRLRMP: Policies 4.4.1(d) and 4.4.3(c).**
- **PRLWP: Policies 3.3.1(d) and 3.3.3(c).¹²**

Policy 4.4.3(c) of the TRLRMP is considered to be of the most relevance to the enhanced scheme and is outlined below:

Policy 4.4.3(c) To manage the disturbance of riparian margins to:
a. ensure that existing public access to water bodies is maintained or enhanced.

At times during the construction process public access will be restricted for safety reasons. These restrictions will be temporary.

The operation of the enhanced scheme will improve, rather than restrict, public access to the Kaniere race or river as a track will be constructed along the new section of race, which is currently inaccessible. In order to mitigate potential effects on walking and

¹² The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Land and Riverbed Management Plan and therefore are not repeated below.

mountain biking activities, TPL has confirmed that it will commit to the provision of further dual purpose walkway/mountain bike route along the majority of the new Kaniere race.

Land Disturbance

Relevant Objectives and policies include:

- **TRLRMP: Objective 4.3.1 and Policies 4.4.1, 4.4.2 and 4.4.3.**
- **PRLWP: Objective 3.2.1 and Policies 3.3.1, 3.3.2 and 3.3.3.**¹³

Policy 4.4.1 of the TRLRMP is considered to be of the most relevance to the enhanced scheme and is outlined below:

- Policy 4.4.1 To manage the disturbance of land in order to avoid remedy or mitigate any adverse effects on:*
- (a) the stability of land (e.g. slumping, subsidence or erosion), river banks and riverbeds;*
 - (b) water quality, including clarity, turbidity, and temperature changes and instream values;*
 - (c) changes in water level including water table;*
 - (d) public access to rivers, lakes and their margins;*

- (e) natural character, cultural, recreational and ecosystem values;*
- (f) soil depth and fertility;*
- (g) the integrity of property or structures.*

The main activity resulting in the disturbance of land is the earthworks components of the enhanced scheme. Earthworks are required to form the embankments of the races, storage ponds, and the McKays deviation. Earthworks will be carried out in accordance with sediment control plans to maintain the water quality.

The effects of the temporary earthworks activities are detailed in the sections above. The mitigation measures proposed include the adoption of an EMP to minimise any potential adverse effects associated with earthworks within and in close proximity to the construction envelope. Further, public access will be temporarily restricted within the construction envelope for safety reasons.

Archaeological authorities will be sought from HPT for the enhanced scheme to ensure that any potential effects of the proposed earthworks on cultural and heritage are adequately identified. An AMP for implementation during construction works will manage the investigation and recording of archaeological sites, monitoring of earthworks and protocols relating to the accidental discovery of unrecorded archaeological sites and artifacts.

¹³ The identified Objectives and Policies in the Proposed Regional Land and Water Plan are identical to those in the Regional Land and Riverbed Management Plan and therefore are not repeated below.

Where stands of vegetation are proposed to be removed to accommodate the enhanced scheme, revegetation and landscape rehabilitation will be undertaken.

6.3.3 Summary regarding relevant objectives and policies

The term “contrary” has been defined by caselaw as meaning repugnant, antagonistic, irreconcilable and sets its face against a proposal.

In light of the above, it is considered that the enhanced scheme is not contrary to (and indeed, in some respects is supported by) the relevant objectives and policies from the applicable planning documents. As such, the consent authority has jurisdiction to consider and (if considered appropriate) grant the present applications, in accordance with section 104D.

7 SUMMARY AND CONCLUSIONS

7.1 Proposed Development

TPL proposes to optimise and continue to operate the existing Kaniere and McKays HEPS. In addition, enhancements to both the Kaniere and McKays HEPS are proposed on the basis that the additional energy generated will provide not only for the more efficient utilisation of infrastructure and investment of the existing HEPS, but will also assist in ensuring security of supply for the West Coast, and specifically Hokitika.

7.2 Consents Required

The principal consents required for the enhanced scheme are outlined in **Schedule 3**. They relate to the diversion and discharge of water from the Kaniere River, the earthworks required to increase the capacity of the races and headponds, the construction and operation of the power stations and the damming of water for storage ponds.

Other consents are required for associated elements of the enhanced scheme such as intakes, structures in rivers, riverbed disturbance, earthworks and vegetation clearance and groundwater discharges.

7.3 Anticipated Effects

Any development proposal has the potential for both positive and negative environmental, social and economic effects. TPL has sought to ensure that the enhanced scheme will provide

optimum generation benefits, while minimising its potential environmental effects.

At the outset of project planning, TPL sought to establish a communication process that encouraged dialogue and robust discussion between the engineers charged with responsibility for designing the enhanced scheme and the specialist consultants it engaged to evaluate the environmental, social and economic effects of the engineering designs.

An on-going and iterative process was instigated which considered options from all perspectives, provided feedback to the designers, and generated modifications to the design proposals. At an early stage, TPL initiated communications with a wide variety of potentially interested parties; a process of consultation that continues and has provided useful information that TPL has also fed back into the design process.

As described in Section 5, potential environmental, social and economic effects have been thoroughly evaluated. Where the design results in notable areas of potential impact and no feasible alternative design is able to ameliorate those effects, the consultants have identified appropriate mitigation measures. In addition, a range of mitigation measures have been developed in consultation with stakeholders and interest groups. These measures have been accepted and committed to by TPL, as outlined in this AEE.

7.4 Mitigation Measures

Mitigation measures to address the key areas of potential environmental effects are described in detail in Section 5. Some of these measures are to be implemented via consent conditions, as outlined in Section 8 of this AEE.

7.5 Consultation

The approach to consultation taken by TPL is summarised in Section 4 of this AEE. TPL has undertaken a comprehensive consultative process, and will continue to have discussions with all stakeholders and parties expressing an interest in, or concern related to the enhanced scheme. Wherever possible, practical outcomes from the consultation process will be taken on board as part of the enhanced scheme design and implementation.

7.6 Overall Conclusions

The enhanced scheme will provide a substantial, secure and sustainable source of electrical power to the West Coast region. Planning and design has focused on minimising potential adverse effects and maximising potential opportunities through the design of the enhanced scheme and proffered conditions.

The enhanced scheme is considered to be not contrary to, and indeed in some respects supported by, the relevant planning documents. It is also consistent with various current government policy directives regarding greenhouse gas emissions and the promotion of renewable energy.

The proposal has also considered, and is consistent with, those relevant matters from Part 2 of the RMA.

Overall, it is concluded that the enhanced scheme accordingly represents the sustainable management of natural and physical resources in terms of the purpose of the RMA.

8 PROPOSED CONDITIONS

TPL will provide a suite of proposed recommended conditions in due course, which reflects and incorporates the various mitigation measures outlined in this AEE, and identified in **Schedule 5**.

Schedule 1 – Resource consents held for the existing scheme

| Consent No. | Consent Purpose/Condition | Date granted | Date expires |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|
| WLD860090 WLD860091 WLD860092 | <p>Water rights associated with the Kaniere Forks Power Station system consisting of an intake at Lake Kaniere, a race with stormwater and dewatering controls to the power station, and tailrace to Kaniere River.</p> <p>Take and use for hydro electric power generation 1m³/s at Lake Kaniere.</p> <p>Discharge 1m³/s at the Kaniere power station tailrace to the Kaniere River.</p> <p>Condition (a): <i>The diversion of water from Lake Kaniere shall be controlled to ensure a minimum of 200 litres per second flows through the control structure and down the natural channel of the Kaniere River, at all times.</i></p> <p>Condition (b): <i>No water shall be taken or diverted from Lake Kaniere for power generation use, when Lake level recedes to a staff gauge level of -0.2metres. This level equates to 100mm above the minimum operating level of the Hokitika Borough Councils water supply which is 1.3 metres below the spillway level.</i></p> | 26 May 1986 | 26 May 2111 |
| WLD860093 WLD860094 WLD860095 WLD860096 WLD860097 WLD860098 WLD860099 | <p>Water rights associated with the Mackays (sic) Creek power station system, consisting of a control weir on Lake Kaniere, an intake system on Kaniere River, a race with stormwater and dewatering controls to the power station, and tailrace to the Kaniere River.</p> <p>Take and use for hydro electric power generation 5m³/s at the Kaniere River and 1m³/s tributarys (sic).</p> <p>Discharge 6m³/s at the McKays power station tailrace to the Kaniere River.</p> <p>Condition (a): <i>The diversion of water from Lake Kaniere shall be controlled to ensure a minimum of 200 litres per second flows through the control structure and down the natural channel of the Kaniere River, at all times.</i></p> <p>Condition (b): <i>No water shall be taken or diverted from Lake Kaniere for power generation use, when Lake level recedes to a staff gauge level of -0.2metres. This level equates to 100mm above the minimum operating level of the Hokitika Borough Councils water supply which is 1.3 metres below the spillway level.</i></p> <p>Condition (c): <i>The diversion of water from the Kaniere River shall be controlled to ensure a minimum of 200 litres per second flows through the control structure and down the natural channel of the Kaniere River, at all times.</i></p> | 26 May 1986 | 26 May 2111 |

Schedule 2 – Key elements of the enhanced scheme

| Element/Chainage | Description |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0m Intake Gates | Construction of new intake gates to increase abstraction to Kaniere race from 1m ³ /s to 8m ³ /s. Removal of accreting river bank accumulation. |
| 20m Armco Culvert and Hans Bay Road Tunnel | Existing tunnel replaced with larger 8m ³ /s capacity. |
| 200m to 8892m Kaniere Race | <p>A wider and deeper race will be cut out of the existing race alignment for a distance of about 540m from the Landing within a relatively narrow 15m wide construction corridor. The construction corridor to a Chainage of 1230m will then increase to a width of 30m and continue to follow the existing race alignment.</p> <p>From 1230m to 1990m the enhanced scheme race will follow a new alignment following the existing transmission line route within a construction corridor of some 30m.</p> <p>From 1990m to Ward Road (Chainage 2700m) the enhanced scheme race will continue its alignment following the transmission line route within a construction corridor of some 20m. Three buffer storage areas of 0.2ha will be developed within this section of the enhanced scheme race.</p> <p>Construct two x 0.2ha buffer storage headponds (Chainage 1000m and 16000m).</p> <p>Typical cross section: a 7m wide canal tapering over a depth of 2m to 5m in width, and maintenance of a 4m access path. An easement of up to 25m will be required for the length of the canal to ensure provision of embankments as needed.</p> |
| Tunnels 20m No1 Tunnel / 638m No2 Tunnel / 2243m No3 Tunnel (Scotties) / 2905m No 4 Tunnel / 3513m No 5 Tunnel / 3598m No 6 Tunnel / 3743m No 7 Tunnel / 4285m No 8 Tunnel (Sandstone & Rock) / 4659m No 9 Tunnel / 4782m No 10 Tunnel / 5113m No 11 Tunnel (2.7km) / 7918 No 12 Tunnel / 8654m No 13 Tunnel | Tunnels beyond Ward Road to be decommissioned. That is Tunnels Nos 5 – 13. |
| Flumes 69m Boxed race flume 'Silver and Red' / 261m No 1 Boxed Flume / 600m No 2 Boxed Flume (Hatchery) / 1226m No 3 Flume (Long Flume) / 2434m No 4 Boxed Flume / 2598m No 5 Boxed Flume / 3454m No 6 Boxed Flume / 3503m No 7 Boxed Flume / 3590m No 8 Boxed Flume / 3730m No 9 Boxed Flume / 3920m No 10 Boxed Flume / 4021m No 11 | Flumes beyond Ward Road to be decommissioned. That is Flumes Nos 6 – Rat House Flume (8892m). |

| Element/Chainage | Description |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Boxed Flume / 4056m No 12 Boxed Flume / 4141m No 13 Boxed Flume / 4212m No 14 Combination Boxed Flume 4691m Boxed Flume and Open Cut race / 4930m Boxed Flume / 5034m Boxed Flume / 5119m Flume with bywash / 7849m Johnsons Flume / 8892m Boxed Flume (Rat House) | |
| Ward Road 3000m Ward Road Tunnel Ward Road (No4) Spill way Ward Road Screens, flume, bywash | Ward Road tunnel to be enlarged to capacity of 8m ³ /s. Ward Road No4 Spillway and Screen decommissioned. |
| Ward Road HEPS 3000m | Either: <ul style="list-style-type: none"> • New 110m penstock to be commissioned (Option 1); or • A continuation of the existing race alignment between Chainage 2700m to 3000m and a much shorter penstock connection to the HEPS (Penstock Option 2) to <p>Commissioned Ward Road HEPS. Spatial extent being 1,600m² of compound including building, car parking and landscaping. Vehicle access to be obtained from Ward Road. Temporary works and laydown area to be re-vegetated at the completion of the commissioning of the Scheme.</p> |
| Spill ways 1590m No 1 Spill way / 1900m No 2 Sill way / 2125m No 3 Spill way / 4600m No 5 Spill way / 4800m No 6 Spill way | |
| Miscellaneous 1750m Jump Over / 2200m No1 Bywash / 5125m No2 Grating | Decommissioned |
| 9259m Steel Penstock | Decommissioned. |
| 9633m Kaniere Forks Power Station | Decommissioned and dewatered. Kaniere Power Station to be adapted for heritage interpretation and recreation area. New Ward Road Power Station to be developed at 411720, 811600. |
| 9650m Tailrace discharge to Kaniere River | Decommissioned. |
| 000m McKays Weir Intake | Weir height increased by 5cm for all but one bay so that environment flows are better controlled and measured. Installation of v-notch weir below the lower bay so that environmental flows can be measured. |
| 000m to 2020m Race | Minor repairs, maintenance and local improvement of the existing canal to remove debris and vegetation, smooth the canal surface, and remove high spots. Volume of race suitable for 8m ³ /s without cut and fill. Some fill to increase low spots at a maximum of 0.5m. |
| Flumes 795m Coal Creek Flume | Replaced with three new 1300mm pipes. Spill facility will be retained. |
| Tunnels | Either: |

| Element/Chainage | Description |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2810m McKays Tunnel | <ul style="list-style-type: none"> • Repair, refurbish and enlargement to capacity of 9m³/s; or • alternative alignment will be provided within a construction corridor of some 40m with some 550,000m³ of excavated material placed in two area of privately owned land on the western side of Blue Bottle Creek. |
| Miscellaneous 2020m Greens Creek inlet (which adds additional 1m ³ /s to 8m ³ /s flow). | Repair undermined wall. Race downstream sized to accommodate 9m ³ /s |
| 3948m McKays HEPS | <p>New 70m above ground penstocks (double pipe penstocks of approx 1.4m diameter) to be commissioned between the constructed 7,600m³ headpond (2.5m depth) and increased capacity McKays HEPS. Existing underground penstock to be decommissioned once new penstocks are installed.</p> <p>Increasing the existing McKays Creek Power Station capacity from 6m³/s to a peak of 9m³/s (which includes the existing 1m³/s take from Blue Bottle Creek), through the establishment of an additional HEPS to generate electricity from the augmented water diversion.</p> |
| McKays Tailrace | Increase the existing discharge from McKays Creek Power Station from 6m ³ /s to 9m ³ /s. The 750m length of the tailrace will be unaltered. |

Schedule 3 – Compliance assessment of resource consents required for the enhanced scheme

| Activity | Description/Location | Activity Status | Rule |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------|
| WEST COAST REGIONAL COUNCIL – TRANSITIONAL WATER MANAGEMENT PLAN | | | |
| Taking and use of surface water | Water take from Lake Kaniere (8m ³ /s) Water take from Kaniere River (8m ³ /s) with additional take from Blue Bottle Creek (1m ³ /s) | Controlled | Rule 12.6.1 |
| Take and use of surface water | Take of surface water that reduces the mean annual low flow of the river minimum flow to less than 75% | Discretionary | Rule 12.1.7 |
| Damming of surface water | Damming for hydro-electric purposes | Controlled | Rule 12.6.1 and 12.4.4 |
| Discharge of water and trace elements to water | Discharge of water through diversion gates and/or over the lake weir to Kaniere River at Ward Road power station and McKays power station | Controlled | Rule 12.6.1 |
| | Discharge of water for fish passage from fish screens at the McKays intake, the weir and control boards at the Lake Kaniere outlet | Discretionary | Rule 12.5.10 |
| Discharge of stormwater to water | Discharge from sediment control works at various locations | Discretionary | Rule 12.5.10 |
| Taking and use of groundwater | Seepage of ground water into races | Restricted discretionary | Rule 12.2.5 |
| | Seepage and discharge of groundwater as a result of the construction works for the HEPS | Restricted discretionary | Rule 12.2.5 |

| Activity | Description/Location | Activity Status | Rule |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|
| Diversion of surface water | Diversion of water from Lake Kaniere for hydro-electric purposes | Controlled | Rule 12.6.1 |
| | Diversion of water from Kaniere River for hydro-electric purposes | Controlled | Rule 12.6.1 |
| WEST COAST REGIONAL COUNCIL – TRANSITIONAL LAND AND RIVERBED MANAGEMENT PLAN | | | |
| Use, erection, placement, repair, maintenance, extension, alteration, replacement reconstruction, demolition or removal of structure in the bed of the river | Modification of the intake structure at Lake Kaniere, install environmental flow bypass, install new tunnel and culvert, expand existing Kaniere race, construct and commission new penstock, power station and tailrace at Ward Road, decommissioning and dewatering penstocks at Kaniere power station | Discretionary | Rule 6.2.6.1 |
| | Replace Coal Creek flume, repair, refurbish and enlarge McKays tunnel, install new penstocks and decommission existing penstocks, construct a new McKays power station | Discretionary | Rule 6.2.6.1 |
| Works (disturbance) in bed of a stream/river | Construction and maintenance of intake structure and associated river bank protection structures at Lake Kaniere | Discretionary | Rule 6.2.6.1 |
| | Construction and related works for the rehabilitation of the existing Kaniere Forks Power Station site and river bank protection structures | Discretionary | Rule 6.2.6.1 |
| | Construction and maintenance of intake structure and associated stream and river bank protection | Discretionary | Rule 6.2.6.1 |

| Activity | Description/Location | Activity Status | Rule |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|
| | structures at McKays weir | | |
| | Construction and related works for the rehabilitation of the existing McKays Power Station site and river bank protection structures | Discretionary | Rule 6.2.6.1 |
| | Construct temporary bridges and culverts during construction | Discretionary | Rule 6.2.6.1 |
| | Maintenance of intake structures and construction of fish passage and screen | Discretionary | Rule 6.2.6.1 |
| Earthworks | Construction of the two headponds and associated structures at the new Ward Road power station | Discretionary | Rule 6.1.4.1 |
| | Construction and related works for the expansion of the existing headpond at McKays power station | Discretionary | Rule 6.1.4.1 |
| | Construction of Kaniere race, penstocks, power station and tail race and decommissioning and dewatering penstocks | Discretionary | Rule 6.1.4.1 |
| | Construction of access tracks and roads | Discretionary | Rule 6.1.4.1 |
| | Disposal of excess soil to ground | Discretionary | Rule 6.1.6.1 |
| | Construction of the HEPS in riparian margins | Discretionary | Rule 6.1.6.1 |
| | Construction of the HEPS including earthworks of greater than 20,000m ³ | Discretionary | Rule 6.1.6.1 |

| Activity | Description/Location | Activity Status | Rule |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|
| Vegetation disturbance | Construction of the HEPS in the riparian margins | Discretionary | Rule 6.2.6.1 |
| WEST COAST REGIONAL COUNCIL – TRANSITIONAL PLAN FOR DISCHARGES TO LAND | | | |
| Discharge of stormwater to ground | Discharge of stormwater from power station | Controlled | Rule 10.2.16 |
| | Discharge of stormwater from roads and access tracks in various locations within the construction envelope | Discretionary | Rule 10.2.17 |
| | Discharge of stormwater from the temporary storage of hazardous substances during construction within the construction envelope | Discretionary | Rule 10.2.28 |
| WEST COAST REGIONAL COUNCIL – AIR PLAN | | | |
| Discharge of contaminants to air | Stockpiling, conveying and handling of gravel, sand soil, rock, sawdust or wood chops for the HEPS as a whole | Discretionary | Rule 10.4.16 |
| | Construction of access tracks/road | Discretionary | Rule 10.4.16 |
| | Earthworks and construction within the construction envelope | Discretionary | Rule 10.4.16 |
| WEST COAST REGIONAL COUNCIL – PROPOSED REGIONAL LAND AND WATER PLAN | | | |
| Taking and use of surface water | Water take from Lake Kaniere (8m ³ /s) Water take from Kaniere River (8m ³ /s) with | Controlled | Rule 51 |

| Activity | Description/Location | Activity Status | Rule |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------|
| | additional take from Blue Bottle Creek (1m ³ /s) | | |
| Take and use of surface water | Take of surface water that reduces the mean annual low flow of the river minimum flow to less than 75% | Discretionary | Rule 54 |
| Damming of surface water | Damming for hydro-electric purposes | Controlled | Rule 51 |
| Discharge of water and trace elements to water | Discharge of water through diversion gates and/or over the lake weir to Kaniere River at Ward HEPS and McKays HEPS | Controlled | Rule 51 |
| | Discharge of water for fish passage from fish screens at the McKays intake, the weir and control boards at the Lake Kaniere outlet | Discretionary | Rule 69 |
| Discharge of stormwater to water | Discharge from sediment control works at various locations | Discretionary | Rule 69 |
| Taking and use of groundwater | Seepage of ground water into races | Restricted discretionary | Rule 53 |
| | Seepage and discharge of groundwater as a result of the construction works for the HEPS | Restricted discretionary | Rule 53 |
| Diversion of surface water | Diversion of water from Lake Kaniere for hydro-electric purposes | Controlled | Rule 51 |
| | Diversion of water from Kaniere River for hydro-electric purposes | Controlled | Rule 51 |

| Activity | Description/Location | Activity Status | Rule |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Use, erection, placement, repair, maintenance, extension, alteration, replacement reconstruction, demolition or removal of structure in the bed of the river | Modification of the intake structure at Lake Kaniere, install environmental flow bypass, install new tunnel and culvert, expand existing Kaniere race, construct and commission new penstock, power station and tailrace at Ward Road, decommissioning and dewatering penstocks at Kaniere power station | Discretionary | Rule 36 |
| | Replace Coal Creek flume, repair, refurbish and enlarge McKays tunnel, install new penstocks and decommission existing penstocks, construct a new McKays power station | Discretionary | Rule 36 |
| Works (disturbance) in bed of a stream/river | Construction and maintenance of intake structure and associated river bank protection structures at Lake Kaniere | Discretionary | Rule 36 |
| | Construction and related works for the rehabilitation of the existing Kaniere Forks Power Station site and river bank protection structures | Discretionary | Rule 36 |
| | Construction and maintenance of intake structure and associated stream and river bank protection structures at McKays weir | Discretionary | Rule 36 |
| | Construction and related works for the rehabilitation of the existing McKays power station site and river bank protection structures | Discretionary | Rule 36 |
| | Construct temporary bridges and culverts during construction | Discretionary | Rule 36 |

| Activity | Description/Location | Activity Status | Rule |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| | Maintenance of intake structure, construction of fish passage and screen | Discretionary | Rule 36 |
| Earthworks | Construction of the two headponds and associated structures at the new Ward Road power station | Discretionary | Rule 11 |
| | Construction and related works for the expansion of the existing headpond at McKays power station | Discretionary | Rule 11 |
| | Construction of Kaniere race, penstocks, power station and tail race and decommissioning and dewatering penstocks | Discretionary | Rule 11 |
| | Construction of access tracks and roads | Discretionary | Rule 11 |
| | Disposal of excess soil to ground | Discretionary | Rule 16 |
| | Construction of the HEPS in riparian margins | Discretionary | Rule 16 |
| | Construction of the HEPS including earthworks of greater than 20,000m ³ | Discretionary | Rule 16 |
| Vegetation disturbance | Construction of the HEPS in the riparian margins | Discretionary | Rule 16 |
| Discharge of stormwater to ground | Discharge of stormwater from power station | Controlled | Rule 51 |
| | Discharge of stormwater from roads and access tracks in various locations within the construction envelope | Discretionary | Rule 69 |

| Activity | Description/Location | Activity Status | Rule |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------|
| | Discharge of stormwater from the temporary storage of hazardous substances during construction within the construction envelope | Discretionary | Rule 69 |
| WESTLAND DISTRICT COUNCIL – DISTRICT PLAN | | | |
| Construction, operation and maintenance of the HEPS as a whole | Construction, operation and maintenance of HEPS for hydro-electric purposes | Non-complying | Rule 5.6.2.1 ¹⁴ |
| | Modification of the intake structure at Lake Kaniere, install environmental flow bypass, install new tunnel and culvert, expand existing Kaniere race, construct and commission new penstocks, power station and tailrace at Ward Road, decommissioning and dewatering penstocks at Kaniere power station | Discretionary | Rule 5.6.2.2 (c) |
| | Replace Coal Creek flume, repair, refurbish and enlarge McKays tunnel, install new penstocks and decommission existing penstocks, construct a new McKays power station | Discretionary | Rule 5.6.2.2 (c) |
| | Indigenous vegetation clearance of more than 2000m ² from conservation land, or an area of greater than 5ha of indigenous vegetation | Non-complying | Rule 5.6.2.1 |

¹⁴ A conservative view of the Westland District Plan rules for the rural policy unit establishes that the construction, operation and maintenance of HEPS for hydro-electric purposes is a non-complying activity. However, it is noted that Rule 5.6.2.2(C) states that “any activity which complies with the standards for discretionary activities (see table 5.7), except mining” is a discretionary activity. The standards in Table 5.7 relate to the bulk, height and location of buildings, number of dwellings on site, noise, heritage issues, and signs. The construction and operation of the proposed power station and associated structures, and activities associated with hydro-electric power generation will meet the discretionary standards.

Schedule 4 – Summary of main features within the existing environment

| Context | Feature | Characteristic | Description |
|----------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Landscape | | | |
| Kaniere River Valley | Lake Kaniere | Length: 8km Width: 2km Depth: Up to 195m | At 22km ² , Lake Kaniere is second only to Lake Brunner in size among the West Coast's lakes. The lake is surrounded by native bush except for two cleared areas of farmland on the eastern shore. |
| | Kaniere River, Lake to McKays tailrace | Length: 9km Total catchment 111km | Generally, visually contained for the length of the scheme. The River, displays variation in character and width. Channel width at Lake outlet of 3-4m, further north at Ward Road some 7m in width, north of McKays with 15m wide, and downstream of McKays tailrace 25m wide. |
| | Flow | <ul style="list-style-type: none"> - At Lake outlet: 6.1m³/s (mean) 5.5m³/s (median); - Upstream McKays Weir: 6.8m³/s (mean) 5.6m³/s (median); - Downstream of McKays Weir: 2.9m³/s (mean) 1.4m³/s (median); - Downstream Kaniere tailrace: 5.1m³/s (mean) 2.8m³/s (median); - Downstream McKays tailrace: 10.8m³/s (mean) 7.5m³/s (median). | Flows from Lake Kaniere to McKays Tailrace are regulated by the existing Kaniere HEPS and McKays HEPS |
| | Instream Character | At the Lake Kaniere outlet | Concrete weir (concrete crest 26.5m in length, and 11m top log section), and control gates that regulate 1m ³ flows to race with the balance diverted to Kaniere River. These utilitarian structures are surrounded by, and contained within, surrounding native bush. The River flows as a series of medium to fast riffle/runs, with a substrate dominated by cobbles, gravels and boulders and occasional patches of sand. |
| | | At the McKays weir | Upstream of the weir the river flows through steep, fast velocity riffle runs. Substrate dominated by boulders, gravel and cobbles. The riparian vegetation on the true right and left consists of native bush. The concrete weir spans some 39m across the river, with a crest of 2.07m. |
| | | At the Kaniere Forks discharge | The river upstream of the tailrace flows through a wide medium velocity riffle/run. Substrate is dominated by cobbles, gravels and also large boulders, some of which are exposed. Riparian vegetation on the true right and left consists of native and exotic scrub including gorse, tutu and broom. |
| | | Below the McKays tailrace | The River flows through wide medium velocity riffle runs. Riparian vegetation on each side consists of native bush. |

| Context | Feature | Characteristic | Description |
|-------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Water Quality | The river for the length of the scheme has generally good water quality, characterised by high dissolved oxygen saturation, and generally low nutrients. Water temperatures are moderate with water temperatures below McKays weir exceeding 20°C on several days in February 2010. | Periphyton were surveyed as visible at all sites along the Kaniere River. Periphyton biomass (chlorophyll <i>a</i>) did not exceed aesthetic recreation guidelines at any sites. The benthic macro-invertebrate community is comparable to that of similar habitats on the West Coast. Seventeen fish species have been recorded in the Kaniere River catchment, 13 of these native and four introduced. |
| Kaniere Race | Race Structure | In operation for over 100 years. | Man made structure that over the years has become integrated into its setting. Race is visible for much of the adjoining 9km long recreational Race Walk. The surrounding area has high natural character values in the context of the wider landscape. |
| Hydrology | | | |
| Lake Kaniere Weir | Flow | | Mean Flow: 1.75m ³ Maximum (2002 – 2008): 37m ³ |
| Land Use | | | |
| Historical | Maori | Lake Kaniere and the Kaniere River Valley was an important transport route, and also provided a source of mahinga kai. Gold Mining and early electricity generating. | Travel route for Ngati Wae Wae, with the Lake and entire river valley length used by iwi before and after contact with Europeans. The River Valley, as centered around Kaniere township was the local base for gold fields in the area with the gold mining rush that commenced in the area circa 1965. The Kaniere race was originally built in 1875 to supply water to gold mining claims at Kaniere Forks. The race was modified commencing 1909 to produce electricity at the Kaniere Forks HEPS. |
| | Industrial | | |
| Present | Vegetation | Kaniere and McKays races and associated HEPS. Given this infrastructure was installed some 100 and 80 years ago, respectively, with the exception of small localised maintenance works the majority of habitats are either continuing to actively regenerating, or remain primary rimu/kamahi forest. From Ward Road to the Kaniere HEPS penstocks, manuka shrubland is replaced by primary mixed podocarp/kamahi-quintina forest which also contains mature rimu and miro trees. Private farmland adjoins parts of the McKay's race, | Intake and race passes through a diverse, intact primary rimu/kamahi forest. Beyond this a 20m wide power line has been cleared and extends to Ward Road. Area is of high ecological value for many reasons including its representativeness, intactness, size and role it has in providing an ecological corridor. Intake and race structure is in modified cleared land, with the race margins being |

| Context | Feature | Characteristic | Description |
|---------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | with some secondary kamahi forest. | dominated by rough exotic pastures with colonizing gorse and manuka. Further from the race edges, contains regenerating mainly secondary rimu/kamahi forest. |
| | Birds | | Forest areas have been fragmented by farming practices. All the bird and animal species present are common in the wider area, and none are specifically restricted to the proposed development envelope. The ecological value of terrestrial habitats is high, with a number of 'At Risk' and 'Threatened' terrestrial bird species, including Long tailed cuckoo (naturally uncommon), western weka (declining), kea (naturally uncommon) and South Island fernbird (declining). |
| | Population | Resident population in the Hokitika Valley, which includes Lake Kaniere is 516. | |
| | Transport | Lake Kaniere Road is defined as a 'local road'. | Low traffic volumes associated with Lake Kaniere residents and tourist traffic. |
| | Industrial and Commercial | Water supply servicing Hokitika domestic and commercial land uses sourced from Lake Kaniere. | Diversion to the Kaniere HEPS is not to occur when lake levels recede to a staff gauge of -0.2m or lower. |
| | Recreation | No industrial or agricultural enterprises between the Kaniere race intake and discharge below McKays HEPS. Scenic reserves | |
| | | Lake Kaniere Scenic Reserve | The Scenic Reserve is over 7000 ha including most of the land from the lake to the top of the mountain peaks which surround it. |
| | | Walking The Kaniere race walkway follows the 9km open ware race from Lake Kaniere to Kennedy Creek | Located within Department of Conservation Estate the track is largely maintained by TPL. |
| | | Other hikes in the area include Kahikatea Forest Walk, Lake Kaniere Walkway and Mount Tūhua Track. Mountain Biking | |
| | | The Kaniere race walkway follows the 9km open ware race from Lake Kaniere to Kennedy Creek | The track is utilised all year round, particularly in the summer, and as a Grade 4+, mainly due to the last 5km of the track, caters more for intermediate mountain bikers. Located within Department of Conservation Estate the track is largely maintained by TPL. |
| | | Kayaking | |

| Context | Feature | Characteristic | Description |
|------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | The Kaniere River is not a renowned Kayaking river. Lake Boat Users | Infrequently used when river is in higher flows. |
| | | Fishing (Lake Based) Fishing (In River) | The lake Kaniere Yacht and Power Board Club undertake a number of organised activities from the Lake. The Lake has a reputation for its scenic qualities and isolation. High proportion of recreational fishing undertaken by boat given access limitations. Not considered to be a significant recreational resource given access issues and an absence of recreational fishery species. |
| Physical Setting | | | |
| Surface Waters | Kaniere River Kennedy Creek | Diversion of water: Kaniere River | Kennedy Creek enters the Kaniere River approximately 200m downstream of the Kaniere HEPS. |
| | Butchers Creek Bluebottle Creek | Diversion of water: Bluebottle and Greens Creek. | Butchers Creek enters the Kaniere River approximately 70m upstream of McKay's weir. Blue Bottle Creek enters the Kaniere River downstream of McKay's weir, some 75m upstream of the Kaniere Forks power station discharge. |
| | | | Weir intake on Bluebottle and diverts this into Greens Creek. Greens creek flows into the McKay race with a consented take from Bluebottle and Green creek tributaries of 1m ³ /s |
| Noise | | In the absence of road traffic and recreational motorised boating there are no major noise sources. | |
| Air Quality | | Ambient air quality is high given existing forested land cover, small population and absence of industrial activities. | |

Schedule 5 – Summary Tables of Mitigation and Effects

| Hydrology: Description of Impact | Environment | Effect | Mitigation |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Lake levels</p> <p>Mean lake level decreases from 0.89m to 0.35m (McKays HEPS enhancements only)</p> | <p>Diversion at a consented limit where 0.2m³/s is identified on the Lake Kaniere Staff gauge.</p> | <p>Maximum daily fluctuations in lake level would be 5cm (under full scheme enhancements, with no inflow), the largest changes in observed lake levels (10cm and greater) are due to natural increases.</p> | <p>Diversion at a consented limit where 0.2m³/s is identified on the Lake Kaniere Staff gauge.</p> <p>Effects post mitigation: Less than minor</p> |
| <p>River levels</p> <p>Simulated mean flow levels downstream of McKays Weir would decrease from 2.4m³/s (basecase) to 1.1m³/s (0.9 m³/s) for McKays HEPS enhancements only.</p> <p>Simulated mean flow levels downstream of the Lake Outlet would decrease from 6.1m³/s to 0.5m³/s.</p> | <p>Minimum flows of 0.2m³/s downstream of Lake Kaniere outlet and McKays weir.</p> | <p>Negligible impact on existing minimum flows from optimisation.</p> | <p>Minimum residual flow to be maintained through release management:</p> <ul style="list-style-type: none"> - Post Kaniere HEPS enhancement: <ul style="list-style-type: none"> • 0.3 cumecs downstream of Lake Kaniere outlet • 0.4 cumecs at Ward Road Bridge • 0.2 cumecs at McKays weir - Post McKays HEPS enhancement: <ul style="list-style-type: none"> • 0.2 cumecs downstream of Lake Kaniere outlet • 0.3 cumecs at McKays weir • 0.5 cumecs downstream of Kaniere Forks Station at McKays ford. <p>Effects post mitigation: Minor adverse effects (enhancement scheme)</p> |

| Aquatic Ecology: Description of Impact | Environment | Effect | Mitigation – without implementing enhanced scheme | Mitigation KNF Enhancements (only) | Mitigation MKY Enhancements (only) |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water temperature: Increased diversion of the Kaniere River, and consequential increased frequencies of lower residual flows. | Water temperatures in the river are naturally high during times in summer. | Increase in frequency of lower residual flows in Kaniere River can increase water temperature, and restrict sensitive aquatic species. Impact potentially more than minor. | Effects negligible | Residual flow to be maintained through release management: <ul style="list-style-type: none"> • 0.3 cumecs downstream of Lake Kaniere outlet • 0.4 cumecs at Ward Road Bridge. • 0.2 cumecs below McKays weir Temperature monitoring and associated flow releases if water temperature monitoring indicates high temperatures. By way of Condition: if water temperature monitoring indicates mean daily water temperatures exceed those at the lake outlet by 3 degrees or more at temperatures of 20 degrees and above at the lake outlet for a period of more than 24 hours between the months October and May inclusive. No more than minor adverse effects (enhanced scheme) – to be confirmed through monitoring | Residual flow to be maintained through release management: <ul style="list-style-type: none"> • 0.2 cumecs at Lake Kaniere outlet • 0.3 cumecs at McKays weir • 0.5 cumecs downstream of Kaniere Forks Station at McKays Ford. Temperature monitoring and associated flow releases if water temperature monitoring indicates high temperatures. By way of Condition: if water temperature monitoring indicates mean daily water temperatures exceed those at the lake outlet by 3 degrees or more at temperatures of 20 degrees and above at the lake outlet for a period of more than 24 hours between the months October and May inclusive. No more than minor adverse effects (enhanced scheme) – to be confirmed through monitoring |
| Increase in filamentous algae: Increased diversion of the Kaniere River, and consequential increased frequencies of lower residual flows. | Surveys indicate a good water quality. | More than minor impact, through an increase in frequency of lower residual flows in Kaniere River | Effects negligible | As above. Flushed flow effect to generate a massed flow of 8m ³ /s. No more than minor adverse effects (enhanced scheme) – to be confirmed through monitoring | As above. Flushed flow effect to generate a massed flow of 8m ³ /s. No more than minor adverse effects (enhanced scheme) – to be confirmed through monitoring |

| Aquatic Ecology: Description of Impact | Environment | Effect | Mitigation – without implementing enhanced scheme | Mitigation KNF Enhancements (only) | Mitigation MKY Enhancements (only) |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reduced connectivity | A number of 'pinch points' of potentially insufficient depth for fish passage. | Can restrict sensitive aquatic species. Increase in frequency of lower residual flows in Kaniere River. Impacts are considered minor to more than minor. | Monitoring to confirm if channel modifications are necessary, especially at Blue Bottle weir to remove pinch points at low flows. Investigate need for residual flow sufficient to main connectivity and habitat downstream of intake for Blue Bottle Creek. Monitor fish communities upstream and downstream of potential instream barriers to identify any impacts on fish passage. Effects post mitigation: Minor positive effects (existing envelope) | Residual flow to be maintained through release management: <ul style="list-style-type: none"> • 0.3 cumecs downstream of Lake Kaniere outlet • 0.4 cumecs at Ward Road Bridge • 0.2 cumecs below McKays weir Minor adverse effects (KNF Enhancements) | Residual flow to be maintained through release management: <ul style="list-style-type: none"> • 0.2 cumecs at Lake Kaniere outlet • 0.3 cumecs at McKays weir • 0.5 cumecs downstream of Kaniere Forks Station at McKays Ford. Minor adverse effects (MKY Enhancements) |
| Fish Passage (natives) | Artificial barriers to upstream fish passage Potential entrainment of fish in tailrace during upstream mitigation. Potential entrainment of fish in canals during | Reduction in Lake Kaniere spill (35% for enhanced scheme) | Provide native fish passes at McKays weir and lake outlet weir. Installation of 20mm fish screens and, if necessary , bypass returns at Kaniere intake and McKays weir, and at Blue Bottle Creek intake. [Bypass probably not necessary at Blue Bottle and Kaniere intakes depends on engineering] Installation of fish screens / return channels to impede fish entry into McKays HEPS tailrace. | Following only to be implemented subject to consent for enhanced Kaniere Scheme. Installation of 20mm fish screens and bypass returns to river at Wards intake. Installation of fish screens/return channels to impede fish entry into Wards and McKays HEPS tailrace, and/or undertake trap and transfer operation from below McKays tailrace and also McKays and Kaniere Weirs to make a concerted effort to better provide passage to alternative locations to Lake | Following only to be implemented subject to consent for enhanced McKays Scheme. Installation of 20mm fish screens and bypass returns to river at Wards intake. Installation of fish screens/return channels to impede fish entry into McKays HEPS tailrace, and/or undertake trap and transfer operation from below McKays tailrace and also McKays and Kaniere Weirs to make a concerted effort to better provide passage to alternative locations to Lake Kaniere as |

| Aquatic Ecology: Description of Impact | Environment | Effect | Mitigation – without implementing enhanced scheme | Mitigation KNF Enhancements (only) | Mitigation MKY Enhancements (only) |
|---------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | downstream migration and possible turbine mortality. | | <p>Effects post mitigation: Minor positive effects (existing envelope)</p> | <p>Kanieri as opposed to relying solely on barrier passage. Alternatively to trap and transfers at the weir provide for passage though fish pass. Provide enhanced flows to stimulate downstream eel passage during high rainfall events that don't result in any spill. Survey of tributaries of the Kanieri River to identify any other artificial barriers to native fish passage (e.g. engineered fords) No true right tributaries of the Kanieri River are to be captured by Wards Road canal.</p> <p>Minor adverse effects (enhanced scheme)</p> | <p>opposed to relying solely on barrier passage. Alternatively to trap and transfers at the weir provide for passage though fish pass. Provide enhanced flows to stimulate downstream eel passage during high rainfall events that don't result in any spill. Survey of tributaries of the Kanieri River to identify any other artificial barriers to native fish passage (e.g. engineered fords) No true right tributaries of the Kanieri River are to be captured by Wards Road canal.</p> <p>Minor adverse effects (enhanced scheme)</p> |
| Construction works associated with dewatering and excavation. | Well developed and stable Scheme envelope | Minor associated with increased sedimentation and other contaminants, and introduction of aquatic weeds or algae. | | <p><i>Environmental Management Plan</i> implemented and monitored to manage the range of construction effects such as sediment run off.</p> <p>Effects post mitigation: Less than minor.</p> | <p><i>Environmental Management Plan</i> implemented and monitored to manage the range of construction effects such as sediment run off.</p> <p>Effects post mitigation: Less than minor.</p> |

| Terrestrial Ecology: Description of Impact | Environment | Effect | Mitigation |
|-----------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Existing envelope maintenance | Well developed and stable Scheme envelope | Negligible | Weed monitoring and control protocol in consultation with DoC Effects post mitigation: Minor positive effects |
| Loss of plant and vegetation community | Largely within the existing scheme envelope and corridor for MKY Enhancements. | More than minor. Vegetation removed 3.7 ha (inclusive of 1.8 ha of low value gorse scrub on private land. Some 1.1 ha (excluding low value scrub) permanently lost as associated with the McKays tunnel deviation. | Rehabilitation and mitigation planting in accordance with <i>Revegetation Management Plan</i> . <i>Environmental Management Plan</i> implemented and monitored to manage the range of construction effects such as sediment run off. Works confined to existing envelope, and where not possible (such as the McKays tunnel deviation) confined to smallest construction envelope possible. For the McKays tunnel deviation: preconstruction monitoring to be undertaken to avoid bat roosting and adherence to appropriate vegetation clearance methods. Offset environmental compensation habitat may be provided. Effects post mitigation: No more than minor |
| | Ward Road HEPS will traverse outside of existing corridor. | More than minor. Vegetation removed 10.1 ha of which 4.9 ha permanently lost. It is noted that 5.2ha of vegetation removed is low value regenerating manuka under the existing transmission lines. | Appropriate level of offset environmental compensation to be provided. Offset environmental compensation habitat may be provided. Revegetation of existing Kaniere HEPS penstocks when decommissioned (Enhancement option only) |

| Terrestrial Ecology: Description of Impact | Environment | Effect | Mitigation |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Effects post mitigation: No more than minor |
| Lake based Avifauna | No change to operating range, although lake levels would have a higher frequency of low levels. | Increased shore exposure. | No mitigation considered necessary. Effects post mitigation: Negligible |
| Lake Kaniere riparian vegetation and wetlands | | Minimal changes in vegetation composition and structure. | No mitigation considered necessary. Effects post mitigation: Less than minor |
| Terrestrial Avifauna | Construction activities associated with enhancements. | No more than minor | Where practicable, avoid disturbance during nest periods. Detailed design and input from ecologist during construction to avoid large mature trees (McKays tunnel deviation and Wards Road – HEPS) Effects post mitigation: Less than minor |

| Landscape: Description of Impact | Environment | Effect | Mitigation |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Existing envelope maintenance, upgrade of surfaces for walking and mountain biking. | Well developed and stable Scheme envelope | Minor | Surface upgrade and maintenance of HEPS and race in consultation with DoC. Effects post mitigation: Minor positive effects |
| Simulated Median flow levels downstream of the Lake Outlet would decrease from 5.5m ³ /s to 0.2m ³ /s (Option 3). Increased diversion of the Kaniere River, and consequential increased frequencies of lower residual flows. | Minimum flows of 0.2m ³ /s downstream of Lake Kaniere outlet and McKays weir to be retained. | Minor effect on natural character of the river corridor. | Reconsenting effects negligible Minimum residual flow to be maintained through release management: Post KNF Enhancements <ul style="list-style-type: none"> • 0.3 cumecs downstream of Lake Kaniere outlet • 0.4 cumecs at Ward Road Bridge • 0.2 cumecs below McKays weir Post MKY Enhancements <ul style="list-style-type: none"> • 0.2 cumecs downstream of Lake Kaniere outlet • 0.3 cumecs at McKays weir • 0.5 cumecs downstream of Kaniere Forks Station at McKays Ford. Minor adverse effects (KNF/MKY Enhancements) |
| Provision of the McKays Tunnel deviation | Well developed and stable Scheme envelope | No more than minor effect on natural character. | Rehabilitation and mitigation planting in accordance with <i>Revegetation Management Plan</i> . Offset environmental compensation habitat to be provided. Noting that the extent of such is to be considered in conjunction with other mitigation as a package. Effects post mitigation: Minor effects |
| Provision of a new race between Lake Kaniere and Wards Road HEPS – KNF Enhancements | Well developed and stable Scheme envelope | More than minor effect on natural character. | Rehabilitation and mitigation planting in accordance with <i>Revegetation Management Plan</i> . <ul style="list-style-type: none"> • Revegetation of existing Kaniere HEPS penstocks when decommissioned. • Enhanced amenity and picnic setting at 'The Landing'. • Kaniere HEPS decommissioned and retained as visitor recreation area. • Any new buildings should be built of materials (or painted in a way) that blends them back into the bush surroundings. Appropriate level of offset environmental compensation to be provided. Effects post mitigation: Minor effects |
| Existing envelope maintenance | Well developed and stable | Negligible | Weed monitoring and control protocol in consultation with DoC |

| Landscape: Description of Impact | Environment | Effect | Mitigation |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Scheme envelope | | Effects post mitigation: Minor positive effects |
| Archeology: Description of Impact | Environment | Effect | Mitigation |
| Loss of historic structure heritage feature for race from lake towards road. KNF Enhancements | Well developed and stable Scheme envelope under DoC ownership, and requires operation of scheme to maintain structural integrity. | More than minor (KNF enhancements) | <p>Surface upgrade and maintenance of HEPS and race in consultation with DoC and in accordance with accidental discovery protocol.</p> <p>Application to New Zealand Historic Places Trust for an archaeology authority.</p> <p>Formation of an archaeological management plan (for construction activities) (KNF enhancements only).</p> <p>Regular maintenance of retired race and avoidance of Ward Road race mans hut. Placement of historic interpretation panels at appropriate locations along the new and existing race.</p> <p>The following historic sites and features should be avoided where practicable:</p> <ul style="list-style-type: none"> • Race Man’s hut above Kaniere Road; • Remains of an earlier (pre 1926) weir at the lake outlet to Kaniere River; • Timber beams, planks and other heritage items downstream of the 1916 concrete weir at the Lake Kaniere outlet; and • The concrete and boulder foundation besides the McKays intake (refer Figure 42, Archaeological Assessment). <p>Historic features to be removed such as the Coal Creek flume should be photographed and recorded prior to removal.</p> <p>The 1931 McKays Creek Power Station should be preserved and adaptively reused if practicable</p> <p>Effects post mitigation: Minor effects</p> |

| Recreation: Description of Impact | Environment | Effect | Mitigation |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Maintenance and construction activities KNF enhancements</p> <p>Loss of historic structure heritage feature for race from lake to Wards road.</p> | <p>Well developed and stable Scheme envelope under DoC ownership.</p> | <p>More than minor impact</p> | <p>Surface upgrade and maintenance of HEPS and race in consultation with DoC.</p> <p>Provision of further dual purpose walkway/mountain biking route over large interconnecting tracts of the Kaniere race.</p> <p>Enhanced amenity and picnic setting at 'The Landing'.</p> <p>Kaniere HEPS decommissioned and retained as visitor recreation area.</p> <p>Effects post mitigation: No more than minor effects.</p> |
| <p>Changes to Lake levels and flows on boat users.</p> | <p>Water take beyond -0.2m on the staff gauge on Lake Kaniere would be adhered to. The only change would be a potential alteration to the way in which the Lake raises and falls</p> | <p>Discernable</p> | <p>N/A</p> <p>Effects post mitigation: Less than minor effects.</p> |